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Radio Resource Control (RRC);
Protocol specification
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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;
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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 E-UTRAN as well as for the radio interface between RN and E-UTRAN.

The scope of the present document also includes:

- the radio related information transported in a transparent container between source eNB and target eNB upon inter eNB handover;
- the radio related information transported in a transparent container between a source or target eNB and another system upon inter RAT handover.

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.

[3] 3GPP TS 36.302: “Evolved Universal Terrestrial Radio Access (E-UTRA); Services provided by the physical layer”.
[10] 3GPP TS 22.011: "Service accessibility".


3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management".

3GPP TS 25.101: "Universal Terrestrial Radio Access (UTRA); User Equipment (UE) radio transmission and reception (FDD)".

3GPP TS 25.102: "Universal Terrestrial Radio Access (UTRA); User Equipment (UE) radio transmission and reception (TDD)".

3GPP TS 25.331: "Universal Terrestrial Radio Access (UTRA); Radio Resource Control (RRC); Protocol specification".

3GPP TS 45.005: "Radio transmission and reception".

3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation".

3GPP TS 36.212: "Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and channel coding".

3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures".


3GPP2 C.S0024-C v2.0: "cdma2000 High Rate Packet Data Air Interface Specification".

3GPP TS 23.003: "Numbering, addressing and identification".

3GPP TS 45.008: "Radio subsystem link control".

3GPP TS 25.133: "Requirements for Support of Radio Resource Management (FDD)".

3GPP TS 25.123: "Requirements for Support of Radio Resource Management (TDD)".

3GPP TS 36.401: "Evolved Universal Terrestrial Radio Access (E-UTRA); Architecture description".

3GPP TS 33.401: "3GPP System Architecture Evolution (SAE); Security architecture".

3GPP2 A.S0008-C v4.0: "Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Radio Access Network Interfaces with Session Control in the Access Network"


3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

3GPP TS 44.060: "General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control/Medium Access Control (RLC/MAC) protocol".

3GPP TS 23.041: "Technical realization of Cell Broadcast Service (CBS)"

3GPP TS 23.038: "Alphabets and Language".
3GPP TS 36.313: "Evolved Universal Terrestrial Radio Access (E-UTRAN); S1 Application Protocol (S1 AP)".

3GPP TS 25.304: "Universal Terrestrial Radio Access (UTRAN); User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode".


3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".

3GPP TS 45.005: "GSM/EDGE Radio transmission and reception".

3GPP2 C.S0087-A v2.0: "E-UTRAN - cdma2000 HRPD Connectivity and Interworking Air Interface Specification"

3GPP TS 44.018: "Mobile radio interface layer 3 specification; Radio Resource Control (RRC) protocol".

3GPP TS 25.223: "Spreading and modulation (TDD)".

3GPP TS 36.104: "Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception".

3GPP TS 36.214: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer - Measurements".

3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core network protocols; Stage 3".

3GPP TS 45.010: "Radio subsystem synchronization".

3GPP TS 23.272: "Circuit Switched Fallback in Evolved Packet System; Stage 2".

3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".

3GPP2 C.S0097-0 v3.0: "E-UTRAN - cdma2000 1x Connectivity and Interworking Air Interface Specification".

3GPP TS 36.355: "LTE Positioning Protocol (LPP)".

3GPP TS 36.216: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer for relaying operation".

3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".

3GPP TS 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".

3GPP TS 22.368: "Service Requirements for Machine Type Communications; Stage 1".

3GPP TS 37.320: "Universal Terrestrial Radio Access (UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRA); Radio measurement collection for Minimization of Drive Tests (MDT); Overall description; Stage 2".

3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC); Stage 2".

3GPP TS 22.146: "Multimedia Broadcast/Multicast Service (MBMS); Stage 1".

3GPP TR 36.816: "Evolved Universal Terrestrial Radio Access (E-UTRA); Study on signalling and procedure for interference avoidance for in-device coexistence".

IS-GPS-200F: "Navstar GPS Space Segment/Navigation User Segment Interfaces".
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].

**Anchor carrier:** In NB-IoT, a carrier where the UE assumes that NPSS/NSSS/NPBCH/SIB-NB are transmitted.

**Bandwidth Reduced:** Refers to operation in downlink and uplink with a limited channel bandwidth of 6 PRBs.

**Cellular IoT EPS Optimisation:** Provides improved support of small data transfer, as defined in TS 24.301 [35].

**Commercial Mobile Alert System:** Public Warning System that delivers Warning Notifications provided by Warning Notification Providers to CMAS capable UEs.

**Common access barring parameters:** The common access barring parameters refer to the access class barring parameters that are broadcast in SystemInformationBlockType2 outside the list of PLMN specific parameters (i.e. in ac-BarringPerPLMN-List).

**Control plane CIoT EPS optimisation:** Enables support of efficient transport of user data (IP, non-IP or SMS) over control plane via the MME without triggering data radio bearer establishment, as defined in TS 24.301 [35].

**CSG member cell:** A cell broadcasting the identity of the selected PLMN, registered PLMN or equivalent PLMN and for which the CSG whitelist of the UE includes an entry comprising cell's CSG ID and the respective PLMN identity.
Dual Connectivity: A UE in RRC_CONNECTED is configured with Dual Connectivity when configured with a Master and a Secondary Cell Group.

EU-Alert: Public Warning System that delivers Warning Notifications provided by Warning Notification Providers using the same AS mechanisms as defined for CMAS.

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

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

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

Korean Public Alert System (KPAS): Public Warning System that delivers Warning Notifications provided by Warning Notification Providers using the same AS mechanisms as defined for CMAS.

Master Cell Group: For a UE not configured with DC, the MCG comprises all serving cells. For a UE configured with DC, the MCG concerns a subset of the serving cells comprising of the PCell and zero or more secondary cells.

MBMS service: MBMS bearer service as defined in TS 23.246 [56] (i.e. provided via an MRB or an SC-MRB).

NB-IoT: NB-IoT allows access to network services via E-UTRA with a channel bandwidth limited to 200 kHz.

NB-IoT UE: A UE that uses NB-IoT.

Non-anchor carrier: In NB-IoT, a carrier where the UE does not assume that NPSS/NSSS/NPBCH/SIB-NB are transmitted.

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

Primary Secondary Cell: The SCG cell in which the UE is instructed to perform random access when performing the SCG change procedure.

Primary Timing Advance Group: Timing Advance Group containing the PCell or the PSCell.

PUCCH SCell: An SCell configured with PUCCH.

Secondary Cell: A cell, operating on a secondary frequency, which may be configured once an RRC connection is established and which may be used to provide additional radio resources.

Secondary Cell Group: For a UE configured with DC, the subset of serving cells not part of the MCG, i.e. comprising of the PSCell and zero or more other secondary cells.

Secondary Timing Advance Group: Timing Advance Group neither containing the PCell nor the PSCell. A secondary timing advance group contains at least one cell with configured uplink.

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 one or more cells comprising of the primary cell and all secondary cells.

Sidelink: UE to UE interface for sidelink communication and sidelink discovery. The sidelink corresponds to the PC5 interface as defined in TS 23.303 [68].

Sidelink communication: AS functionality enabling ProSe Direct Communication as defined in TS 23.303 [68], between two or more nearby UEs, using E-UTRA technology but not traversing any network node.

Sidelink discovery: AS functionality enabling ProSe Direct Discovery as defined in TS 23.303 [68], using E-UTRA technology but not traversing any network node.

UE in CE: Refers to a UE that is capable of using coverage enhancement, and requires coverage enhancement mode to access a cell or is configured in a coverage enhancement mode

User plane CIoT EPS optimisation: Enables support for change from EMM-IDLE mode to EMM-CONNECTED mode without the need for using the Service Request procedure, as defined in TS 24.301 [35].
Timing Advance Group: A group of serving cells that is configured by RRC and that, for the cells with an UL configured, use the same timing reference cell and the same Timing Advance value. A Timing Advance Group only includes cells of the same cell group i.e. it either includes MCG cells or SCG cells.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1], TS 36.300 [9] 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] or TS 36.300 [9].

1xRTT CDMA2000 1x Radio Transmission Technology
AB Access Barring
ACDC Application specific Congestion control for Data Communication
ACK Acknowledgement
AM Acknowledged Mode
ANDSF Access Network Discovery and Selection Function
ARQ Automatic Repeat Request
AS Access Stratum
ASN.1 Abstract Syntax Notation One
BCCH Broadcast Control Channel
BCD Binary Coded Decimal
BCH Broadcast Channel
BL Bandwidth reduced Low complexity
BLER Block Error Rate
BR Bandwidth Reduced
BR-BCCH Bandwidth Reduced Broadcast Control Channel
CA Carrier Aggregation
CCCH Common Control Channel
CCO Cell Change Order
CE Coverage Enhancement
CG Cell Group
CIoT Cellular IoT
CMAS Commercial Mobile Alert Service
CP Control Plane
C-RNTI Cell RNTI
CRS Cell-specific Reference Signal
CSFB CS fallback
CSG Closed Subscriber Group
CSI Channel State Information
DC Dual Connectivity
DCCH Dedicated Control Channel
DCI Downlink Control Information
DFN Direct Frame Number
DL Downlink
DL-SCH Downlink Shared Channel
DRB (user) Data Radio Bearer
DRX Discontinuous Reception
DTCH Dedicated Traffic Channel
EAB Extended Access Barring
eDRX Extended DRX
E-UTRAN Evolved Universal Terrestrial Radio Access Network
E-UTRAN Evolved Universal Terrestrial Radio Access Network
E-UTRAN Evolved Universal Terrestrial Radio Access Network
FDD Frequency Division Duplex
FFS For Further Study
GERAN GSM/EDGE Radio Access Network
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNSS</td>
<td>Global Navigation Satellite System</td>
</tr>
<tr>
<td>G-RNTI</td>
<td>Group RNTI</td>
</tr>
<tr>
<td>GSM</td>
<td>Global System for Mobile Communications</td>
</tr>
<tr>
<td>HARQ</td>
<td>Hybrid Automatic Repeat Request</td>
</tr>
<tr>
<td>HFN</td>
<td>Hyper Frame Number</td>
</tr>
<tr>
<td>HPLMN</td>
<td>Home Public Land Mobile Network</td>
</tr>
<tr>
<td>HRPD</td>
<td>CDMA2000 High Rate Packet Data</td>
</tr>
<tr>
<td>H-SFN</td>
<td>Hyper SFN</td>
</tr>
<tr>
<td>IDC</td>
<td>In-Device Coexistence</td>
</tr>
<tr>
<td>IE</td>
<td>Information element</td>
</tr>
<tr>
<td>IMEI</td>
<td>International Mobile Equipment Identity</td>
</tr>
<tr>
<td>IMSI</td>
<td>International Mobile Subscriber Identity</td>
</tr>
<tr>
<td>IoT</td>
<td>Internet of Things</td>
</tr>
<tr>
<td>ISM</td>
<td>Industrial, Scientific and Medical</td>
</tr>
<tr>
<td>kB</td>
<td>Kilobyte (1000 bytes)</td>
</tr>
<tr>
<td>L1</td>
<td>Layer 1</td>
</tr>
<tr>
<td>L2</td>
<td>Layer 2</td>
</tr>
<tr>
<td>L3</td>
<td>Layer 3</td>
</tr>
<tr>
<td>LAA</td>
<td>Licensed-Assisted Access</td>
</tr>
<tr>
<td>LWA</td>
<td>LTE-WLAN Aggregation</td>
</tr>
<tr>
<td>LWAAP</td>
<td>LTE-WLAN Aggregation Adaptation Protocol</td>
</tr>
<tr>
<td>LWIP</td>
<td>LTE-WLAN Radio Level Integration with IPsec Tunnel</td>
</tr>
<tr>
<td>MAC</td>
<td>Medium Access Control</td>
</tr>
<tr>
<td>MBMS</td>
<td>Multimedia Broadcast Multicast Service</td>
</tr>
<tr>
<td>MBSFN</td>
<td>Multimedia Broadcast multicast service Single Frequency Network</td>
</tr>
<tr>
<td>MCG</td>
<td>Master Cell Group</td>
</tr>
<tr>
<td>MCPTT</td>
<td>Mission Critical Push To Talk</td>
</tr>
<tr>
<td>MDT</td>
<td>Minimization of Drive Tests</td>
</tr>
<tr>
<td>MIB</td>
<td>Master Information Block</td>
</tr>
<tr>
<td>MO</td>
<td>Mobile Originating</td>
</tr>
<tr>
<td>N/A</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>NACC</td>
<td>Network Assisted Cell Change</td>
</tr>
<tr>
<td>NAICS</td>
<td>Network Assisted Interference Cancellation/Suppression</td>
</tr>
<tr>
<td>NAS</td>
<td>Non Access Stratum</td>
</tr>
<tr>
<td>NB-IoT</td>
<td>NarrowBand Internet of Things</td>
</tr>
<tr>
<td>NPBCH</td>
<td>Narrowband Physical Broadcast channel</td>
</tr>
<tr>
<td>NPDCCH</td>
<td>Narrowband Physical Downlink Control channel</td>
</tr>
<tr>
<td>NPDSCCH</td>
<td>Narrowband Physical Downlink Shared channel</td>
</tr>
<tr>
<td>NPRACH</td>
<td>Narrowband Physical Random Access channel</td>
</tr>
<tr>
<td>NPSS</td>
<td>Narrowband Primary Synchronization Signal</td>
</tr>
<tr>
<td>NPUSCH</td>
<td>Narrowband Physical Uplink Shared channel</td>
</tr>
<tr>
<td>NRS</td>
<td>Narrowband Reference Signal</td>
</tr>
<tr>
<td>NSSS</td>
<td>Narrowband Secondary Synchronization Signal</td>
</tr>
<tr>
<td>PCCH</td>
<td>Paging Control Channel</td>
</tr>
<tr>
<td>PCell</td>
<td>Primary Cell</td>
</tr>
<tr>
<td>PDCCH</td>
<td>Physical Downlink Control Channel</td>
</tr>
<tr>
<td>PDCP</td>
<td>Packet Data Convergence Protocol</td>
</tr>
<tr>
<td>PDU</td>
<td>Protocol Data Unit</td>
</tr>
<tr>
<td>PLMN</td>
<td>Public Land Mobile Network</td>
</tr>
<tr>
<td>PMK</td>
<td>Pairwise Master Key</td>
</tr>
<tr>
<td>ProSe</td>
<td>Proximity based Services</td>
</tr>
<tr>
<td>PS</td>
<td>Public Safety (in context of sidelink), Packet Switched (otherwise)</td>
</tr>
<tr>
<td>PSCell</td>
<td>Primary Secondary Cell</td>
</tr>
<tr>
<td>PSK</td>
<td>Pre-Shared Key</td>
</tr>
<tr>
<td>PTAG</td>
<td>Primary Timing Advance Group</td>
</tr>
<tr>
<td>PUCCH</td>
<td>Physical Uplink Control Channel</td>
</tr>
<tr>
<td>QCI</td>
<td>QoS Class Identifier</td>
</tr>
<tr>
<td>Term</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>QoS</td>
<td>Quality of Service</td>
</tr>
<tr>
<td>RACH</td>
<td>Random Access CHannel</td>
</tr>
<tr>
<td>RAT</td>
<td>Radio Access Technology</td>
</tr>
<tr>
<td>RB</td>
<td>Radio Bearer</td>
</tr>
<tr>
<td>RCLWI</td>
<td>RAN Controlled LTE-WLAN Integration</td>
</tr>
<tr>
<td>RLC</td>
<td>Radio Link Control</td>
</tr>
<tr>
<td>RMTC</td>
<td>RSSI Measurement Timing Configuration</td>
</tr>
<tr>
<td>RN</td>
<td>Relay Node</td>
</tr>
<tr>
<td>RNTI</td>
<td>Radio Network Temporary Identifier</td>
</tr>
<tr>
<td>ROHC</td>
<td>ROBust Header Compression</td>
</tr>
<tr>
<td>RPLMN</td>
<td>Registered Public Land Mobile Network</td>
</tr>
<tr>
<td>RRC</td>
<td>Radio Resource Control</td>
</tr>
<tr>
<td>RSCP</td>
<td>Received Signal Code Power</td>
</tr>
<tr>
<td>RSRP</td>
<td>Reference Signal Received Power</td>
</tr>
<tr>
<td>RSRQ</td>
<td>Reference Signal Received Quality</td>
</tr>
<tr>
<td>RSSI</td>
<td>Received Signal Strength Indicator</td>
</tr>
<tr>
<td>SAE</td>
<td>System Architecture Evolution</td>
</tr>
<tr>
<td>SAP</td>
<td>Service Access Point</td>
</tr>
<tr>
<td>SC</td>
<td>Sidelink Control</td>
</tr>
<tr>
<td>SCell</td>
<td>Secondary Cell</td>
</tr>
<tr>
<td>SCG</td>
<td>Secondary Cell Group</td>
</tr>
<tr>
<td>SC-MRB</td>
<td>Single Cell MRB</td>
</tr>
<tr>
<td>SC-RNTI</td>
<td>Single Cell RNTI</td>
</tr>
<tr>
<td>SD-RSRP</td>
<td>Sidelink Discovery Reference Signal Received Power</td>
</tr>
<tr>
<td>SFN</td>
<td>System Frame Number</td>
</tr>
<tr>
<td>SI</td>
<td>System Information</td>
</tr>
<tr>
<td>SIB</td>
<td>System Information Block</td>
</tr>
<tr>
<td>SI-RNTI</td>
<td>System Information RNTI</td>
</tr>
<tr>
<td>SL</td>
<td>Sidelink</td>
</tr>
<tr>
<td>SLSS</td>
<td>Sidelink Synchronisation Signal</td>
</tr>
<tr>
<td>SMC</td>
<td>Security Mode Control</td>
</tr>
<tr>
<td>SPS</td>
<td>Semi-Persistent Scheduling</td>
</tr>
<tr>
<td>SR</td>
<td>Scheduling Request</td>
</tr>
<tr>
<td>SRB</td>
<td>Signalling Radio Bearer</td>
</tr>
<tr>
<td>S-RSRP</td>
<td>Sidelink Reference Signal Received Power</td>
</tr>
<tr>
<td>SSAC</td>
<td>Service Specific Access Control</td>
</tr>
<tr>
<td>SSTD</td>
<td>SFN and Subframe Timing Difference</td>
</tr>
<tr>
<td>STAG</td>
<td>Secondary Timing Advance Group</td>
</tr>
<tr>
<td>S-TMSI</td>
<td>SAE Temporary Mobile Station Identifier</td>
</tr>
<tr>
<td>TA</td>
<td>Tracking Area</td>
</tr>
<tr>
<td>TAG</td>
<td>Timing Advance Group</td>
</tr>
<tr>
<td>TDD</td>
<td>Time Division Duplex</td>
</tr>
<tr>
<td>TDM</td>
<td>Time Division Multiplexing</td>
</tr>
<tr>
<td>TM</td>
<td>Transparent Mode</td>
</tr>
<tr>
<td>TPC-RNTI</td>
<td>Transmit Power Control RNTI</td>
</tr>
<tr>
<td>T-RPT</td>
<td>Time Resource Pattern of Transmission</td>
</tr>
<tr>
<td>TTT</td>
<td>Time To Trigger</td>
</tr>
<tr>
<td>UE</td>
<td>User Equipment</td>
</tr>
<tr>
<td>UICC</td>
<td>Universal Integrated Circuit Card</td>
</tr>
<tr>
<td>UL</td>
<td>Uplink</td>
</tr>
<tr>
<td>UL-SCH</td>
<td>Uplink Shared Channel</td>
</tr>
<tr>
<td>UM</td>
<td>Unacknowledged Mode</td>
</tr>
<tr>
<td>UP</td>
<td>User Plane</td>
</tr>
<tr>
<td>UTC</td>
<td>Coordinated Universal Time</td>
</tr>
<tr>
<td>UTRAN</td>
<td>Universal Terrestrial Radio Access Network</td>
</tr>
<tr>
<td>VoLTE</td>
<td>Voice over Long Term Evolution</td>
</tr>
<tr>
<td>WLAN</td>
<td>Wireless Local Area Network</td>
</tr>
<tr>
<td>WT</td>
<td>WLAN Termination</td>
</tr>
</tbody>
</table>

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

In this specification, (parts of) procedures and messages specified for the UE equally apply to the RN for functionality necessary for the RN. There are also (parts of) procedures and messages which are only applicable to the RN in its communication with the E-UTRAN, in which case the specification denotes the RN instead of the UE. Such RN-specific aspects are not applicable to the UE.

NB-IoT is a non backward compatible variant of E-UTRAN supporting a reduced set of functionality. In this specification, (parts of) procedures and messages specified for the UE equally apply to the UE in NB-IoT. There are also some features and related procedures and messages that are not supported by UEs in NB-IoT.

In particular, the following features are not supported in NB-IoT and corresponding procedures and messages do not apply to the UE in NB-IoT:

- Connected mode mobility (Handover and measurement reporting);
- Inter-RAT cell reselection or inter-RAT mobility in connected mode;
- CSG;
- Relay Node (RN);
- Carrier Aggregation (CA);
- Dual connectivity (DC);
- GBR (QoS);
- ACB, EAB, SSAC and ACDC;
- MBMS;
- Self-configuration and self-optimisation;
- Measurement logging and reporting for network performance optimisation;
- Public warning systems e.g. CMAS, ETWS and PWS;
- Real time services (including emergency call);
- CS services and CS fallback;
- In-device coexistence;
- RAN assisted WLAN interworking;
- Network-assisted interference cancellation/suppression;
- Sidelink (including direct communication and direct discovery).

NOTE: In regard to mobility, NB-IoT is a separate RAT from E-UTRAN.

In this specification, there are also (parts of) procedures and messages which are only applicable to UEs in NB-IoT, in which case this is stated explicitly.

This specification is organised as follows:

- sub-clause 4.2 describes the RRC protocol model;
- sub-clause 4.3 specifies the services provided to upper layers as well as the services expected from lower layers;
- sub-clause 4.4 lists the RRC functions;
- clause 5 specifies RRC procedures, including UE state transitions;
- clause 6 specifies the RRC message in a mixed format (i.e. tabular & ASN.1 together);
- 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 the RRC messages transferred across network nodes;
- clause 11 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 in RRC_CONNECTED 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 (not applicable for NB-IoT);
  - UE controlled mobility;
  - The UE:
    - Monitors a Paging channel to detect incoming calls, system information change, for ETWS capable UEs, ETWS notification, and for CMAS capable UEs, CMAS notification;
    - Performs neighbouring cell measurements and cell (re-)selection;
    - Acquires system information.
    - Performs logging of available measurements together with location and time for logged measurement configured UEs.

- **RRC_CONNECTED**:
  - Transfer of unicast data to/from UE.
  - At lower layers, the UE may be configured with a UE specific DRX.
  - For UEs supporting CA, use of one or more SCells, aggregated with the PCell, for increased bandwidth;
  - For UEs supporting DC, use of one SCG, aggregated with the MCG, for increased bandwidth;
  - Network controlled mobility, i.e. handover and cell change order with optional network assistance (NACC) to GERAN (not applicable for NB-IoT);
  - The UE:
    - Monitors a Paging channel and/or System Information Block Type 1 contents to detect system information change, for ETWS capable UEs, ETWS notification, and for CMAS capable UEs, CMAS notification (not applicable for NB-IoT);
    - Monitors control channels associated with the shared data channel to determine if data is scheduled for it;
    - Provides channel quality and feedback information (not applicable for NB-IoT);
    - Performs neighbouring cell measurements and measurement reporting (not applicable for NB-IoT);
    - Acquires system information (not applicable for NB-IoT).

The following figure not only provides an overview of the RRC states in E-UTRA, but also illustrates the mobility support between E-UTRAN, UTRAN and GERAN.
Figure 4.2.1-1: E-UTRA states and inter RAT mobility procedures, 3GPP

The following figure illustrates the mobility support between E-UTRAN, CDMA2000 1xRTT and CDMA2000 HRPD. The details of the CDMA2000 state models are out of the scope of this specification.

Figure 4.2.1-2: Mobility procedures between E-UTRA and CDMA2000

The inter-RAT handover procedure(s) supports the case of signalling, conversational services, non-conversational services and combinations of these.

In addition to the state transitions shown in Figure 4.2.1-1 and Figure 4.2.1-2, there is support for connection release with redirection information from E-UTRA RRC_CONNECTED to GERAN, UTRAN and CDMA2000 (HRPD Idle/1xRTT Dormant mode).

For NB-IoT, mobility between E-UTRA and UTRAN, GERAN and between E-UTRA and CDMA2000 1xRTT and CDMA2000 HRPD is not supported and hence only the E-UTRA states depicted in Figure 4.2.1-1 are applicable.

4.2.2 Signalling radio bearers

“Signalling Radio Bearers” (SRBs) are defined as Radio Bearers (RB) 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;
- For NB-IoT, SRB1bis is for RRC messages (which may include a piggybacked NAS message) as well as for NAS messages prior to the activation of security, all using DCCH logical channel;
- SRB2 is for RRC messages which include logged measurement information as well as for NAS messages, all using DCCH logical channel. SRB2 has a lower-priority than SRB1 and is always configured by E-UTRAN after security activation. SRB2 is not applicable for NB-IoT.

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 NAS message piggybacking is used only for transferring the initial NAS message during connection setup.

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

Once security is activated, all RRC messages on SRB1 and SRB2, including those containing NAS or non-3GPP messages, are integrity protected and ciphered by PDCP. NAS independently applies integrity protection and ciphering to the NAS messages.

For a UE configured with DC, all RRC messages, regardless of the SRB used and both in downlink and uplink, are transferred via the MCG.

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 terminating call, for ETWS, for CMAS;
- Transfer of dedicated control information, i.e. information for one specific UE.

4.3.2 Services expected from lower layers

In brief, the following are the main services that RRC expects from lower layers:
- PDCP: integrity protection and ciphering;
- RLC: reliable and in-sequence transfer of information, without introducing duplicates and with support for segmentation and concatenation.

Further details about the services provided by Packet Data Convergence Protocol layer (e.g. integrity and ciphering) are provided in TS 36.323 [8]. The services provided by Radio Link Control layer (e.g. the RLC modes) are specified in TS 36.322 [7]. Further details about the services provided by Medium Access Control layer (e.g. the logical channels) are provided in TS 36.321 [6]. The services provided by physical layer (e.g. the transport channels) are specified in TS 36.302 [3].

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, 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 (not applicable for NB-IoT);
- RRC connection control:
  - Paging;
  - Establishment/ modification/ suspension / resumption / release of RRC connection, including e.g. assignment/ modification of UE identity (C-RNTI), establishment/ modification/ release of SRB1, SRB1bis and SRB2, access class barring;
  - Initial security activation, i.e. initial configuration of AS integrity protection (SRBs) and AS ciphering (SRBs, DRBs);
  - For RNs, configuration of AS integrity protection for DRBs;
  - RRC connection mobility including e.g. intra-frequency and inter-frequency handover, associated security handling, i.e. key/ algorithm change, specification of RRC context information transferred between network nodes;

NOTE 1: In NB-IoT, only key change (but no re-keying) at RRC Connection Resumption and RRC context information transfer are applicable.

- Establishment/ modification/ release of RBs carrying user data (DRBs);
- Radio configuration control including e.g. assignment/ modification of ARQ configuration, HARQ configuration, DRX configuration;
- For RNs, RN-specific radio configuration control for the radio interface between RN and E-UTRAN;
- In case of CA, cell management including e.g. change of PCell, addition/ modification/ release of SCell(s) and addition/modification/release of STAG(s);
- In case of DC, cell management including e.g. change of PSCell, addition/ modification/ release of SCG cell(s) and addition/modification/release of SCG TAG(s).
- QoS control including assignment/ modification of semi-persistent scheduling (SPS) configuration information for DL and UL, 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 (not applicable for NB-IoT);
- Recovery from radio link failure;
- In case of LWA, RCLWI and LWIP, WLAN mobility set management including e.g. addition/ modification/ release of WLAN(s) from the WLAN mobility set;
- Inter-RAT mobility including e.g. security activation, transfer of RRC context information (not applicable for NB-IoT);
- Measurement configuration and reporting (not applicable for NB-IoT):
  - Establishment/ modification/ release of measurements (e.g. intra-frequency, inter-frequency and inter- RAT measurements);
  - Setup and release of measurement gaps;
  - Measurement reporting;
- Other functions including e.g. transfer of dedicated NAS information and non-3GPP dedicated information, transfer of UE radio access capability information, support for E-UTRAN sharing (multiple PLMN identities);
- Generic protocol error handling;
- Support of self-configuration and self-optimisation (not applicable for NB-IoT);
- Support of measurement logging and reporting for network performance optimisation [60] (not applicable for NB-IoT);

NOTE 2: Random access is specified entirely in the MAC including initial transmission power estimation.
4.5 Data available for transmission for NB-IoT

For the purpose of MAC Data Volume and Power Headroom reporting, the NB-IoT UE shall consider the following as data available for transmission in the RRC layer:

- For SDUs to be submitted to lower layers:
  - the SDU itself, if the SDU has not yet been processed by RRC, or
  - the PDU if the SDU has been processed by RRC; or
- The data available for transmission in upper layers not submitted to the RRC layer.

5 Procedures

5.1 General

5.1.1 Introduction

The procedural requirements are structured according to the main functional areas: system information (5.2), connection control (5.3), inter-RAT mobility (5.4) and measurements (5.5). In addition sub-clause 5.6 covers other aspects e.g. NAS dedicated information transfer, UE capability transfer, sub-clause 5.7 specifies the generic error handling, sub-clause 5.8 covers MBMS, clause 5.8 cover SC-PTM (i.e. MBMS service reception via SC-MRB) sub-clause 5.9 covers RN-specific procedures and sub-clause 5.10 covers sidelink.

For NB-IoT, only a subset of the above procedural requirements applies: system information (5.2), connection control (5.3), some part of other aspects (5.6), and general error handling (5.7). Subclauses inter-RAT mobility (5.4), measurements (5.5), MBMS (5.8), RN procedures (5.9) and Sidelink (5.10) are not applicable in NB-IoT.

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 1: E-UTRAN may initiate a subsequent procedure prior to receiving the UE's response of a previously initiated procedure.

1> within a sub-clause execute the steps according to the order specified in the procedural description;

1> consider the term 'radio bearer' (RB) to cover SRBs and DRBs but not 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 E-UTRAN 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> upon handover to E-UTRA; or

1> upon receiving an RRCConnectionReconfiguration message including the fullConfig:
  2> apply the Conditions in the ASN.1 for inclusion of the fields for the DRB/PDCP/RLC setup during the reconfiguration of the DRBs included in the drb-ToAddModList;
NOTE 2: At each point in time, the UE keeps a single value for each field except for during handover when the UE temporarily stores the previous configuration so it can revert back upon handover failure. In other words: when the UE reconfigures a field, the existing value is released except for during handover.

NOTE 3: Although not explicitly stated, the UE initially considers all functionality to be deactivated/released until it is explicitly stated that the functionality is setup/activated. Correspondingly, the UE initially considers lists to be empty e.g. the list of radio bearers, the list of measurements.

1> upon receiving an extension field comprising the entries in addition to the ones carried by the original field (regardless of whether E-UTRAN may signal more entries in total); apply the following generic behaviour if explicitly stated to be applicable:

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;

NOTE 4: A field comprising a list of entries normally includes 'list' in the field name. The typical way to extend (the size of) such a list is to introduce a field comprising the additional entries, which should include 'listExt' in the name of the field/IE. E.g. field1List-RAT, field1ListExt-RAT.

5.2 System information

5.2.1 Introduction

5.2.1.1 General

System information is divided into the MasterInformationBlock (MIB) and a number of SystemInformationBlocks (SIBs). The MIB includes a limited number of most essential and most frequently transmitted parameters that are needed to acquire other information from the cell, and is transmitted on BCH. SIBs other than SystemInformationBlockType1 are carried in SystemInformation (SI) messages and mapping of SIBs to SI messages is flexibly configurable by schedulingInfoList included in SystemInformationBlockType1, with restrictions that: each SIB is contained only in a single SI message, and at most once in that message; only SIBs having the same scheduling requirement (periodicity) can be mapped to the same SI message; SystemInformationBlockType2 is always mapped to the SI message that corresponds to the first entry in the list of SI messages in schedulingInfoList. There may be multiple SI messages transmitted with the same periodicity. SystemInformationBlockType1 and all SI messages are transmitted on DL-SCH.

The Bandwidth reduced Low Complexity (BL) UEs and UEs in Coverage Enhancement (CE) apply Bandwidth Reduced (BR) version of the SIB or SI messages. A UE considers itself in enhanced coverage as specified in TS 36.304 [4]. In this and subsequent clauses, anything applicable for a particular SIB or SI message equally applies to the corresponding BR version unless explicitly stated otherwise.

For NB-IoT, a reduced set of system information block with similar functionality but different content is defined; the UE applies the NB-IoT (NB) version of the MIB and the SIBs. These are denoted MasterInformationBlock-NB and SystemInformationBlockTypeX-NB in this specification. All other system information blocks (without NB suffix) are not applicable to NB-IoT; this is not further stated in the corresponding text.

NOTE 1: The physical layer imposes a limit to the maximum size a SIB can take. When DCI format 1C is used the maximum allowed by the physical layer is 1736 bits (217 bytes) while for format 1A the limit is 2216 bits (277 bytes), see TS 36.212 [22] and TS 36.213 [23]. For BL UEs and UEs in CE, the maximum SIB and SI message size is 936 bits, see TS 36.213 [23]. For NB-IoT, the maximum SIB and SI message size is 680 bits, see TS 36.213 [23].

In addition to broadcasting, E-UTRAN may provide SystemInformationBlockType1, including the same parameter values, via dedicated signalling i.e., within an RRCConnectionReconfiguration message.

The UE applies the system information acquisition and change monitoring procedures for the PCell, except when being a BL UE or a UE in CE or a NB-IoT UE in RRC_CONNECTED mode while T311 is not running. For an SCell, E-UTRAN provides, via dedicated signalling, all system information relevant for operation in RRC_CONNECTED when adding the SCell. However, a UE that is configured with DC shall acquire the MasterInformationBlock of the PSCell but use it only to determine the SFN timing of the SCG, which may be different from the MCG. Upon change of the
relevant system information of a configured SCell, E-UTRAN releases and subsequently adds the concerned SCell, which may be done with a single RRCConnectionReconfiguration message. If the UE is receiving or interested to receive an MBMS service in a cell, the UE shall apply the system information acquisition and change monitoring procedure to acquire parameters relevant for MBMS operation and apply the parameters acquired from system information only for MBMS operation for this cell.

NOTE 2: E-UTRAN may configure via dedicated signalling different parameter values than the ones broadcast in the concerned SCell.

An RN configured with an RN subframe configuration does not need to apply the system information acquisition and change monitoring procedures. Upon change of any system information relevant to an RN, E-UTRAN provides the system information blocks containing the relevant system information to an RN configured with an RN subframe configuration via dedicated signalling using the RNRerconfiguration message. For RNs configured with an RN subframe configuration, the system information contained in this dedicated signalling replaces any corresponding stored system information and takes precedence over any corresponding system information acquired through the system information acquisition procedure. The dedicated system information remains valid until overridden.

NOTE 3: E-UTRAN may configure an RN, via dedicated signalling, with different parameter values than the ones broadcast in the concerned cell.

5.2.1.2 Scheduling

The MIB uses a fixed schedule with a periodicity of 40 ms and repetitions made within 40 ms. The first transmission of the MIB is scheduled in subframe #0 of radio frames for which the SFN mod 4 = 0, and repetitions are scheduled in subframe #0 of all other radio frames. For TDD/FDD system with a bandwidth larger than 1.4 MHz that supports BL UEs or UEs in CE, MIB transmission may additionally be repeated in subframe#0 of the same radio frame, and in subframe#5 of the previous radio frame for FDD and subframe #5 of the same radio frame for TDD.

NOTE: The UE may assume the scheduling of MIB repetitions does not change.

For BL UEs or UEs in CE, MIB is applied which may be provided with additional repetitions, while for SIB1 and further SI messages, separate messages are used which are scheduled independently and with content that may differ. The separate instance of SIB1 is named as SystemInformationBlockType1-BR. The SystemInformationBlockType1-BR uses a schedule with a periodicity of 80ms. TBS for SystemInformationBlockType1-BR and the repetitions made within 80ms are indicated via schedulingInfoSIB1-BR in MIB.

The SI messages are transmitted within periodically occurring time domain windows (referred to as SI-windows) using dynamic scheduling. Each SI message is associated with a SI-window and the SI-windows of different SI messages do not overlap. That is, within one SI-window only the corresponding SI is transmitted. The length of the SI-window is common for all SI messages, and is configurable. Within the SI-window, the corresponding SI message can be transmitted a number of times in any subframe other than MBSFN subframes, uplink subframes in TDD, and subframe #5 of radio frames for which SFN mod 2 = 0. The UE acquires the detailed time-domain scheduling (and other information, e.g. frequency-domain scheduling, used transport format) from decoding SI-RNTI on PDCCH (see TS 36.321 [6]). For a BL UE or a UE in CE, the detailed time/frequency domain scheduling information for the SI messages is provided in SystemInformationBlockType1-BR.

For UEs other than BL UE or UEs in CE SI-RNTI is used to address SystemInformationBlockType1 as well as all SI messages.

SystemInformationBlockType1 configures the SI-window length and the transmission periodicity for the SI messages.

5.2.1.2a Scheduling for NB-IoT

The MasterInformationBlock-NB (MIB-NB) uses a fixed schedule with a periodicity of 640 ms and repetitions made within 640 ms. The first transmission of the MIB-NB is scheduled in subframe #0 of radio frames for which the SFN mod 64 = 0 and repetitions are scheduled in subframe #0 of all other radio frames. The transmissions are arranged in 8 independently decodable blocks of 80 ms duration.

The SystemInformationBlockType1-NB (SIB1-NB) uses a fixed schedule with a periodicity of 2560 ms. SIB1-NB transmission occurs in subframe #4 of every other frame in 16 continuous frames. The starting frame for the first
transmission of the SIB1-NB is derived from the cell PCID and the number of repetitions within the 2560 ms period and repetitions are made, equally spaced, within the 2560 ms period (see TS 36.213 [23]). TBS for SystemInformationBlockType1-NB and the repetitions made within the 2560 ms are indicated by schedulingInfoSIB1 field in the MIB-NB.

The SI messages are transmitted within periodically occurring time domain windows (referred to as SI-windows) using scheduling information provided in SystemInformationBlockType1-NB. Each SI message is associated with a SI-window and the SI-windows of different SI messages do not overlap. That is, within one SI-window only the corresponding SI is transmitted. The length of the SI-window is common for all SI messages, and is configurable.

Within the SI-window, the corresponding SI message can be transmitted a number of times over 2 or 8 consecutive NB-IoT downlink subframes depending on TBS. The UE acquires the detailed time/frequency domain scheduling information and other information, e.g. used transport format for the SI messages from schedulingInfoList field in SystemInformationBlockType1-NB. The UE is not required to accumulate several SI messages in parallel but may need to accumulate a SI message across multiple SI windows, depending on coverage condition.

SystemInformationBlockType1-NB configures the SI-window length and the transmission periodicity for all SI messages.

5.2.1.3 System information validity and notification of changes

Change of system information (other than for ETWS, CMAS and EAB parameters and other than for AB parameters for NB-IoT) only occurs at specific radio frames, i.e. the concept of a modification period is used. System information may be transmitted a number of times with the same content within a modification period, as defined by its scheduling. 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 SystemInformationBlockType1-BR, modification period boundaries for BL UEs and UEs in CE are defined by SFN values for which (H-SFN * 1024 + SFN) mod m = 0. For NB-IoT, H-SFN is always provided and the modification period boundaries are defined by SFN values for which (H-SFN * 1024 + SFN) mod m = 0.

To enable system information update notification for RRC_IDLE UEs configured to use a DRX 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 256 = 0. For NB-IoT, the boundaries of the eDRX acquisition period are determined by H-SFN values for which H-SFN mod 1024 = 0.

When the network changes (some of the) system information, it first notifies the UEs about this change, i.e. this may be done throughout a modification period. In the next modification period, the network transmits the updated system information. These general principles are illustrated in figure 5.2.1.3-1, in which different colours indicate different system information. Upon receiving a change notification, the UE not configured to use a DRX cycle that is longer than the modification period acquires the new system information immediately from the start of the next modification period. Upon receiving a change notification applicable to eDRX, a UE in RRC_IDLE configured to use a DRX cycle that is longer than the modification period acquires the updated system information immediately from the start of the next eDRX acquisition period. The UE applies the previously acquired system information until the UE acquires the new system information. The possible boundaries of modification for SystemInformationBlockType1-BR are defined by SFN values for which SFN mod 512 = 0 except for notification of ETWS/CMAS for which the eNB may change SystemInformationBlockType1-BR content at any time. For NB-IoT, the possible boundaries of modification for SystemInformationBlockType1-NB are defined by SFN values for which (H-SFN * 1024 + SFN) mod 4096 = 0.

![Figure 5.2.1.3-1: Change of system Information](image)

The Paging message is used to inform UEs in RRC_IDLE and UEs in RRC_CONNECTED about a system information change. If the UE is in RRC_CONNECTED or is not configured to use a DRX cycle longer than the modification period in RRC_IDLE, and receives a Paging message including the systemInfoModification, it knows that the system information will change at the next modification period boundary. A UE in RRC_IDLE that is configured to use a DRX...
cycle longer than the modification period, and receives in an eDRX acquisition period at least one Paging message including the systemInfoModification-eDRX, shall acquire the updated system information at the next eDRX acquisition period boundary. Although the UE may be informed about changes in system information, no further details are provided e.g. regarding which system information will change, except if systemInfoValueTagSI is received by BL UEs or UEs in CE.

In RRC_CONNECTED, BL UEs or UEs in CE or NB-IoT UEs are not required to acquire system information except when T311 is running or upon handover where the UE is only required to acquire the MasterInformationBlock in the target PCell. In RRC_IDLE, E-UTRAN may notify BL UEs or UEs in CE or NB-IoT UEs about SI update, and except for NB-IoT, ETWS and CMAS notification and EAB modification, using Direct Indication information, as specified in 6.6 (or 6.7.5 in NB-IoT) and TS 36.212 [22].

NOTE: Upon system information change essential for BL UEs, UEs in CE, or NB-IoT UEs in RRC_CONNECTED, E-UTRAN may initiate connection release.

SystemInformationBlockType1 (or MasterInformationBlock-NB in NB-IoT) includes a value tag systemInfoValueTag, that indicates if a change has occurred in the SI messages. UEs may use systemInfoValueTag, e.g. upon return from out of coverage, to verify if the previously stored SI messages are still valid. Additionally, for other than BL UEs or UEs in CE or NB-IoT UEs, the UE considers stored system information to be invalid after 3 hours from the moment it was successfully confirmed as valid, unless specified otherwise. BL UE or UE in CE considers stored system information to be invalid after 24 hours from the moment it was successfully confirmed as valid, unless the UE is configured by parameter si-ValidityTime to consider stored system information to be invalid 3 hours after validity confirmation. NB-IoT UE considers stored system information to be invalid after 24 hours from the moment it was successfully confirmed as valid. If a BL UE, UE in CE or NB-IoT UE in RRC_CONNECTED state considers the stored system information invalid, the UE shall continue using the stored system information while in RRC_CONNECTED state in the serving cell.

For BL UEs or UEs in CE or NB-IoT UEs, the change of specific SI message can additionally be indicated by a SI message specific value tag systemInfoValueTagSI. If systemInfoValueTag included in the SystemInformationBlockType1-BR (or MasterInformationBlock-NB in NB-IoT) is different from the one of the stored system information and if systemInfoValueTagSI is included in the SystemInformationBlockType1-BR (or SystemInformationBlockType1-NB in NB-IoT) for a specific SI message and is different from the stored one, the UE shall consider this specific SI message to be invalid. If only systemInfoValueTag is included and is different from the stored one, the BL UE or UE in CE should consider any stored system information except SystemInformationBlockType10, SystemInformationBlockType11, SystemInformationBlockType12 and SystemInformationBlockType14 to be invalid; the NB-IoT UE should consider any stored system information except SystemInformationBlockType14-NB to be invalid.

E-UTRAN may not update systemInfoValueTag upon change of some system information e.g. ETWS information, CMAS information, regularly changing parameters like time information (SystemInformationBlockType8, SystemInformationBlockType16, hyperSFN-MSB in SystemInformationBlockType1-NB), EAB and AB parameters. Similarly, E-UTRAN may not include the systemInfoModification within the Paging message upon change of some system information.

The UE that is not configured to use a DRX cycle longer than the modification period verifies that stored system information remains valid by either checking systemInfoValueTag in SystemInformationBlockType1 (or MasterInformationBlock-NB in NB-IoT) after the modification period boundary, or attempting to find the systemInfoModification indication at least modificationPeriodCoeff times during the modification period in case no paging is received, in every modification period. If no paging message is received by the UE during a modification period, the UE may assume that no change of system information will occur at the next modification period boundary. If UE in RRC_CONNECTED, during a modification period, receives one paging message, it may deduce from the presence/ absence of systemInfoModification whether a change of system information other than ETWS information, CMAS information and EAB parameters will occur in the next modification period or not.

When the RRC_IDLE UE is configured with a DRX cycle that is longer than the modification period, and at least one modification period boundary has passed since the UE last verified validity of stored system information, the UE verifies that stored system information remains valid by checking the systemInfoValueTag before establishing or resuming an RRC connection.

ETWS and/or CMAS capable UEs in RRC_CONNECTED, other than BL UEs and UEs in CE, shall attempt to read paging at least once every defaultPagingCycle to check whether ETWS and/or CMAS notification is present or not.
5.2.1.4 Indication of ETWS notification

ETWS primary notification and/or ETWS secondary notification can occur at any point in time. The Paging message is used to inform ETWS capable UEs in RRC_IDLE and UEs in RRC_CONNECTED about presence of an ETWS primary notification and/or ETWS secondary notification. If the UE receives a Paging message including the etws-Indication, it shall start receiving the ETWS primary notification and/or ETWS secondary notification according to schedulingInfoList contained in SystemInformationBlockType1. If the UE receives Paging message including the etws-Indication while it is acquiring ETWS notification(s), the UE shall continue acquiring ETWS notification(s) based on the previously acquired schedulingInfoList until it re-acquires schedulingInfoList in SystemInformationBlockType1.

NOTE: The UE is not required to periodically check schedulingInfoList contained in SystemInformationBlockType1, but Paging message including the etws-Indication triggers the UE to re-acquire schedulingInfoList contained in SystemInformationBlockType1 for scheduling changes for SystemInformationBlockType10 and SystemInformationBlockType11. The UE may or may not receive a Paging message including the etws-Indication and/or systemInfoModification when ETWS is no longer scheduled.

ETWS primary notification is contained in SystemInformationBlockType10 and ETWS secondary notification is contained in SystemInformationBlockType11. Segmentation can be applied for the delivery of a secondary notification. The segmentation is fixed for transmission of a given secondary notification within a cell (i.e. the same segment size for a given segment with the same messageIdentifier, serialNumber and warningMessageSegmentNumber). An ETWS secondary notification corresponds to a single CB data IE as defined according to TS 23.041 [37].

5.2.1.5 Indication of CMAS notification

CMAS notification can occur at any point in time. The Paging message is used to inform CMAS capable UEs in RRC_IDLE and UEs in RRC_CONNECTED about presence of one or more CMAS notifications. If the UE receives a Paging message including the cmas-Indication, it shall start receiving the CMAS notifications according to schedulingInfoList contained in SystemInformationBlockType1. If the UE receives Paging message including the cmas-Indication while it is acquiring CMAS notification(s), the UE shall continue acquiring CMAS notification(s) based on the previously acquired schedulingInfoList until it re-acquires schedulingInfoList in SystemInformationBlockType1.

NOTE: The UE is not required to periodically check schedulingInfoList contained in SystemInformationBlockType1, but Paging message including the cmas-Indication triggers the UE to re-acquire schedulingInfoList contained in SystemInformationBlockType1 for scheduling changes for SystemInformationBlockType12. The UE may or may not receive a Paging message including the cmas-Indication and/or systemInfoModification when SystemInformationBlockType12 is no longer scheduled.

CMAS notification is contained in SystemInformationBlockType12. Segmentation can be applied for the delivery of a CMAS notification. The segmentation is fixed for transmission of a given CMAS notification within a cell (i.e. the same segment size for a given segment with the same messageIdentifier, serialNumber and warningMessageSegmentNumber). E-UTRAN does not interleave transmissions of CMAS notifications, i.e. all segments of a given CMAS notification transmission are transmitted prior to those of another CMAS notification. A CMAS notification corresponds to a single CB data IE as defined according to TS 23.041 [37].

5.2.1.6 Notification of EAB parameters change

Change of EAB parameters can occur at any point in time. The EAB parameters are contained in SystemInformationBlockType14. The Paging message is used to inform EAB capable UEs in RRC_IDLE about a change of EAB parameters or that SystemInformationBlockType14 is no longer scheduled. If the UE receives a Paging message including the eab-ParamModification, it shall acquire SystemInformationBlockType14 according to schedulingInfoList contained in SystemInformationBlockType1. If the UE receives a Paging message including the eab-ParamModification while it is acquiring SystemInformationBlockType14, the UE shall continue acquiring SystemInformationBlockType14 based on the previously acquired schedulingInfoList until it re-acquires schedulingInfoList in SystemInformationBlockType1.

NOTE: The EAB capable UE is not expected to periodically check schedulingInfoList contained in SystemInformationBlockType1.

5.2.1.7 Access Barring parameters change in NB-IoT

Change of Access Barring (AB) parameters can occur at any point in time. The AB parameters are contained in SystemInformationBlockType14-NB. Update of the AB parameters does not impact the systemInfoValueTag in the MasterInformationBlock-NB or the systemInfoValueTagSI in SystemInformationBlockType1-NB.
A NB-IoT UE checks *ab-Enabled* indication in the MasterInformationBlock-NB to know whether access barring is enabled. If access barring is enabled the UE shall not initiate the RRC connection establishment / resume for all access causes except mobile terminating calls until the UE has a valid version of SystemInformationBlockType14-NB.

### 5.2.2 System information acquisition

#### 5.2.2.1 General

![Diagram](image)

**Figure 5.2.2.1-1: System information acquisition, normal**

The UE applies the system information acquisition procedure to acquire the AS- and NAS- system information that is broadcasted by the E-UTRAN. The procedure applies to UEs in RRC_IDLE and UEs in RRC_CONNECTED.

For BL UE, UE in CE and NB-IoT UE, specific conditions apply, as specified below.

#### 5.2.2.2 Initiation

The UE shall apply the system information acquisition procedure upon selecting (e.g. upon power on) and upon re-selecting a cell, after handover completion, after entering E-UTRA from another RAT, upon return from out of coverage, upon receiving a notification that the system information has changed, upon receiving an indication about the presence of an ETWS notification, upon receiving an indication about the presence of a CMAS notification, upon receiving a notification that the EAB parameters have changed, upon receiving a request from CDMA2000 upper layers and upon exceeding the maximum validity duration. Unless explicitly stated otherwise in the procedural specification, the system information acquisition procedure overwrites any stored system information, i.e. delta configuration is not applicable for system information and the UE discontinues using a field if it is absent in system information unless explicitly specified otherwise.

In RRC_CONNECTED, BL UEs and UEs in CE are required to acquire system information when T311 is running or upon handover where the UE is only required to acquire the MasterInformationBlock in the target PCell.

**NOTE:** Upon handover, E-UTRAN provides system information required by the UE in RRC_CONNECTED except MIB with RRC signalling, i.e. systemInformationBlockType1Dedicated and mobilityControlInfo.

#### 5.2.2.3 System information required by the UE

The UE shall:

1> ensure having a valid version, as defined below, of (at least) the following system information, also referred to as the 'required' system information:

2> if in RRC_IDLE:

3> if the UE is a NB-IoT UE:

4> the MasterInformationBlock-NB and SystemInformationBlockType1-NB as well as SystemInformationBlockType2-NB through SystemInformationBlockType5-NB;

3> else:

4> the MasterInformationBlock and SystemInformationBlockType1 (or SystemInformationBlockType1-BR depending on whether the UE is a BL UE or the UE in CE) as well as SystemInformationBlockType2
through SystemInformationBlockType8 (depending on support of the concerned RATs), SystemInformationBlockType17 (depending on support of RAN-assisted WLAN interworking);

2> if in RRC_CONNECTED; and
2> the UE is not a BL UE; and
2> the UE is not in CE; and
2> the UE is not a NB-IoT UE:

3> the MasterInformationBlock, SystemInformationBlockType1 and SystemInformationBlockType2 as well as SystemInformationBlockType8 (depending on support of CDMA2000), SystemInformationBlockType17 (depending on support of RAN-assisted WLAN interworking);

2> if in RRC_CONNECTED and T311 is running; and
2> the UE is a BL UE or the UE is in CE or the UE is a NB-IoT UE;

3> the MasterInformationBlock (or MasterInformationBlock-NB in NB-IoT), SystemInformationBlockType1-BR (or SystemInformationBlockType1-NB in NB-IoT) and SystemInformationBlockType2 (or SystemInformationBlockType2-NB in NB-IoT);

1> delete any stored system information after 3 hours or 24 hours from the moment it was confirmed to be valid as defined in 5.2.1.3, unless specified otherwise;

1> consider any stored system information except SystemInformationBlockType10, SystemInformationBlockType11, SystemInformationBlockType12 and SystemInformationBlockType14 (systemInformationBlockType14-NB in NB-IoT) to be invalid if systemInfoValueTag included in the SystemInformationBlockType1 (MasterInformationBlock-NB in NB-IoT) is different from the one of the stored system information and in case of NB-IoT UEs, BL UEs and UEs in CE, systemInfoValueTagSI is not broadcasted. Otherwise consider system information validity as defined in 5.2.1.3;

5.2.2.4 System information acquisition by the UE

The UE shall:

1> apply the specified BCCH configuration defined in 9.1.1.1 or BR-BCCH configuration defined in 9.1.1.8;

1> if the procedure is triggered by a system information change notification:

2> if the UE uses an idle DRX cycle longer than the modification period:

3> start acquiring the required system information, as defined in 5.2.2.3, from the next eDRX acquisition period boundary;

2> else

3> start acquiring the required system information, as defined in 5.2.2.3, from the beginning of the modification period following the one in which the change notification was received;

NOTE 1: The UE continues using the previously received system information until the new system information has been acquired.

1> if the UE is in RRC_IDLE and enters a cell for which the UE does not have stored a valid version of the system information required in RRC_IDLE, as defined in 5.2.2.3:

2> acquire, using the system information acquisition procedure as defined in 5.2.3, the system information required in RRC_IDLE, as defined in 5.2.2.3;

1> following successful handover completion to a PCell for which the UE does not have stored a valid version of the system information required in RRC_CONNECTED, as defined in 5.2.2.3:

2> acquire, using the system information acquisition procedure as defined in 5.2.3, the system information required in RRC_CONNECTED, as defined in 5.2.2.3;

2> upon acquiring the concerned system information:
3> discard the corresponding radio resource configuration information included in the radioResourceConfigCommon previously received in a dedicated message, if any;

1> following a request from CDMA2000 upper layers:

2> acquire SystemInformationBlockType8, as defined in 5.2.3;

1> neither initiate the RRC connection establishment/resume procedure nor initiate transmission of the RRCConnectionReestablishmentRequest message until the UE has a valid version of the MasterInformationBlock (MasterInformationBlock-NB in NB-IoT) and SystemInformationBlockType1 (SystemInformationBlockType1-NB in NB-IoT) messages as well as SystemInformationBlockType2 (SystemInformationBlockType2-NB in NB-IoT);

1> not initiate the RRC connection establishment/resume procedure subject to EAB until the UE has a valid version of SystemInformationBlockType14, if broadcast;

1> if the UE is ETWS capable:

2> upon entering a cell during RRC_IDLE, following successful handover or upon connection re-establishment:

3> discard any previously buffered warningMessageSegment;

3> clear, if any, the current values of messageIdentifier and serialNumber for SystemInformationBlockType11;

2> when the UE acquires SystemInformationBlockType1 following ETWS indication, upon entering a cell during RRC_IDLE, following successful handover or upon connection re-establishment:

3> if schedulingInfoList indicates that SystemInformationBlockType10 is present:

4> if the UE is in CE:

5> start acquiring SystemInformationBlockType10;

4> else

5> start acquiring SystemInformationBlockType10 immediately;

3> if schedulingInfoList indicates that SystemInformationBlockType11 is present:

4> start acquiring SystemInformationBlockType11 immediately;

NOTE 2: UEs shall start acquiring SystemInformationBlockType10 and SystemInformationBlockType11 as described above even when systemInfoValueTag in SystemInformationBlockType1 has not changed.

1> if the UE is CMAS capable:

2> upon entering a cell during RRC_IDLE, following successful handover or upon connection re-establishment:

3> discard any previously buffered warningMessageSegment;

3> clear, if any, stored values of messageIdentifier and serialNumber for SystemInformationBlockType12 associated with the discarded warningMessageSegment;

2> when the UE acquires SystemInformationBlockType1 following CMAS indication, upon entering a cell during RRC_IDLE, following successful handover and upon connection re-establishment:

3> if schedulingInfoList indicates that SystemInformationBlockType12 is present:

4> acquire SystemInformationBlockType12;

NOTE 3: UEs shall start acquiring SystemInformationBlockType12 as described above even when systemInfoValueTag in SystemInformationBlockType1 has not changed.

1> if the UE is interested to receive MBMS services:

2> if the UE is capable of MBMS reception as specified in 5.8:
3> if schedulingInfoList indicates that SystemInformationBlockType13 is present and the UE does not have stored a valid version of this system information block:

4> acquire SystemInformationBlockType13;

2> if the UE is capable of SC-PTM reception as specified in 5.8a:

3> if schedulingInfoList indicates that SystemInformationBlockType20 is present and the UE does not have stored a valid version of this system information block:

4> acquire SystemInformationBlockType20;

2> if the UE is capable of MBMS Service Continuity:

3> if schedulingInfoList indicates that SystemInformationBlockType15 is present and the UE does not have stored a valid version of this system information block:

4> acquire SystemInformationBlockType15;

1> if the UE is EAB capable:

2> when the UE does not have stored a valid version of SystemInformationBlockType14 upon entering RRC_IDLE, or when the UE acquires SystemInformationBlockType1 following EAB parameters change notification, or upon entering a cell during RRC_IDLE, or before establishing an RRC connection if using eDRX with DRX cycle longer than the modification period:

3> if schedulingInfoList indicates that SystemInformationBlockType14 is present:

4> start acquiring SystemInformationBlockType14 immediately;

3> else:

4> discard SystemInformationBlockType14, if previously received;

NOTE 4: EAB capable UEs start acquiring SystemInformationBlockType14 as described above even when systemInfoValueTag in SystemInformationBlockType1 has not changed.

NOTE 5: EAB capable UEs maintain an up to date SystemInformationBlockType14 in RRC_IDLE.

1> if the UE is capable of sidelink communication and is configured by upper layers to receive or transmit sidelink communication:

2> if the cell used for sidelink communication meets the S-criteria as defined in TS 36.304 [4]; and

2> if schedulingInfoList indicates that SystemInformationBlockType18 is present and the UE does not have stored a valid version of this system information block:

3> acquire SystemInformationBlockType18;

1> if the UE is capable of sidelink discovery and is configured by upper layers to receive or transmit sidelink discovery announcements on the primary frequency:

2> if schedulingInfoList of the serving cell/ PCell indicates that SystemInformationBlockType19 is present and the UE does not have stored a valid version of this system information block:

3> acquire SystemInformationBlockType19;

1> if the UE is capable of sidelink discovery and, for each of the one or more frequencies included in discInterFREQList, if included in SystemInformationBlockType19 and for which the UE is configured by upper layers to receive sidelink discovery announcements on:

2> if SystemInformationBlockType19 of the serving cell/ PCell does not provide the corresponding reception resources; and

2> if schedulingInfoList of the cell on the concerned frequency indicates that SystemInformationBlockType19 is present and the UE does not have stored a valid version of this system information block:

3> acquire SystemInformationBlockType19;
1> if the UE is capable of sidelink discovery and, for each of the one or more frequencies included in discInterFreqList, if included in SystemInformationBlockType19 and for which the UE is configured by upper layers to transmit sidelink discovery announcements on:

2> if SystemInformationBlockType19 of the serving cell/ PCell includes discTxResourcesInterFreq which is set to acquireSI-FromCarrier, and

2> if schedulingInfoList of the cell on the concerned frequency indicates that SystemInformationBlockType19 is present and the UE does not have stored a valid version of this system information block:

3> acquire SystemInformationBlockType19;

1> if the UE is a NB-IoT UE and if ab-Enabled included in MasterInformationBlock-NB is set to TRUE:

2> not initiate the RRC connection establishment/resume procedure for all access causes except mobile terminating calls until the UE has acquired the SystemInformationBlockType14-NB;

The UE may apply the received SIBs immediately, i.e. the UE does not need to delay using a SIB until all SI messages have been received. The UE may delay applying the received SIBs until completing lower layer procedures associated with a received or a UE originated RRC message, e.g. an ongoing random access procedure.

NOTE 6: While attempting to acquire a particular SIB, if the UE detects from schedulingInfoList that it is no longer present, the UE should stop trying to acquire the particular SIB.

5.2.2.5 Essential system information missing

The UE shall:

1> if in RRC_IDLE or in RRC_CONNECTED while T311 is running:

2> if the UE is unable to acquire the MasterInformationBlock (MasterInformationBlock-NB in NB-IoT); or

2> if the UE is neither a BL UE nor in CE nor in NB-IoT and the UE is unable to acquire the SystemInformationBlockType1; or

2> if the BL UE or UE in CE is unable to acquire SystemInformationBlockType1-BR or SystemInformationBlockType1-BR is not scheduled; or

2> if the NB-IoT UE is unable to acquire the SystemInformationBlockType1-NB:

3> consider the cell as barred in accordance with TS 36.304 [4]; and

3> perform barring as if intraFreqReselection is set to allowed, and as if the csg-Indication is set to FALSE;

2> else if the UE is unable to acquire the SystemInformationBlockType2 (or SystemInformationBlockType2-NB in NB-IoT):

3> treat the cell as barred in accordance with TS 36.304 [4];

5.2.2.6 Actions upon reception of the MasterInformationBlock message

Upon receiving the MasterInformationBlock message the UE shall:

1> apply the radio resource configuration included in the phich-Config;

1> if the UE is in RRC_IDLE or if the UE is in RRC_CONNECTED while T311 is running:

2> if the UE has no valid system information stored according to 5.2.2.3 for the concerned cell:

3> apply the received value of dl-Bandwidth to the ul-Bandwidth until SystemInformationBlockType2 is received;

Upon receiving the MasterInformationBlock-NB message the UE shall:

1> apply the radio resource configuration included in accordance with the operationModeInfo.
5.2.2.7 Actions upon reception of the SystemInformationBlockType1 message

Upon receiving the SystemInformationBlockType1 or SystemInformationBlockType1-BR either via broadcast or via dedicated signalling, the UE shall:

1> if in RRC_IDLE or in RRC_CONNECTED while T311 is running; and

1> if the UE is a category 0 UE according to TS 36.306 [5]; and

1> if category0Allowed is not included in SystemInformationBlockType1:

2> consider the cell as barred in accordance with TS 36.304 [4];

1> if in RRC_CONNECTED while T311 is not running, and the UE supports multi-band cells as defined by bit 31 in featureGroupIndicators:

2> disregard the freqBandIndicator and multiBandInfoList, if received, while in RRC_CONNECTED;

2> forward the cellIdentity to upper layers;

2> forward the trackingAreaCode to upper layers;

1> else:

2> if the frequency band indicated in the freqBandIndicator is part of the frequency bands supported by the UE and it is not a downlink only band; or

2> if the UE supports multiBandInfoList, and if one or more of the frequency bands indicated in the multiBandInfoList are part of the frequency bands supported by the UE and they are not downlink only bands:

3> forward the cellIdentity to upper layers;

3> forward the trackingAreaCode to upper layers;

3> if, for the frequency band selected by the UE (from freqBandIndicator or multiBandInfoList), the freqBandInfo or the multiBandInfoList-v10j0 is present and the UE capable of multiNS-Pmax supports at least one additionalSpectrumEmission in the NS-PmaxList within the freqBandInfo or multiBandInfoList-v10j0:

4> apply the first listed additionalSpectrumEmission which it supports among the values included in NS-PmaxList within freqBandInfo or multiBandInfoList-v10j0;

4> if the additionalPmax is present in the same entry of the selected additionalSpectrumEmission within NS-PmaxList:

5> apply the additionalPmax;

4> else:

5> apply the p-Max;

3> else:

4> apply the additionalSpectrumEmission in SystemInformationBlockType2 and the p-Max;

2> else:

3> consider the cell as barred in accordance with TS 36.304 [4]; and

3> perform barring as if intraFreqReselection is set to notAllowed, and as if the csg-Indication is set to FALSE;

Upon receiving the SystemInformationBlockType1-NB, the UE shall:

1> if the frequency band indicated in the freqBandIndicator is part of the frequency bands supported by the UE; or
1> if one or more of the frequency bands indicated in the multiBandInfoList are part of the frequency bands supported by the UE:

2> forward the cellIdentity to upper layers;

2> forward the trackingAreaCode to upper layers;

2> if attachWithoutPDN-Connectivity is received for the selected PLMN

3> forward the attachWithoutPDN-Connectivity to upper layers;

2> else

3> indicate to upper layers that attachWithoutPDN-Connectivity is not present;

2> if, for the frequency band selected by the UE (from freqBandIndicator or multiBandInfoList), the freqBandInfo is present and the UE capable of multiNS-Pmax supports at least one additionalSpectrumEmission in the NS-PmaxList within the freqBandInfo:

3> apply the first listed additionalSpectrumEmission which it supports among the values included in NS-PmaxList within freqBandInfo;

3> if the additionalPmax is present in the same entry of the selected additionalSpectrumEmission within NS-PmaxList:

4> apply the additionalPmax;

3> else:

4> apply the p-Max;

2> else:

3> apply the additionalSpectrumEmission in SystemInformationBlockType2-NB and the p-Max;

1> else:

2> consider the cell as barred in accordance with TS 36.304 [4]; and

2> perform barring as if intraFreqReselection is set to notAllowed.

5.2.2.8 Actions upon reception of SystemInformation messages

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

5.2.2.9 Actions upon reception of SystemInformationBlockType2

Upon receiving SystemInformationBlockType2, the UE shall:

1> apply the configuration included in the radioResourceConfigCommon;

1> if upper layers indicate that a (UE specific) paging cycle is configured:

2> apply the shortest of the (UE specific) paging cycle and the defaultPagingCycle included in the radioResourceConfigCommon;

1> if the mbsfn-SubframeConfigList is included:

2> consider that DL assignments may occur in the MBSFN subframes indicated in the mbsfn-SubframeConfigList under the conditions specified in [23, 7.1];

1> apply the specified PCCH configuration defined in 9.1.1.3;

1> not apply the timeAlignmentTimerCommon;
1> if in RRC_CONNECTED and UE is configured with RLF timers and constants values received within rlf-TimersAndConstants:
   2> not update its values of the timers and constants in ue-TimersAndConstants except for the value of timer T300;

1> if in RRC_CONNECTED while T311 is not running; and the UE supports multi-band cells as defined by bit 31 in featureGroupIndicators or multipleNS-Pmax:
   2> disregard the additionalSpectrumEmission and ul-CarrierFreq, if received, while in RRC_CONNECTED;

1> if attachWithoutPDN-Connectivity is received for the selected PLMN:
   2> forward attachWithoutPDN-Connectivity to upper layers;

1> else
   2> indicate to upper layers that attachWithoutPDN-Connectivity is not present;

1> if cp-CIoT-EPS-Optimisation is received for the selected PLMN:
   2> forward cp-CIoT-EPS-Optimisation to upper layers;

1> else
   2> indicate to upper layers that cp-CIoT-EPS-Optimisation is not present;

1> if up-CIoT-EPS-Optimisation is received for the selected PLMN:
   2> forward up-CIoT-EPS-Optimisation to upper layers;

1> else
   2> indicate to upper layers that up-CIoT-EPS-Optimisation is not present;

Upon receiving SystemInformationBlockType2-NB, the UE shall:

1> apply the configuration included in the radioResourceConfigCommon;
1> apply the defaultPagingCycle included in the radioResourceConfigCommon;
1> apply the specified PCCH configuration defined in 9.1.1.3.
1> if in RRC_CONNECTED and UE is configured with RLF timers and constants values received within rlf-TimersAndConstants:
   2> not update its values of the timers and constants in ue-TimersAndConstants except for the value of timer T300;

5.2.2.10 Actions upon reception of SystemInformationBlockType3

Upon receiving SystemInformationBlockType3, the UE shall:

1> if in RRC_IDLE, the redistributionServingInfo is included and the UE is redistribution capable:
   2> perform E-UTRAN inter-frequency redistribution procedure as specified in TS 36.304 [4, 5.2.4.10];

1> if in RRC_IDLE, or in RRC_CONNECTED while T311 is running:
   2> if, for the frequency band selected by the UE (from the procedure in Section 5.2.2.7) to represent the serving cell's carrier frequency, the freqBandInfo or the multiBandInfoList-v10j0 is present in SystemInformationBlockType3 and the UE capable of multiNS-Pmax supports at least one additionalSpectrumEmission in the NS-PmaxList within the freqBandInfo or multiBandInfoList-v10j0:
      3> apply the first listed additionalSpectrumEmission which it supports among the values included in NS-PmaxList within freqBandInfo or multiBandInfoList-v10j0;
Upon receiving SystemInformationBlockType3-NB, the UE shall:

1> if in RRC_IDLE, or in RRC_CONNECTED while T311 is running:

2> if, for the frequency band selected by the UE (from the procedure in subclause 5.2.2.7) to represent the serving cell's carrier frequency, the freqBandInfo or the multiBandInfoList is present in SystemInformationBlockType3-NB and the UE capable of multiNS-Pmax supports at least one additionalSpectrumEmission in the NS-PmaxList within the freqBandInfo or the multiBandInfoList:

3> apply the first listed additionalSpectrumEmission which it supports among the values included in NS-PmaxList within freqBandInfo or multiBandInfoList;

4> if the additionalPmax is present in the same entry of the selected additionalSpectrumEmission within NS-PmaxList:

5> apply the additionalPmax;

6> else:

7> apply the p-Max;

5.2.2.11 Actions upon reception of SystemInformationBlockType4

No UE requirements related to the contents of this SystemInformationBlock (SystemInformationBlockType4 or SystemInformationBlockType4-NB) apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.12 Actions upon reception of SystemInformationBlockType5

Upon receiving SystemInformationBlockType5, the UE shall:

1> if in RRC_IDLE, the redistributionInterFreqInfo is included and the UE is redistribution capable:

2> perform E-UTRAN inter-frequency redistribution procedure as specified in TS 36.304 [4, 5.2.4.10];

1> if in RRC_IDLE, or in RRC_CONNECTED while T311 is running:

2> if the frequency band selected by the UE to represent a non-serving E-UTRA carrier frequency is not a downlink only band:

3> if, for the selected frequency band, the freqBandInfo or the multiBandInfoList-v10j0 is present and the UE capable of multiNS-Pmax supports at least one additionalSpectrumEmission in the NS-PmaxList within freqBandInfo or multiBandInfoList-v10j0:

4> apply the first listed additionalSpectrumEmission which it supports among the values included in NS-PmaxList within freqBandInfo or multiBandInfoList-v10j0;

5> if the additionalPmax is present in the same entry of the selected additionalSpectrumEmission within NS-PmaxList:
Upon receiving SystemInformationBlockType5-NB, the UE shall:

1> if in RRC_IDLE, or in RRC_CONNECTED while T311 is running:

2> if, for the frequency band selected by the UE (from multiBandInfoList) to represent a non-serving NB-IoT carrier frequency, the freqBandInfo is present and the UE capable of multiNS-Pmax supports at least one additionalSpectrumEmission in the NS-PmaxList within the freqBandInfo:

3> apply the first listed additionalSpectrumEmission which it supports among the values included in NS-PmaxList within freqBandInfo;

3> if the additionalPmax is present in the same entry of the selected additionalSpectrumEmission within NS-PmaxList:

4> apply the additionalPmax;

3> else:

4> apply the p-Max;

2> else:

3> apply the p-Max;

5.2.2.13 Actions upon reception of SystemInformationBlockType6

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

5.2.2.14 Actions upon reception of SystemInformationBlockType7

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

5.2.2.15 Actions upon reception of SystemInformationBlockType8

Upon receiving SystemInformationBlockType8, the UE shall:

1> if sib8-PerPLMN-List is included and the UE is capable of network sharing for CDMA2000:

2> apply the CDMA2000 parameters below corresponding to the RPLMN;

1> if the systemTimeInfo is included:

2> forward the systemTimeInfo to CDMA2000 upper layers;

1> if the UE is in RRC_IDLE and if searchWindowSize is included:

2> forward the searchWindowSize to CDMA2000 upper layers;

1> if parametersHRPD is included:

2> forward the preRegistrationInfoHRPD to CDMA2000 upper layers only if the UE has not received the preRegistrationInfoHRPD within an RRCConnectionReconfiguration message after entering this cell;

2> if the cellReselectionParametersHRPD is included:

3> forward the neighCellList to the CDMA2000 upper layers;
if the parameters1XRTT is included:

if the csfb-RegistrationParam1XRTT is included:

forward the csfb-RegistrationParam1XRTT to the CDMA2000 upper layers which will use this information to determine if a CS registration/re-registration towards CDMA2000 1xRTT in the EUTRA cell is required;

else:

indicate to CDMA2000 upper layers that CSFB Registration to CDMA2000 1xRTT is not allowed;

if the longCodeState1XRTT is included:

forward the longCodeState1XRTT to CDMA2000 upper layers;

if the cellReselectionParameters1XRTT is included:

forward neighCellList to the CDMA2000 upper layers;

if the csfb-SupportForDualRxUEs is included:

forward csfb-SupportForDualRxUEs to the CDMA2000 upper layers;

else:

forward csfb-SupportForDualRxUEs, with its value set to FALSE, to the CDMA2000 upper layers;

if ac-BarringConfig1XRTT is included:

forward ac-BarringConfig1XRTT to the CDMA2000 upper layers;

if the csfb-DualRxTxSupport is included:

forward csfb-DualRxTxSupport to the CDMA2000 upper layers;

else:

forward csfb-DualRxTxSupport, with its value set to FALSE, to the CDMA2000 upper layers;

5.2.2.16 Actions upon reception of SystemInformationBlockType9

Upon receiving SystemInformationBlockType9, the UE shall:

if hnb-Name is included, forward the hnb-Name to upper layers;

5.2.2.17 Actions upon reception of SystemInformationBlockType10

Upon receiving SystemInformationBlockType10, the UE shall:

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

5.2.2.18 Actions upon reception of SystemInformationBlockType11

Upon receiving SystemInformationBlockType11, the UE shall:

if there is no current value for messageIdentifier and serialNumber for SystemInformationBlockType11; or

if either the received value of messageIdentifier or of serialNumber or of both are different from the current values of messageIdentifier and serialNumber for SystemInformationBlockType11:

use the received values of messageIdentifier and serialNumber for SystemInformationBlockType11 as the current values of messageIdentifier and serialNumber for SystemInformationBlockType11;

discard any previously buffered warningMessageSegment;

if all segments of a warning message have been received:

assemble the warning message from the received warningMessageSegment;
The UE should discard any stored `warningMessageSegment` and the current value of `messageIdentifier` and `serialNumber` for `SystemInformationBlockType11` if the complete warning message has not been assembled within a period of 3 hours.

5.2.2.19 Actions upon reception of `SystemInformationBlockType12`

Upon receiving `SystemInformationBlockType12`, the UE shall:

1> if the `SystemInformationBlockType12` contains a complete warning message:

2> forward the received warning message, `messageIdentifier`, `serialNumber` and `dataCodingScheme` to upper layers;

2> continue reception of `SystemInformationBlockType12`;

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 is currently being assembled:

3> store the received `warningMessageSegment`;

4> if all segments of a warning message have been received:

4> assemble the warning message from the received `warningMessageSegment`;

4> forward the received complete warning message, `messageIdentifier`, `serialNumber` and `dataCodingScheme` to upper layers;

4> stop assembling a warning message for this `messageIdentifier` and `serialNumber` and delete all stored information held for it;

4> continue reception of `SystemInformationBlockType12`;

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> store the received warningMessageSegment;
3> continue reception of SystemInformationBlockType12;

The UE should discard warningMessageSegment and the associated values of messageIdentifier and serialNumber for SystemInformationBlockType12 if the complete warning message has 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.

5.2.2.20 Actions upon reception of SystemInformationBlockType13

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

5.2.2.21 Actions upon reception of SystemInformationBlockType14

No UE requirements related to the contents of this SystemInformationBlock (SystemInformationBlockType14 or SystemInformationBlockType14-NB) apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.22 Actions upon reception of SystemInformationBlockType15

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

5.2.2.23 Actions upon reception of SystemInformationBlockType16

No UE requirements related to the contents of this SystemInformationBlock (SystemInformationBlockType16 or SystemInformationBlockType16-NB) apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.24 Actions upon reception of SystemInformationBlockType17

Upon receiving SystemInformationBlockType17, the UE shall:

1> if wlan-OffloadConfigCommon corresponding to the RPLMN is included:
   2> if the UE is not configured with rclwi-Configuration with command set to steerToWLAN:
      3> apply the wlan-Id-List corresponding to the RPLMN;
   2> if not configured with the wlan-OffloadConfigDedicated:
      3> apply the wlan-OffloadConfigCommon corresponding to the RPLMN;

5.2.2.25 Actions upon reception of SystemInformationBlockType18

Upon receiving SystemInformationBlockType18, the UE shall:

1> if SystemInformationBlockType18 message includes the commConfig:
   2> if configured to receive sidelink communication:
      3> from the next SC period, as defined by sc-Period, use the resource pool indicated by commRxPool for sidelink communication monitoring, as specified in 5.10.3;
   2> if configured to transmit sidelink communication:
      3> from the next SC period, as defined by sc-Period, use the resource pool indicated by commTxPoolNormalCommon, commTxPoolNormalCommonExt or by commTxPoolExceptional for sidelink communication transmission, as specified in 5.10.4;

5.2.2.26 Actions upon reception of SystemInformationBlockType19

Upon receiving SystemInformationBlockType19, the UE shall:
1> if SystemInformationBlockType19 message includes the discConfig or discConfigPS:
   2> from the next discovery period, as defined by discPeriod, use the resources indicated by discRxPool, discRxResourcesInterFreq or discRxPoolPS for sidelink discovery monitoring, as specified in 5.10.5;
   2> if SystemInformationBlockType19 message includes the discTxPoolCommon or discTxPoolPS-Common; and the UE is in RRC_IDLE:
      3> from the next discovery period, as defined by discPeriod, use the resources indicated by discTxPoolCommon or discTxPoolPS-Common for sidelink discovery announcement, as specified in 5.10.6;
2> if the SystemInformationBlockType19 message includes the discTxPowerInfo:
   3> use the power information included in discTxPowerInfo for sidelink discovery transmission on the serving frequency, as specified in TS 36.213 [23];
1> if SystemInformationBlockType19 message includes the discConfigRelay:
   2> if the SystemInformationBlockType19 message includes the txPowerInfo:
      3> use the power information included in txPowerInfo for sidelink discovery transmission on the corresponding non-serving frequency, as specified in TS 36.213 [23];

5.2.2.27 Actions upon reception of SystemInformationBlockType20

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

5.2.3 Acquisition of an SI message

When acquiring an SI message, the UE shall:

1> determine the start of the SI-window for the concerned SI message as follows:
   2> 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 SystemInformationBlockType1;
   2> determine the integer value $x = (n - 1) \times w$, where $w$ is the si-WindowLength;
   2> the SI-window starts at the subframe $a$, where $a = x \mod 10$, in the radio frame for which SFN mod $T = \text{FLOOR}(x/10)$, where $T$ is the si-Periodicity of the concerned SI message;

NOTE: E-UTRAN should configure an SI-window of 1 ms only if all SIs are scheduled before subframe #5 in radio frames for which SFN mod 2 = 0.

1> receive DL-SCH using the SI-RNTI 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, excluding the following subframes:
   2> subframe #5 in radio frames for which SFN mod 2 = 0;
   2> any MBSFN subframes;
   2> any uplink subframes in TDD;
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;

5.2.3a Acquisition of an SI message by BL UE or UE in CE or a NB-IoT UE

When acquiring an SI message, the BL UE or UE in CE or NB-IoT UE shall:

1> determine the start of the SI-window for the concerned SI message as follows:
2> for the concerned SI message, determine the number \( n \) which corresponds to the order of entry in the list of SI messages configured by \( \text{schedulingsnfoList} \) in \( \text{SystemInformationBlockType1-BR} \) (or \( \text{SystemInformationBlockType1-NB} \) in NB-IoT);

2> determine the integer value \( x = (n - 1) \times w \), where \( w \) is the \( \text{si-WindowLength-BR} \) (or \( \text{si-WindowLength} \) in NB-IoT);

2> if the UE is a NB-IoT UE:

3> the SI-window starts at the subframe \#0 in the radio frame for which \( (\text{H-SFN} \times 1024 + \text{SFN}) \mod T = \text{FLOOR}(x/10) + \text{Offset} \), where \( T \) is the \( \text{si-Periodicity} \) of the concerned SI message and, Offset is the offset of the start of the SI-Window \( (\text{si-RadioFrameOffset}) \);

2> else:

3> the SI-window starts at the subframe \#0 in the radio frame for which \( \text{SFN} \mod T = \text{FLOOR}(x/10) \), where \( T \) is the \( \text{si-Periodicity} \) of the concerned SI message;

1> if the UE is a NB-IoT UE:

2> receive and accumulate SI message transmissions on DL-SCH from the start of the SI-window and continue until the end of the SI-window whose absolute length in time is given by \( \text{si-WindowLength} \), starting from the radio frames as provided in \( \text{si-RepetitionPattern} \) and in subframes as provided in \( \text{downlinkBitmap} \), or until successful decoding of the accumulated SI message transmissions excluding the subframes used for transmission of NPSS, NSSS, \( \text{MasterInformationBlock-NB} \) and \( \text{SystemInformationBlockType1-NB} \). If there are not enough subframes for one SI message transmission in the radio frames as provided in \( \text{si-RepetitionPattern} \), the UE shall continue to receive the SI message transmission in the radio frames following the radio frame indicated in \( \text{si-RepetitionPattern} \);

1> else:

2> receive and accumulate SI message transmissions on DL-SCH on narrowband provided by \( \text{si-Narrowband} \), from the start of the SI-window and continue until the end of the SI-window whose absolute length in time is given by \( \text{si-WindowLength-BR} \), only in radio frames as provided in \( \text{si-RepetitionPattern} \) and subframes as provided in \( \text{fdd-DownlinkOrTddSubframeBitmapBR} \) in \( \text{bandwidthReducedAccessRelatedInfo} \), or until successful decoding of the accumulated SI message transmissions;

1> if the SI message was not possible to decode from the accumulated SI message transmissions by the end of the SI-window, continue reception and accumulation of SI message transmissions on DL-SCH in the next SI-window occasion for the concerned SI message;

### 5.3 Connection control

#### 5.3.1 Introduction

##### 5.3.1.1 RRC connection control

RRC connection establishment involves the establishment of SRB1. E-UTRAN completes RRC connection establishment prior to completing the establishment of the S1 connection, i.e. prior to receiving the UE context information from the EPC. Consequently, AS security is not activated during the initial phase of the RRC connection. During this initial phase of the RRC connection, the E-UTRAN may configure the UE to perform measurement reporting, but the UE only sends the corresponding measurement reports after successful security activation. However, the UE only accepts a handover message when security has been activated.

**NOTE:** In case the serving frequency broadcasts multiple overlapping bands, E-UTRAN can only configure measurements after having obtained the UE capabilities, as the measurement configuration needs to be set according to the band selected by the UE.

Upon receiving the UE context from the EPC, E-UTRAN activates security (both ciphering and integrity protection) using the initial security activation procedure. The RRC messages to activate 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 security is not ciphered, while the subsequent messages (e.g. used to establish SRB2 and DRBs) are both integrity protected and ciphered.
After having initiated the initial security activation procedure, E-UTRAN initiates the establishment of SRB2 and DRBs, i.e. E-UTRAN may do this prior to receiving the confirmation of the initial security activation from the UE. In any case, E-UTRAN will apply both ciphering and integrity protection for the RRC connection reconfiguration messages used to establish SRB2 and DRBs. E-UTRAN should release the RRC connection if the initial security activation and/or the radio bearer establishment fails (i.e. security activation and DRB establishment are triggered by a joint S1-procedure, which does not support partial success).

For SRB2 and DRBs, security is always activated from the start, i.e. the E-UTRAN does not establish these bearers prior to activating security.

For some radio configuration fields, a critical extension has been defined. A switch from the original version of the field to the critically extended version is allowed using any connection reconfiguration. The UE reverts to the original version of some critically extended fields upon handover and re-establishment as specified elsewhere in this specification. Otherwise, switching a field from the critically extended version to the original version is only possible using the handover or re-establishment procedure with the full configuration option. This also applies for fields that are critically extended within a release (i.e. original and extended version defined in same release).

After having initiated the initial security activation procedure, E-UTRAN may configure a UE that supports CA, with one or more SCells in addition to the PCell that was initially configured during connection establishment. The PCell is used to provide the security inputs and upper layer system information (i.e. the NAS mobility information e.g. TAI). SCells are used to provide additional downlink and optionally uplink radio resources. When not configured with DC all SCells the UE is configured with, if any, are part of the MCG. When configured with DC however, some of the SCells are part of a SCG. In this case, user data carried by a DRB may either be transferred via MCG (i.e. MCG-DRB), via SCG (SCG-DRB) or via both MCG and SCG in DL while E-UTRAN configures the CG used in UL (split DRB). An RRC connection reconfiguration message may be used to change the DRB type from MCG-DRB to SCG-DRB or to split DRB, as well as from SCG-DRB or split DRB to MCG-DRB.

SCG change is a synchronous SCG reconfiguration procedure (i.e. involving RA to the PSCell) including reset/ re-establishment of layer 2 and, if SCG DRBs are configured, refresh of security. The procedure is used in a number of different scenarios e.g. SCG establishment, PSCell change, Key refresh, change of DRB type. The UE performs the SCG change related actions upon receiving an RRCConnectionReconfiguration message including mobilityControlInfoSCG, see 5.3.10.10.

The release of the RRC connection normally is initiated by E-UTRAN. The procedure may be used to re-direct the UE to an E-UTRA frequency or an inter-RAT carrier frequency. Only in exceptional cases, as specified within this specification, TS 36.300 [9], TS 36.304 [4] or TS 24.301 [35], may the UE abort the RRC connection, i.e. move to RRC_IDLE without notifying E-UTRAN.

The suspension of the RRC connection is initiated by E-UTRAN. When the RRC connection is suspended, the UE stores the UE AS context and the resumeIdentity, and transitions to RRC_IDLE state. The RRC message to suspend the RRC connection is integrity protected and ciphered. Suspension can only be performed when at least 1 DRB is successfully established.

The resumption of a suspended RRC connection is initiated by upper layers when the UE has a stored UE AS context, RRC connection resume is permitted by E-UTRAN and the UE needs to transit from RRC_IDLE state to RRC_CONNECTED state. When the RRC connection is resumed, RRC configures the UE according to the RRC connection resume procedure based on the stored UE AS context and any RRC configuration received from E-UTRAN. The RRC connection resume procedure re-activates security and re-establishes SRB(s) and DRB(s). The request to resume the RRC connection includes the resumeIdentity. The request is not ciphered, but protected with a message authentication code.

In response to a request to resume the RRC connection, E-UTRAN may resume the suspended RRC connection, reject the request to resume and instruct the UE to either keep or discard the stored context, or setup a new RRC connection.

5.3.1.2 Security

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

RRC handles the configuration of the security parameters which are part of the AS configuration: the integrity protection algorithm, the ciphering algorithm and two parameters, namely the keyChangeIndicator and the nextHopChainingCount, which are used by the UE to determine the AS security keys upon handover, connection re-establishment and/or connection resume.
The integrity protection algorithm is common for signalling radio bearers SRB1 and SRB2. The ciphering algorithm is common for all radio bearers (i.e. SRB1, SRB2 and DRBs). Neither integrity protection nor ciphering applies for SRB0.

RRC integrity and ciphering are always activated together, i.e. in one message/procedure. RRC integrity and ciphering are never de-activated. However, it is possible to switch to a 'NULL' ciphering algorithm (eea0).

The 'NULL' integrity protection algorithm (eia0) is used only for the UE in limited service mode [32, TS33.401]. 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 check has failed and indicate the integrity verification check failure to RRC.

The AS applies three different security keys: one for the integrity protection of RRC signalling (K_{RRCint}), one for the ciphering of RRC signalling (K_{RRCenc}) and one for the ciphering of user data (K_{UPenc}). All three AS keys are derived from the K_{UNB} key. The K_{UNB} is based on the K_{ASME} key, which is handled by upper layers.

Upon connection establishment new AS keys are derived. No AS-parameters are exchanged to serve as inputs for the derivation of the new AS keys at connection establishment.

The integrity and ciphering of the RRC message used to perform handover is based on the security configuration used prior to the handover and is performed by the source eNB.

The integrity and ciphering algorithms can only be changed upon handover. The four AS keys (K_{UNB}, K_{RRCint}, K_{RRCenc} and K_{UPenc}) change upon every handover, connection re-establishment and connection resume. The keyChangeIndicator is used upon handover and indicates whether the UE should use the keys associated with the K_{ASME} key taken into use with the latest successful NAS SMC procedure. The nextHopChainingCount parameter is used upon handover, connection re-establishment and connection resume by the UE when deriving the new K_{UNB} that is used to generate K_{RRCenc}, K_{RRCint} and K_{UPenc} (see TS 33.401 [32]). An intra cell handover procedure may be used to change the keys in RRC_CONNECTED.

For each radio bearer an independent counter (COUNT, as specified in TS 36.323 [8]) is maintained for each direction. For each DRB, the COUNT is used as input for ciphering. For each SRB, the COUNT is used as input for both ciphering and integrity protection. It is not allowed to use the same COUNT value more than once for a given security key. At connection resume the COUNT is reset. In order to limit the signalling overhead, individual messages/packets include a short sequence number (PDCP SN, as specified in TS 36.323 [8]). In addition, an overflow counter mechanism is used: the hyper frame number (TX_HFN and RX_HFN, as specified in TS 36.323 [8]). The HFN needs to be synchronized between the UE and the eNB. The eNB is responsible for avoiding reuse of the COUNT with the same RB identity and with the same K_{UNB}, e.g. due to the transfer of large volumes of data, release and establishment of new RBs. In order to avoid such re-use, the eNB may e.g. use different RB identities for successive RB establishments, trigger an intra cell handover or an RRC_CONNECTED to RRC_IDLE to RRC_CONNECTED transition.

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.

In case of DC, a separate K_{UNB} is used for SCG-DRBs (S-K_{UNB}). This key is derived from the key used for the MCG (K_{UNB}) and an SCG counter that is used to ensure freshness. To refresh the S_{K_{UNB}} e.g. when the COUNT will wrap around, E-UTRAN employs an SCG change, i.e. an RRCConnectionReconfiguration message including mobilityControlInfoSCG. When performing handover, while at least one SCG-DRB remains configured, both K_{UNB} and S-K_{UNB} are refreshed. In such case E-UTRAN performs handover with SCG change i.e. an RRCConnectionReconfiguration message including both mobilityControlInfo and mobilityControlInfoSCG. The ciphering algorithm is common for all radio bearers within a CG but may be different between MCG and SCG. The ciphering algorithm for SCG DRBs can only be changed upon SCG change.

5.3.1.2a RN security

For RNs, AS security follows the procedures in 5.3.1.2. Furthermore, E-UTRAN may configure per DRB whether or not integrity protection is used. The use of integrity protection may be configured only upon DRB establishment and reconfigured only upon handover or upon the first reconfiguration following RRC connection re-establishment.

To provide integrity protection on DRBs between the RN and the E-UTRAN, the K_{UPmac} key is derived from the K_{UNB} key as described in TS33.401 [32]. The same integrity protection algorithm used for SRBs also applies to the DRBs. The K_{UPmac} changes at every handover and RRC connection re-establishment and is based on an updated K_{UNB} which is derived by taking into account the nextHopChainingCount. The COUNT value maintained for DRB ciphering is also used for integrity protection, if the integrity protection is configured for the DRB.
5.3.1.3 Connected mode mobility

In RRC_CONNECTED, the network controls UE mobility, i.e. the network decides when the UE shall connect to which E-UTRA cell(s), or inter-RAT cell. For network controlled mobility in RRC_CONNECTED, the PCell can be changed using an RRCConnectionReconfiguration message including the mobilityControlInfo (handover), whereas the SCell(s) can be changed using the RRCConnectionReconfiguration message either with or without the mobilityControlInfo.

An SCG can be established, reconfigured or released by using an RRCConnectionReconfiguration message with or without the mobilityControlInfo. In case Random Access to the PSCell is required upon SCG reconfiguration, E-UTRAN employs the SCG change procedure (i.e. an RRCConnectionReconfiguration message including the mobilityControlInfosCG). The PSCell can only be changed using the SCG change procedure and by release and addition of the PCell.

The network triggers the handover procedure e.g. based on radio conditions, load. To facilitate this, the network may configure the UE to perform measurement reporting (possibly including the configuration of measurement gaps). The network may also initiate handover blindly, i.e. without having received measurement reports from the UE.

Before sending the handover message to the UE, the source eNB prepares one or more target cells. The source eNB selects the target PCell. The source eNB may also provide the target eNB with a list of best cells on each frequency for which measurement information is available, in order of decreasing RSRP. The source eNB may also include available measurement information for the cells provided in the list. The target eNB decides which SCells are configured for use after handover, which may include cells other than the ones indicated by the source eNB. If an SCG is configured, handover involves either SCG release or SCG change. In case the UE was configured with DC, the target eNB indicates in the handover message whether the UE shall release the entire SCG configuration. Upon connection re-establishment, the UE releases the entire SCG configuration except for the DRB configuration, while E-UTRAN in the first reconfiguration message following the re-establishment either releases the DRB(s) or reconfigures the DRB(s) to MCG DRB(s).

The target eNB generates the message used to perform the handover, i.e. the message including the AS-configuration to be used in the target cell(s). The source eNB transparently (i.e. does not alter values/content) forwards the handover message/information received from the target to the UE. When appropriate, the source eNB may initiate data forwarding for (a subset of) the DRBs.

After receiving the handover message, the UE attempts to access the target PCell at the first available RACH occasion according to Random Access resource selection defined in TS 36.321 [6], i.e. the handover is asynchronous. Consequently, when allocating a dedicated preamble for the random access in the target PCell, E-UTRAN shall ensure it is available from the first RACH occasion the UE may use. Upon successful completion of the handover, the UE sends a message used to confirm the handover.

If the target eNB does not support the release of RRC protocol which the source eNB used to configure the UE, the target eNB may be unable to comprehend the UE configuration provided by the source eNB. In this case, the target eNB should use the full configuration option to reconfigure the UE for Handover and Re-establishment. Full configuration option includes an initialization of the radio configuration, which makes the procedure independent of the configuration used in the source cell(s) with the exception that the security algorithms are continued for the RRC re-establishment.

After the successful completion of handover, PDCP SDUs may be re-transmitted in the target cell(s). This only applies for DRBs using RLC-AM mode and for handovers not involving full configuration option. The further details are specified in TS 36.323 [8]. After the successful completion of handover not involving full configuration option, the SN and the HFN are reset except for the DRBs using RLC-AM mode (for which both SN and HFN continue). For reconfigurations involving the full configuration option, the PDCP entities are newly established (SN and HFN do not continue) for all DRBs irrespective of the RLC mode. The further details are specified in TS 36.323 [8].

One UE behaviour to be performed upon handover is specified, i.e. this is regardless of the handover procedures used within the network (e.g. whether the handover includes X2 or S1 signalling procedures).

The source eNB should, for some time, maintain a context to enable the UE to return in case of handover failure. After having detected handover failure, the UE attempts to resume the RRC connection either in the source PCell or in another cell using the RRC re-establishment procedure. This connection resumption succeeds only if the accessed cell is prepared, i.e. concerns a cell of the source eNB or of another eNB towards which handover preparation has been performed. The cell in which the re-establishment procedure succeeds becomes the PCell while SCells and STAGs, if configured, are released.
Normal measurement and mobility procedures are used to support handover to cells broadcasting a CSG identity. In addition, E-UTRAN may configure the UE to report that it is entering or leaving the proximity of cell(s) included in its CSG whitelist. Furthermore, E-UTRAN may request the UE to provide additional information broadcast by the handover candidate cell e.g. global cell identity, CSG identity, CSG membership status.

NOTE: E-UTRAN may use the ‘proximity report’ to configure measurements as well as to decide whether or not to request additional information broadcast by the handover candidate cell. The additional information is used to verify whether or not the UE is authorised to access the target PCell and may also be needed to identify handover candidate cell (PCI confusion i.e. when the physical layer identity that is included in the measurement report does not uniquely identify the cell).

5.3.1.4 Connection control in NB-IoT

In NB-IoT, during the RRC connection establishment procedure, SRB1bis is established implicitly with SRB1. SRB1bis uses the logical channel identity defined in 9.1.2a, with the same configuration as SRB1 but no PDCP entity. SRB1bis is used until security is activated. The RRC messages to activate security (command and successful response) are sent over SRB1 being integrity protected and ciphering is started after completion of the procedure. In case of unsuccessful security activation, the failure message is sent over SRB1 and subsequent messages are sent over SRB1bis. Once security is activated, new RRC messages shall be transmitted using SRB1. A NB-IoT UE that only supports the Control Plane CIoT EPS optimisation (see TS 24.301 [35]) only establishes SRB1bis.

A NB-IoT UE only supports 0, 1 or 2 DRBs, depending on its capability. A NB-IoT UE that only supports the Control Plane CIoT EPS optimisation (see TS 24.301 [35]) does not need to support any DRBs and associated procedures.

Table 5.3.1.4-1 lists the procedures that are applicable for NB-IoT. All other procedures are not applicable; this is not further stated in the corresponding procedures.

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NOTE: Not applicable for a UE that only supports the Control Plane CIoT EPS optimisation (see TS 24.301 [35]).

5.3.2 Paging

5.3.2.1 General

![Figure 5.3.2.1-1: Paging](image)

The purpose of this procedure is:

- to transmit paging information to a UE in RRC_IDLE and/ or;
- to inform UEs in RRC_IDLE, and UEs in RRC_CONNECTED other than NB-IoT UEs, BL UEs and UEs in CE, about a system information change and/ or;
- to inform UEs in RRC_IDLE other than NB-IoT UEs, and UEs in RRC_CONNECTED other than NB-IoT UEs, BL UEs and UEs in CE, about an ETWS primary notification and/ or ETWS secondary notification and/ or;
- to inform UEs in RRC_IDLE other than NB-IoT UEs, and UEs in RRC_CONNECTED other than NB-IoT UEs, BL UEs and UEs in CE, about a CMAS notification and/ or;
- to inform UEs other than NB-IoT UEs in RRC_IDLE about an EAB parameters modification and/ or;
- to inform UEs other than NB-IoT UEs in RRC_IDLE to perform E-UTRAN inter-frequency redistribution procedure.

The paging information is provided to upper layers, which in response may initiate RRC connection establishment, e.g. to receive an incoming call.

### 5.3.2.2 Initiation

E-UTRAN initiates the paging procedure by transmitting the Paging message at the UE’s paging occasion as specified in TS 36.304 [4]. E-UTRAN may address multiple UEs within a Paging message by including one PagingRecord for each UE. E-UTRAN may also indicate a change of system information, and/ or provide an ETWS notification or a CMAS notification in the Paging message.

### 5.3.2.3 Reception of the Paging message by the UE

Upon receiving the Paging message, the UE shall:

1> if in RRC_IDLE, for each of the PagingRecord, if any, included in the Paging message:
2> if the ue-Identity included in the PagingRecord matches one of the UE identities allocated by upper layers:
3> forward the ue-Identity and, except for NB-IoT, the cn-Domain to the upper layers;
1> if the UE is not configured with a DRX cycle longer than the modification period and the systemInfoModification is included; or
1> if the UE is configured with a DRX cycle longer than the modification period and the systemInfoModification-eDRX is included:
2> re-acquire the required system information using the system information acquisition procedure as specified in 5.2.2.
1> if the etws-Indication is included and the UE is ETWS capable:
2> re-acquire SystemInformationBlockType1 immediately, i.e., without waiting until the next system information modification period boundary;
2> if the schedulingInfoList indicates that SystemInformationBlockType10 is present:
3> acquire SystemInformationBlockType10;

NOTE: If the UE is in CE, it is up to UE implementation when to start acquiring SystemInformationBlockType10.

2> if the schedulingInfoList indicates that SystemInformationBlockType11 is present:
3> acquire SystemInformationBlockType11;
1> if the cmas-Indication is included and the UE is CMAS capable:
2> re-acquire SystemInformationBlockType1 immediately, i.e., without waiting until the next system information modification period boundary as specified in 5.2.1.5;
2> if the schedulingInfoList indicates that SystemInformationBlockType12 is present:
3> acquire SystemInformationBlockType12;
1> if in RRC_IDLE, the eab-ParamModification is included and the UE is EAB capable:
2> consider previously stored SystemInformationBlockType14 as invalid;
2> re-acquire SystemInformationBlockType1 immediately, i.e., without waiting until the next system information modification period boundary as specified in 5.2.1.6;
2> re-acquire SystemInformationBlockType14 using the system information acquisition procedure as specified in 5.2.2.4;
1> if in RRC_IDLE, the redistributionIndication is included and the UE is redistribution capable:
2> Perform E-UTRAN inter-frequency redistribution procedure as specified in TS 36.304 (5.2.4.10, [4]);

5.3.3 RRC connection establishment

5.3.3.1 General

![Diagram of RRC connection establishment, successful](image1)

**Figure 5.3.3.1-1: RRC connection establishment, successful**

![Diagram of RRC connection establishment, network reject](image2)

**Figure 5.3.3.1-2: RRC connection establishment, network reject**
The purpose of this procedure is to establish or resume an RRC connection. RRC connection establishment involves SRB1 (and SRB1bis for NB-IoT) establishment. The procedure is also used to transfer the initial NAS dedicated information/message from the UE to E-UTRAN.

E-UTRAN applies the procedure as follows:

- When establishing an RRC connection:
  - to establish SRB1 and, for NB-IoT, SRB1bis;
- When resuming an RRC connection:
  - to restore the AS configuration from a stored context including resuming SRB(s) and DRB(s).
5.3.3.1a Conditions for establishing RRC Connection for sidelink communication/discovery

For sidelink communication an RRC connection is initiated only in the following case:

1> if configured by upper layers to transmit non-relay related sidelink communication and related data is available for transmission:

   2> if SystemInformationBlockType18 is broadcast by the cell on which the UE camps; and if the valid version of SystemInformationBlockType18 does not include commTxPoolNormalCommon;

1> if configured by upper layers to transmit relay related sidelink communication:

   2> if the UE is acting as sidelink relay UE; and if SystemInformationBlockType18 is broadcast by the cell on which the UE camps; or

   2> if the UE has a selected sidelink relay UE; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met and if SystemInformationBlockType18 is broadcast by the cell on which the UE camps; and if the valid version of SystemInformationBlockType18 does not include commTxPoolNormalCommon or commTxAllowRelayCommon;

For sidelink discovery an RRC connection is initiated only in the following case:

1> if configured by upper layers to transmit non-PS related sidelink discovery announcements:

   2> if the frequency on which the UE is configured to transmit non-PS related sidelink discovery announcements concerns the camped frequency; and SystemInformationBlockType19 of the cell on which the UE camps does not include discTxPoolCommon-r12; or

   2> if the frequency on which the UE is configured to transmit non-PS related sidelink discovery announcements is included in discInterFreqList in SystemInformationBlockType19 broadcast by the cell on which the UE camps, with discTxResourcesInterFreq included within discResourcesNonPS and set to requestDedicated;

1> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements:

   2> if the frequency on which the UE is configured to transmit non-relay PS related sidelink discovery announcements concerns the camped frequency; and SystemInformationBlockType19 of the cell on which the UE camps includes discConfigPS but does not include discTxPoolPS-Common; or

   2> if the frequency on which the UE is configured to transmit non-relay PS related sidelink discovery announcements (e.g. group member discovery) is included in discInterFreqList in SystemInformationBlockType19 broadcast by the cell on which the UE camps, with discTxResourcesInterFreq within discResourcesPS included and set to requestDedicated;

1> if configured by upper layers to transmit relay PS related sidelink discovery announcements:

   2> if the UE is acting as sidelink relay UE; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met; or

   2> if the UE is selecting a sidelink relay UE / has a selected sidelink relay UE; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:

      3> if the frequency on which the UE is configured to transmit relay PS related sidelink discovery announcements concerns the camped frequency; and SystemInformationBlockType19 of the cell on which the UE camps includes discConfigRelay and discConfigPS but does not include discTxPoolPS-Common;

NOTE: Upper layers initiate an RRC connection. The interaction with NAS is left to UE implementation.

5.3.3.2 Initiation

The UE initiates the procedure when upper layers request establishment or resume of an RRC connection while the UE is in RRC_IDLE.

Except for NB-IoT, upon initiation of the procedure, the UE shall:
1> if SystemInformationBlockType2 includes ac-BarringPerPLMN-List and the ac-BarringPerPLMN-List includes an AC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]):

2> select the AC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers;

2> in the remainder of this procedure, use the selected AC-BarringPerPLMN entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the common access barring parameters included in SystemInformationBlockType2;

1> else

2> in the remainder of this procedure use the common access barring parameters (i.e. presence or absence of these parameters) included in SystemInformationBlockType2;

1> if SystemInformationBlockType2 contains ACDC-BarringPerPLMN-List and the ACDC-BarringPerPLMN-List includes an ACDC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]):

2> select the ACDC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers;

2> in the remainder of this procedure, use the selected ACDC-BarringPerPLMN entry for ACDC barring check (i.e. presence or absence of access barring parameters in this entry) irrespective of the ACDC-BarringForCommon parameters included in SystemInformationBlockType2;

1> else:

2> in the remainder of this procedure use the ACDC-BarringForCommon (i.e. presence or absence of these parameters) included in SystemInformationBlockType2 for ACDC barring check;

1> if upper layers indicate that the RRC connection is subject to EAB (see TS 24.301 [35]):

2> if the result of the EAB check, as specified in 5.3.3.12, is that access to the cell is barred:

3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that EAB is applicable, upon which the procedure ends;

1> else if the UE is establishing the RRC connection for mobile terminating calls:

2> if timer T302 is running:

3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring is applicable due to ACDC, upon which the procedure ends;
inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile terminating calls is applicable, upon which the procedure ends;

1> else if the UE is establishing the RRC connection for emergency calls:

2> if SystemInformationBlockType2 includes the ac-BarringInfo:

3> if the ac-BarringForEmergency is set to TRUE:

4> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11]:

5> if the ac-BarringInfo includes ac-BarringForMO-Data, and for all of these valid Access Classes for the UE, the corresponding bit in the ac-BarringForSpecialAC contained in ac-BarringForMO-Data is set to one:

6> consider access to the cell as barred;

4> else: 5> consider access to the cell as barred;

2> if access to the cell is barred:

3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication, upon which the procedure ends;

1> else if the UE is establishing the RRC connection for mobile originating calls:

2> perform access barring check as specified in 5.3.3.11, using T303 as "Tbarring" and ac-BarringForMO-Data as "AC barring parameter";

2> if access to the cell is barred:

3> if SystemInformationBlockType2 includes ac-BarringForCSFB or the UE does not support CS fallback:

4> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls is applicable, upon which the procedure ends;

3> else (SystemInformationBlockType2 does not include ac-BarringForCSFB and the UE supports CS fallback):

4> if timer T306 is not running, start T306 with the timer value of T303;

4> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls and mobile originating CS fallback is applicable, upon which the procedure ends;

1> else if the UE is establishing the RRC connection for mobile originating signalling:

2> perform access barring check as specified in 5.3.3.11, using T305 as "Tbarring" and ac-BarringForMO-Signalling as "AC barring parameter";

2> if access to the cell is barred:

3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating signalling is applicable, upon which the procedure ends;

1> else if the UE is establishing the RRC connection for mobile originating CS fallback:

2> if SystemInformationBlockType2 includes ac-BarringForCSFB:

NOTE 1: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN.

5> if the ac-BarringInfo includes ac-BarringForMO-Data, and for all of these valid Access Classes for the UE, the corresponding bit in the ac-BarringForSpecialAC contained in ac-BarringForMO-Data is set to one:

6> consider access to the cell as barred;
3> perform access barring check as specified in 5.3.3.11, using T306 as "Tbarring" and \textit{ac-BarringForCSFB} as "AC barring parameter"; 

3> if access to the cell is barred: 

4> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating CS fallback is applicable, due to \textit{ac-BarringForCSFB}, upon which the procedure ends; 

2> else: 

3> perform access barring check as specified in 5.3.3.11, using T306 as "Tbarring" and \textit{ac-BarringForMO-Data} as "AC barring parameter"; 

3> if access to the cell is barred: 

4> if timer T303 is not running, start T303 with the timer value of T306; 

4> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating CS fallback and mobile originating calls is applicable, due to \textit{ac-BarringForMO-Data}, upon which the procedure ends; 

1> else if the UE is establishing the RRC connection for mobile originating MMTEL voice, mobile originating MMTEL video, mobile originating SMSsoIP or mobile originating SMS: 

2> if the UE is establishing the RRC connection for mobile originating MMTEL voice and \textit{SystemInformationBlockType2} includes \textit{ac-BarringSkipForMMTELVoice}; or 

2> if the UE is establishing the RRC connection for mobile originating MMTEL video and \textit{SystemInformationBlockType2} includes \textit{ac-BarringSkipForMMTELVideo}; or 

2> if the UE is establishing the RRC connection for mobile originating SMSsoIP or SMS and \textit{SystemInformationBlockType2} includes \textit{ac-BarringSkipForSMS}: 

3> consider access to the cell as not barred; 

2> else: 

3> if \textit{establishmentCause} received from higher layers is set to \textit{mo-Signalling} (including the case that \textit{mo-Signalling} is replaced by \textit{highPriorityAccess} according to 3GPP TS 24.301 [35] or by \textit{mo-VoiceCall} according to the subclause 5.3.3.3): 

4> perform access barring check as specified in 5.3.3.11, using T305 as "Tbarring" and \textit{ac-BarringForMO-Signalling} as "AC barring parameter"; 

4> if access to the cell is barred: 

5> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating signalling is applicable, upon which the procedure ends; 

3> if \textit{establishmentCause} received from higher layers is set to \textit{mo-Data} (including the case that \textit{mo-Data} is replaced by \textit{highPriorityAccess} according to 3GPP TS 24.301 [35] or by \textit{mo-VoiceCall} according to the subclause 5.3.3.3): 

4> perform access barring check as specified in 5.3.3.11, using T303 as "Tbarring" and \textit{ac-BarringForMO-Data} as "AC barring parameter"; 

4> if access to the cell is barred: 

5> if \textit{SystemInformationBlockType2} includes \textit{ac-BarringForCSFB} or the UE does not support CS fallback: 

6> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls is applicable, upon which the procedure ends;
5> else (SystemInformationBlockType2 does not include ac-BarringForCSFB and the UE supports CS fallback):

6> if timer T306 is not running, start T306 with the timer value of T303;

6> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls and mobile originating CS fallback is applicable, upon which the procedure ends;

1> if the UE is resuming an RRC connection:

2> release the MCG SCell(s), if configured, in accordance with 5.3.10.3a;

2> release powerPrefIndicationConfig, if configured and stop timer T340, if running;

2> release reportProximityConfig and clear any associated proximity status reporting timer;

2> release obtainLocationConfig, if configured;

2> release idc-Config, if configured;

2> release measSubframePatternPCell, if configured;

2> release the entire SCG configuration, if configured, except for the DRB configuration (as configured by drb-ToAddModListSCG);

2> release naics-Info for the PCell, if configured;

2> release the LWA configuration, if configured, as described in 5.6.14.3;

2> release the LWIP configuration, if configured, as described in 5.6.17.3;

1> apply the default physical channel configuration as specified in 9.2.4;

1> apply the default semi-persistent scheduling configuration as specified in 9.2.3;

1> apply the CCCH configuration as specified in 9.1.1.2;

1> apply the timeAlignmentTimerCommon included in SystemInformationBlockType2;

1> start timer T300;

1> if the UE is resuming an RRC connection:

2> initiate transmission of the RRConnectionResumeRequest message in accordance with 5.3.3.3a;

1> else:

2> if stored, discard the UE AS context and resumIdentity;

2> initiate transmission of the RRConnectionRequest message in accordance with 5.3.3.3;

NOTE 2: Upon initiating the connection establishment procedure, the UE is not required to ensure it maintains up to date system information applicable only for UEs in RRC_IDLE state. However, the UE needs to perform system information acquisition upon cell re-selection.

For NB-IoT, upon initiation of the procedure, the UE shall:

1> if the UE is establishing or resuming the RRC connection for mobile originating exception data; or

1> if the UE is establishing or resuming the RRC connection for mobile originating data; or

1> if the UE is establishing or resuming the RRC connection for delay tolerant access; or

1> if the UE is establishing or resuming the RRC connection for mobile originating signalling;
2> perform access barring check as specified in 5.3.3.14;
2> if access to the cell is barred:
3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC
connection with suspend indication and that access barring is applicable, upon which the procedure ends;
1> apply the default physical channel configuration as specified in 9.2.4;
1> apply the default MAC main configuration as specified in 9.2.2;
1> apply the CCCH configuration as specified in 9.1.1.2;
1> start timer T300;
1> if the UE is establishing an RRC connection:
2> initiate transmission of the \textit{RRCConnectionRequest} message in accordance with 5.3.3.3;
1> else if the UE is resuming an RRC connection:
2> initiate transmission of the \textit{RRCConnectionResumeRequest} message in accordance with 5.3.3.3a;

\textbf{NOTE 3:} Upon initiating the connection establishment or resumption procedures, the UE is not required to ensure it
maintains up to date system information applicable only for UEs in RRC\_IDLE state. However, the UE
needs to perform system information acquisition upon cell re-selection.

\textbf{5.3.3.3} \hspace{1em} \textbf{Actions related to transmission of } \textit{RRCConnectionRequest} \textbf{message}

The UE shall set the contents of \textit{RRCConnectionRequest} message as follows:
1> set the \textit{ue-Identity} as follows:
2> if upper layers provide an S-TMSI:
3> set the \textit{ue-Identity} to the value received from upper layers;
2> else:
3> draw a random value in the range 0 .. 2^{40}-1 and set the \textit{ue-Identity} to this value;

\textbf{NOTE 1:} Upper layers provide the S-TMSI if the UE is registered in the TA of the current cell.
1> if the UE supports \textit{mo-VoiceCall} establishment cause and UE is establishing the RRC connection for mobile
originating MMTel voice and SystemInformationBlockType2 includes \textit{voiceServiceCauseIndication}:
2> set the \textit{establishmentCause} to \textit{mo-VoiceCall};
1> else:
2> set the \textit{establishmentCause} in accordance with the information received from upper layers;
1> if the UE is a NB-IoT UE:
2> if the UE supports multi-tone transmission, include \textit{multiToneSupport};
2> if the UE supports multi-carrier operation, include \textit{multiCarrierSupport};

The UE shall submit the \textit{RRCConnectionRequest} message to lower layers for transmission.

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 5.3.3.5.

\textbf{5.3.3.3a} \hspace{1em} \textbf{Actions related to transmission of } \textit{RRCConnectionResumeRequest} \textbf{message}

The UE shall set the contents of \textit{RRCConnectionResumeRequest} message as follows:
1> if the UE is a NB-IoT UE; or
if field useFullResumeID is signalled in SystemInformationBlockType2:
  2> set the resumeID to the stored resumeIdentity;

else
  2> set the truncatedResumeID to include bits in bit position 9 to 20 and 29 to 40 from the left in the stored resumeIdentity.

if the UE supports mo-VoiceCall establishment cause and UE is resuming the RRC connection for mobile originating MMTEL voice and SystemInformationBlockType2 includes voiceServiceCauseIndication:
  2> set the resumeCause to mo-VoiceCall;

else
  2> set the resumeCause in accordance with the information received from upper layers;

set the shortResumeMAC-I to the 16 least significant bits of the MAC-I calculated:
  2> over the ASN.1 encoded as per section 8 (i.e., a multiple of 8 bits) VarShortResumeMAC-Input (or VarShortResumeMAC-Input-NB in NB-IoT);
  2> with the K_RRCint key and the previously configured integrity protection algorithm; and
  2> with all input bits for COUNT, BEARER and DIRECTION set to binary ones;

restore the RRC configuration and security context from the stored UE AS context:

restore the PDCP state and re-establish PDCP entities for SRB1;

resume SRB1;

NOTE: Until successful connection resumption, the default physical layer configuration and the default MAC Main configuration are applied for the transmission of SRB0 and SRB1, and SRB1 is used only for transfer of the RRCConnectionResume message.

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

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 5.3.3.5.

5.3.3.4 Reception of the RRCConnectionSetup by the UE

NOTE: Prior to this, lower layer signalling is used to allocate a C-RNTI. For further details see TS 36.321 [6];

The UE shall:

if the RRCConnectionSetup is received in response to an RRCConnectionResumeRequest:
  2> release all radio resources, including release of the RLC entity, the MAC configuration and the associated PDCP entity for all established or suspended RBs, except for SRB0;
  2> discard the stored UE AS context and resumeIdentity;
  2> indicate to upper layers that the RRC connection resume has been fallbacked;
  1> perform the radio resource configuration procedure in accordance with the received radioResourceConfigDedicated and as specified in 5.3.10;
  1> if stored, discard the cell reselection priority information provided by the idleModeMobilityControlInfo or inherited from another RAT;
  1> stop timer T300;
  1> stop timer T302, if running;
  1> stop timer T303, if running;
1> stop timer T305, if running;
1> stop timer T306, if running;
1> stop timer T308, if running;
1> perform the actions as specified in 5.3.3.7;
1> stop timer T320, if running;
1> stop timer T350, if running;
1> perform the actions as specified in 5.6.12.4;
1> release rclwi-Configuration, if configured, as specified in 5.6.16.2;
1> stop timer T360, if running;
1> enter RRC_CONNECTED;
1> stop the cell re-selection procedure;
1> consider the current cell to be the PCell;
1> set the content of RRCConnectionSetupComplete message as follows:
  2> if the RRCConnectionSetup is received in response to an RRCConnectionResumeRequest:
    3> if upper layers provide an S-TMSI:
      4> set the s-TMSI to the value received from upper layers;
    2> set the selectedPLMN-Identity to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]) from the PLMN(s) included in the plmn-IdentityList in SystemInformationBlockType1 (or SystemInformationBlockType1-NB in NB-IoT);
  2> if upper layers provide the 'Registered MME', include and set the registeredMME as follows:
    3> if the PLMN identity of the 'Registered MME' is different from the PLMN selected by the upper layers:
      4> include the plmnIdentity in the registeredMME and set it to the value of the PLMN identity in the 'Registered MME' received from upper layers;
    3> set the mmegi and the mmec to the value received from upper layers;
  2> except for NB-IoT, if upper layers provided the 'Registered MME':
    3> include and set the gummei-Type to the value provided by the upper layers;
  2> if the UE supports CIoT EPS optimisation(s):
    3> include attachWithoutPDN-Connectivity if received from upper layers;
    3> include up-CIoT-EPS-Optimisation if received from upper layers;
    3> except for NB-IoT, include cp-CIoT-EPS-Optimisation if received from upper layers;
  2> if connecting as an RN:
    3> include the rn-SubframeConfigReq;
  2> set the dedicatedInfoNAS to include the information received from upper layers;
  2> except for NB-IoT:
    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:
      4> include rlf-InfoAvailable;
if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in \textit{plmn-IdentityList} stored in \textit{VarLogMeasReport}:

4> include \textit{logMeasAvailableMBSFN};

else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in \textit{plmn-IdentityList} stored in \textit{VarLogMeasReport}:

4> include \textit{logMeasAvailable};

if the UE has connection establishment failure information available in \textit{VarConnEstFailReport} and if the RPLMN is equal to \textit{plmn-Identity} stored in \textit{VarConnEstFailReport}:

4> include \textit{connEstFailInfoAvailable};

include the \textit{mobilityState} and set it to the mobility state (as specified in TS 36.304 [4]) of the UE just prior to entering RRC\_CONNECTED state;

if the UE supports storage of mobility history information and the UE has mobility history information available in \textit{VarMobilityHistoryReport}:

4> include \textit{mobilityHistoryAvail};

if UE needs UL gaps during continuous uplink transmission:

3> include \textit{ue-CE-NeedULGaps};

submit the \textit{RRCConnectionSetupComplete} message to lower layers for transmission, upon which the procedure ends;

5.3.3.4a Reception of the \textit{RRCConnectionResume} by the UE

The UE shall:

1> stop timer T300;

1> restore the PDCP state and re-establish PDCP entities for SRB2 and all DRBs;

1> if \textit{drb-ContinueROHC} is included:

2> indicate to lower layers that stored UE AS context is used and that \textit{drb-ContinueROHC} is configured;

2> continue the header compression protocol context for the DRBs configured with the header compression protocol;

1> else:

2> indicate to lower layers that stored UE AS context is used;

2> reset the header compression protocol context for the DRBs configured with the header compression protocol;

1> discard the stored UE AS context and \textit{resumeIdentity};

1> perform the radio resource configuration procedure in accordance with the received \textit{radioResourceConfigDedicated} and as specified in 5.3.10;

NOTE: When performing the radio resource configuration procedure, for the physical layer configuration and the MAC Main configuration, the restored RRC configuration from the stored UE AS context is used as basis for the reconfiguration.

1> resume SRB2 and all DRBs;

1> if stored, discard the cell reselection priority information provided by the \textit{idleModeMobilityControlInfo} or inherited from another RAT;

1> if the \textit{RRCConnectionResume} message includes the \textit{measConfig}:
2> perform the measurement configuration procedure as specified in 5.5.2;
1> stop timer T302, if running;
1> stop timer T303, if running;
1> stop timer T305, if running;
1> stop timer T306, if running;
1> stop timer T308, if running;
1> perform the actions as specified in 5.3.3.7;
1> stop timer T320, if running;
1> stop timer T350, if running;
1> perform the actions as specified in 5.6.12.4;
1> stop timer T360, if running;
1> update the KeNB key based on the KASME key to which the current KeNB is associated, using the nextHopChainingCount value indicated in the RRCConnectionResume message, as specified in TS 33.401 [32];
1> store the nextHopChainingCount value;
1> derive the K RRCint key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];
1> request lower layers to verify the integrity protection of the RRCConnectionResume message, using the previously configured algorithm and the K RRCint key;
1> if the integrity protection check of the RRCConnectionResume message fails:
2> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'other', upon which the procedure ends;
1> derive the K RRCenc key and the KUPenc key associated with the previously configured ciphering algorithm, as specified in TS 33.401 [32];
1> configure lower layers to resume integrity protection 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;
1> configure lower layers to resume ciphering and to apply the ciphering algorithm, the K RRCenc key and the KUPenc key, i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE;
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> consider the current cell to be the PCell;
1> set the content of RRCConnectionResumeComplete message as follows:
2> set the selectedPLMN-Identity to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]) from the PLMN(s) included in the plmn-IdentityList in SystemInformationBlockType1;
2> set the dedicatedInfoNAS to include the information received from upper layers;
2> except for NB-IoT:
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:
4> include rlf-InfoAvailable;

3> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport:

4> include logMeasAvailableMBSFN;

3> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport:

4> include logMeasAvailable;

3> if the UE has connection establishment failure information available in VarConnEstFailReport and if the RPLMN is equal to plmn-Identity stored in VarConnEstFailReport:

4> include connEstFailInfoAvailable;

3> include the mobilityState and set it to the mobility state (as specified in TS 36.304 [4]) of the UE just prior to entering RRC_CONNECTED state;

3> if the UE supports storage of mobility history information and the UE has mobility history information available in VarMobilityHistoryReport:

4> include mobilityHistoryAvail;

1> submit the RRCConnectionResumeComplete message to lower layers for transmission;

1> the procedure ends.

5.3.3.5 Cell re-selection while T300, T302, T303, T305, T306, or T308 is running

The UE shall:

1> if cell reselection occurs while T300, T302, T303, T305, T306, or T308 is running:

2> if timer T302, T303, T305, T306, and/or T308 is running:

3> stop timer T302, T303, T305, T306, and T308, whichever ones were running;

3> perform the actions as specified in 5.3.3.7;

2> if timer T300 is running:

3> stop timer T300;

3> if UE has sent RRCConnectionResumeRequest message and has not received RRCConnectionResume message:

4> reset MAC and re-establish RLC for all RBs that are established;

4> suspend SRB1;

3> else:

4> reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established;

3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication;

5.3.3.6 T300 expiry

The UE shall:

1> if timer T300 expires:

2> if UE has sent RRCConnectionResumeRequest message and has not received RRCConnectionResume message:
3> reset MAC and re-establish RLC for all RBs that are established;
3> suspend SRB1;

2> else:
3> reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established;
2> if the UE is a NB-IoT UE and connEstFailOffset is included in SystemInformationBlockType2-NB:
3> use connEstFailOffset for the parameter Qoffsettemp for the concerned cell when performing cell selection and reselection according to TS 36.304 [4];

NOTE 0: For NB-IoT, the number of times that the UE detects T300 expiry on the same cell before applying connEstFailOffset and the amount of time that the UE applies connEstFailOffset before removing the offset from evaluation of the cell is up to UE implementation.

2> else if the UE supports RRC Connection Establishment failure temporary Qoffset and T300 has expired a consecutive connEstFailCount times on the same cell for which txFailParams is included in SystemInformationBlockType2:
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 36.304 [4] and TS 25.304 [40];

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> except for NB-IoT, store the following connection establishment failure information in the VarConnEstFailReport by setting its fields as follows:
3> clear the information included in VarConnEstFailReport, if any;
3> set the plmn-Identity to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]) from the PLMN(s) included in the plmn-IdentityList in SystemInformationBlockType1;
3> set the failedCellId to the global cell identity of the cell where connection establishment failure is detected;
3> set the measResultFailedCell to include the RSRP and RSRQ, if available, of the cell where connection establishment failure is detected and based on measurements collected up to the moment the UE detected the failure;
3> if available, set the measResultNeighCells, in order of decreasing ranking-criterion as used for cell re-selection, 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 (GERAN) 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 36.133 [16].

3> if detailed location information is available, set the content of the locationInfo as follows:
4> include the locationCoordinates;
4> include the horizontalVelocity, if available;
3> set the numberOfPreamblesSent to indicate the number of preambles sent by MAC for the failed random access procedure;
3> set contentionDetected to indicate whether contention resolution was not successful as specified in TS 36.321 [6] for at least one of the transmitted preambles for the failed random access procedure;
30.3.3.7 T302, T303, T305, T306, or T308 expiry or stop

The UE shall:

1> if timer T302 expires or is stopped:
   2> inform upper layers about barring alleviation for mobile terminating access;
   2> if timer T303 is not running:
      3> inform upper layers about barring alleviation for mobile originating calls;
   2> if timer T305 is not running:
      3> inform upper layers about barring alleviation for mobile originating signalling;
   2> if timer T306 is not running:
      3> inform upper layers about barring alleviation for mobile originating CS fallback;
   2> if timer T308 is not running:
      3> inform upper layers about barring alleviation for ACDC;
1> if timer T303 expires or is stopped:
   2> if timer T302 is not running:
      3> inform upper layers about barring alleviation for mobile originating calls;
1> if timer T305 expires or is stopped:
   2> if timer T302 is not running:
      3> inform upper layers about barring alleviation for mobile originating signalling;
1> if timer T306 expires or is stopped:
   2> if timer T302 is not running:
      3> inform upper layers about barring alleviation for mobile originating CS fallback;
1> if timer T308 expires or is stopped:
   2> if timer T302 is not running:
      3> inform upper layers about barring alleviation for ACDC;

5.3.3.8 Reception of the RRCConnectionReject by the UE

The UE shall:

1> stop timer T300;
1> reset MAC;
1> except for NB-IoT, start timer T302, with the timer value set to the waitTime;
1> if the UE is a NB-IoT UE; or
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5.3.3.9 Abortion of RRC connection establishment

If upper layers abort the RRC connection establishment procedure 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;

5.3.3.10 Handling of SSAC related parameters

Upon request from the upper layers, the UE shall:

1> if SystemInformationBlockType2 includes ac-BarringPerPLMN-List and the ac-BarringPerPLMN-List contains an AC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]):

2> select the AC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers;

2> in the remainder of this procedure, use the selected AC-BarringPerPLMN entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the common access barring parameters included in SystemInformationBlockType2;
5.3.3.11 Access barring check

1> if timer T302 or "Tbarring" is running:

2> consider access to the cell as barred;

1> else if SystemInformationBlockType2 includes "AC barring parameter":

2> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11], and

NOTE: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN.

3> if, for at least one of these Access Classes, the corresponding bit in the ac-BarringForSpecialAC contained in ssac-BarringForMMTEL-Voice is set to zero:

4> set BarringFactorForMMTEL-Voice to one and BarringTimeForMMTEL-Voice to zero;

3> else:

4> set BarringFactorForMMTEL-Voice and BarringTimeForMMTEL-Voice to the value of ac-BarringFactor and ac-BarringTime included in ssac-BarringForMMTEL-Voice, respectively;

2> else set BarringFactorForMMTEL-Voice to one and BarringTimeForMMTEL-Voice to zero;

1> set the local variables BarringFactorForMMTEL-Video and BarringTimeForMMTEL-Video as follows:

2> if ssac-BarringForMMTEL-Video is present:

3> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11], and

NOTE: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN.

3> if, for at least one of these Access Classes, the corresponding bit in the ac-BarringForSpecialAC contained in ssac-BarringForMMTEL-Video is set to zero:

4> set BarringFactorForMMTEL-Video to one and BarringTimeForMMTEL-Video to zero;

3> else:

4> set BarringFactorForMMTEL-Video and BarringTimeForMMTEL-Video to the value of ac-BarringFactor and ac-BarringTime included in ssac-BarringForMMTEL-Video, respectively;

2> else set BarringFactorForMMTEL-Video to one and BarringTimeForMMTEL-Video to zero;

1> forward the variables BarringFactorForMMTEL-Voice, BarringTimeForMMTEL-Voice, BarringFactorForMMTEL-Video and BarringTimeForMMTEL-Video to the upper layers;
2> else:
3> draw a random number 'rand' uniformly distributed in the range: \(0 \leq \text{rand} < 1\);
4> if 'rand' is lower than the value indicated by \textit{ac-BarringFactor} included in "AC barring parameter":
5> consider access to the cell as not barred;
3> else:
4> consider access to the cell as barred;
1> else:
2> consider access to the cell as not barred;
1> if access to the cell is barred and both timers T302 and "Tbarring" are not running:
2> draw a random number 'rand' that is uniformly distributed in the range \(0 \leq \text{rand} < 1\);
2> start timer "Tbarring" with the timer value calculated as follows, using the \textit{ac-BarringTime} included in "AC barring parameter":
"Tbarring" = (0.7+ 0.6 * \text{rand}) * \textit{ac-BarringTime};

5.3.3.12 EAB check

The UE shall:
1> if \textit{SystemInformationBlockType14} is present and includes the \textit{eab-Param}:
2> if the \textit{eab-Common} is included in the \textit{eab-Param}:
3> if the UE belongs to the category of UEs as indicated in the \textit{eab-Category} contained in \textit{eab-Common}; and
3> if for the Access Class of the UE, as stored on the USIM and with a value in the range 0..9, the corresponding bit in the \textit{eab-BarringBitmap} contained in \textit{eab-Common} is set to one:
4> consider access to the cell as barred;
3> else:
4> consider access to the cell as not barred due to EAB;
2> else (the \textit{eab-PerPLMN-List} is included in the \textit{eab-Param}):
3> select the entry in the \textit{eab-PerPLMN-List} corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]):
3> if the \textit{eab-Config} for that PLMN is included:
4> if the UE belongs to the category of UEs as indicated in the \textit{eab-Category} contained in \textit{eab-Config}; and
4> if for the Access Class of the UE, as stored on the USIM and with a value in the range 0..9, the corresponding bit in the \textit{eab-BarringBitmap} contained in \textit{eab-Config} is set to one:
5> consider access to the cell as barred;
4> else:
5> consider access to the cell as not barred due to EAB;
3> else:
4> consider access to the cell as not barred due to EAB;
1> else:
5.3.3.13 Access barring check for ACDC

The UE shall:

1. if timer T302 is running:
   2. consider access to the cell as barred;

1. else if SystemInformationBlockType2 includes "ACDC barring parameter":
   2. draw a random number 'rand' uniformly distributed in the range: $0 \leq \text{rand} < 1$;
   2. if 'rand' is lower than the value indicated by ac-BarringFactor included in "ACDC barring parameter":
      3. consider access to the cell as not barred;
   2. else:
      3. consider access to the cell as barred;

1. else:
   2. consider access to the cell as not barred;

1. if access to the cell is barred and timer T302 is not running:
   2. draw a random number 'rand' that is uniformly distributed in the range $0 \leq \text{rand} < 1$;
   2. start timer "Tbarring" with the timer value calculated as follows, using the ac-BarringTime included in "ACDC barring parameter":
      "Tbarring" = $(0.7 + 0.6 \cdot \text{rand}) \cdot \text{ac-BarringTime}$. 

5.3.3.14 Access Barring check for NB-IoT

The UE shall:

1. if ab-Enabled included in MasterInformationBlock-NB is set to TRUE and SystemInformationBlockType14-NB is broadcast:
   2. if the ab-Common is included in ab-Param:
      3. if the UE belongs to the category of UEs as indicated in the ab-Category contained in ab-Common; and
      3. if for the Access Class of the UE, as stored on the USIM and with a value in the range 0..9, the corresponding bit in the ab-BarringBitmap contained in ab-Common is set to one:
         4. if the establishmentCause received from higher layers is set to mo-ExceptionData and ab-BarringForExceptionData is set to FALSE in the ab-Common:
            5. consider access to the cell as not barred;
         4. else:
            5. if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11] and for at least one of these valid Access Classes for the UE, the corresponding bit in the ab-BarringForSpecialAC contained in ab-Common is set to zero:
               NOTE 1: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN.
            6. consider access to the cell as not barred;
         5. else:
6> consider access to the cell as barred;
   3> else:
   4> consider access to the cell as not barred;

2> else (the ab-PerPLMN-List is included in the ab-Param):

6> select the ab-PerPLMN entry in ab-PerPLMN-List corresponding to the PLMN selected by upper layers
   (see TS 23.122 [11], TS 24.301 [35]);

3> if the ab-Config for that PLMN is included:

4> if the UE belongs to the category of UEs as indicated in the ab-Category contained in ab-Config; and

4> if for the Access Class of the UE, as stored on the USIM and with a value in the range 0..9, the
   corresponding bit in the ab-BarringBitmap contained in ab-Config is set to one:

5> if the establishmentCause received from higher layers is set to mo-ExceptionData and ab-
   BarringForExceptionData is set to FALSE in the ab-Config:
   6> consider access to the cell as not barred;

5> else:

6> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range
   11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11] and
   for at least one of these valid Access Classes for the UE, the corresponding bit in the ab-
   BarringForSpecialAC contained in ab-Config is set to zero:

NOTE 2: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the
HPLMN/ EHPLMN.

7> consider access to the cell as not barred;

6> else:

7> consider access to the cell as barred;

4> else:

5> consider access to the cell as not barred;

3> else:

4> consider access to the cell as not barred;

1> else:

2> consider access to the cell as not barred;
5.3.4 Initial security activation

5.3.4.1 General

![Security mode command, successful](image1)

![Security mode command, failure](image2)

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

5.3.4.2 Initiation

E-UTRAN initiates the security mode command procedure to a UE in RRC_CONNECTED. Moreover, E-UTRAN applies the procedure as follows:

- when only SRB1, or for NB-IoT SRB1 and SRB1bis, is established, i.e. prior to establishment of SRB2 and/or DRBs.

5.3.4.3 Reception of the SecurityModeCommand by the UE

The UE shall:

1> derive the $K_{SNB}$ key, as specified in TS 33.401 [32];

1> derive the $K_{RRC_{int}}$ key associated with the integrityProtAlgorithm indicated in the SecurityModeCommand message, as specified in TS 33.401 [32];

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 $K_{RRC_{int}}$ key;

1> if the SecurityModeCommand message passes the integrity protection check:

2> derive the $K_{RRC_{enc}}$ key and the $K_{UPenc}$ key associated with the cipheringAlgorithm indicated in the SecurityModeCommand message, as specified in TS 33.401 [32];

2> if connected as an RN:

3> derive the $K_{UPenc}$ key associated with the integrityProtAlgorithm indicated in the SecurityModeCommand message, as specified in TS 33.401 [32];
configure lower layers to apply 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;

configure lower layers to apply ciphering using the indicated algorithm, the $K_{RRCenc}$ key and the $K_{UPenc}$ key after 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;

if connected as an RN:

configure lower layers to apply integrity protection using the indicated algorithm and the $K_{UPint}$ key, for DRBs that are subsequently configured to apply integrity protection, if any;

consider AS security to be activated;

upon RRC connection establishment, if UE does not need UL gaps during continuous uplink transmission:

configure lower layers to stop using UL gaps during continuous uplink transmission in FDD for SecurityModeComplete message and subsequent uplink transmission in RRC_CONNECTED except for UL transmissions as specified in TS36.211 [21];

submit the SecurityModeComplete message to lower layers for transmission, upon which the procedure ends;

else:

continue using the configuration used prior to the reception of the SecurityModeCommand message, i.e. neither apply integrity protection nor ciphering.

submit the SecurityModeFailure message to lower layers for transmission, upon which the procedure ends;

5.3.5 RRC connection reconfiguration

5.3.5.1 General

Figure 5.3.5.1-1: RRC connection reconfiguration, successful

Figure 5.3.5.1-2: RRC connection reconfiguration, failure
The purpose of this procedure is to modify an RRC connection, e.g. to establish/modify/release RBs, to perform handover, to setup/modify/release measurements, to add/modify/release SCells. As part of the procedure, NAS dedicated information may be transferred from E-UTRAN to the UE.

5.3.5.2 Initiation

E-UTRAN may initiate the RRC connection reconfiguration procedure to a UE in RRC_CONNECTED. E-UTRAN applies the procedure as follows:

- the mobilityControlInfo is included only when AS-security has been activated, and SRB2 with at least one DRB are setup and not suspended;
- the establishment of RBs (other than SRB1, that is established during RRC connection establishment) is included only when AS security has been activated;
- the addition of SCells is performed only when AS security has been activated;

5.3.5.3 Reception of an RRCConnectionReconfiguration not including the mobilityControlInfo by the UE

If the RRCConnectionReconfiguration message does not include the mobilityControlInfo and the UE is able to comply with the configuration included in this message, the UE shall:

1> if this is the first RRCConnectionReconfiguration message after successful completion of the RRC connection re-establishment procedure:
2> re-establish PDCP for SRB2 and for all DRBs that are established, if any;
2> re-establish RLC for SRB2 and for all DRBs that are established, if any;
2> if the RRCConnectionReconfiguration message includes the fullConfig:
3> perform the radio configuration procedure as specified in 5.3.5.8;
2> if the RRCConnectionReconfiguration message includes the radioResourceConfigDedicated:
3> perform the radio resource configuration procedure as specified in 5.3.10;
2> resume SRB2 and all DRBs that are suspended, if any;

NOTE 1: The handling of the radio bearers after the successful completion of the PDCP re-establishment, e.g. the re-transmission of unacknowledged PDCP SDUs (as well as the associated status reporting), the handling of the SN and the HFN, is specified in TS 36.323 [8].

NOTE 2: The UE may discard SRB2 messages and data that it receives prior to completing the reconfiguration used to resume these bearers.

1> else:
2> if the RRCConnectionReconfiguration message includes the radioResourceConfigDedicated:
3> perform the radio resource configuration procedure as specified in 5.3.10;

NOTE 3: If the RRCConnectionReconfiguration message includes the establishment of radio bearers other than SRB1, the UE may start using these radio bearers immediately, i.e. there is no need to wait for an outstanding acknowledgment of the SecurityModeComplete message.

1> if the received RRCConnectionReconfiguration includes the sCellToReleaseList:
2> perform SCell release as specified in 5.3.10.3a;
1> if the received RRCConnectionReconfiguration includes the sCellToAddModList:
2> perform SCell addition or modification as specified in 5.3.10.3b;
1> if the received RRCConnectionReconfiguration includes the scg-Configuration; or
if the current UE configuration includes one or more split DRBs and the received 
RRCConnectionReconfiguration includes radioResourceConfigDedicated including drb-ToAddModList:

2> perform SCG reconfiguration as specified in 5.3.10.10;

1> if the received RRCConnectionReconfiguration includes the systemInformationBlockType1Dedicated:

2> perform the actions upon reception of the SystemInformationBlockType1 message as specified in 5.2.2.7;

1> if the RRCConnectionReconfiguration message includes the dedicatedInfoNASList:

2> forward each element of the dedicatedInfoNASList to upper layers in the same order as listed;

1> if the RRCConnectionReconfiguration message includes the measConfig:

2> perform the measurement configuration procedure as specified in 5.5.2;

1> perform the measurement identity autonomous removal as specified in 5.5.2.2a;

1> if the RRCConnectionReconfiguration message includes the otherConfig:

2> perform the other configuration procedure as specified in 5.3.10.9;

1> if the RRCConnectionReconfiguration message includes the sl-DiscConfig or sl-CommConfig:

2> perform the sidelink dedicated configuration procedure as specified in 5.3.10.15;

1> if the RRCConnectionReconfiguration message includes wlan-OffloadInfo:

2> perform the dedicated WLAN offload configuration procedure as specified in 5.6.12.2;

1> if the RRCConnectionReconfiguration message includes rclwi-Configuration:

2> perform the WLAN traffic steering command procedure as specified in 5.6.16.2;

1> if the RRCConnectionReconfiguration message includes lwa-Configuration:

2> perform the LWA configuration procedure as specified in 5.6.14.2;

1> if the RRCConnectionReconfiguration message includes lwip-Configuration:

2> perform the LWIP reconfiguration procedure as specified in 5.6.17.2;

1> upon RRC connection establishment, if UE does not need UL gaps during continuous uplink transmission:

2> configure lower layers to stop using UL gaps during continuous uplink transmission in FDD for 
RRCConnectionReconfigurationComplete message and subsequent uplink transmission in 
RRC_CONNECTED except for UL transmissions as specified in TS36.211 [21];

1> submit the RRCConnectionReconfigurationComplete message to lower layers for transmission using the new 
configuration, upon which the procedure ends;

5.3.5.4 Reception of an RRCConnectionReconfiguration including the mobilityControlInfo by the UE (handover)

If the RRCConnectionReconfiguration message includes the mobilityControlInfo and the UE is able to comply with the 
configuration included in this message, the UE shall:

1> stop timer T310, if running;

1> stop timer T312, if running;

1> start timer T304 with the timer value set to \( t_{304} \) as included in the mobilityControlInfo;

1> stop timer T370, if running;

1> if the carrierFreq is included:
2> consider the target PCell to be one on the frequency indicated by the carrierFreq with a physical cell identity indicated by the targetPhysCellId;

1> else:

2> consider the target PCell to be one on the frequency of the source PCell with a physical cell identity indicated by the targetPhysCellId;

1> start synchronising to the DL of the target PCell;

NOTE 1: The UE should perform the handover as soon as possible following the reception of the RRC message triggering the handover, which could be before confirming successful reception (HARQ and ARQ) of this message.

1> if BL UE or UE in CE:

2> acquire the MasterInformationBlock in the target PCell;

1> reset MCG MAC and SCG MAC, if configured;

1> re-establish PDCP for all RBs that are established;

NOTE 2: The handling of the radio bearers after the successful completion of the PDCP re-establishment, e.g. the re-transmission of unacknowledged PDCP SDUs (as well as the associated status reporting), the handling of the SN and the HFN, is specified in TS 36.323 [8].

1> re-establish MCG RLC and SCG RLC, if configured, for all RBs that are established;

1> configure lower layers to consider the SCell(s) other than the PSCell, if configured, to be in deactivated state;

1> apply the value of the newUE-Identity as the C-RNTI;

1> if the RRCConnectionReconfiguration message includes the fullConfig:

2> perform the radio configuration procedure as specified in 5.3.5.8;

1> configure lower layers in accordance with the received radioResourceConfigCommon;

1> configure lower layers in accordance with any additional fields, not covered in the previous, if included in the received mobilityControlInfo;

1> if the received RRCConnectionReconfiguration includes the sCellToReleaseList:

2> perform SCell release as specified in 5.3.10.3a;

1> if the received RRCConnectionReconfiguration includes the scg-Configuration; or

1> if the current UE configuration includes one or more split DRBs and the received RRCConnectionReconfiguration includes radioResourceConfigDedicated including drb-ToAddModList:

2> perform SCG reconfiguration as specified in 5.3.10.10;

1> if the RRCConnectionReconfiguration message includes the radioResourceConfigDedicated:

2> perform the radio resource configuration procedure as specified in 5.3.10;

1> if the keyChangeIndicator received in the securityConfigHO is set to TRUE:

2> update the K_{NB} key based on the K_{ASME} key taken into use with the latest successful NAS SMC procedure, as specified in TS 33.401 [32];

1> else:

2> update the K_{NB} key based on the current K_{NB} or the NH, using the nextHopChainingCount value indicated in the securityConfigHO, as specified in TS 33.401 [32];

1> store the nextHopChainingCount value;
1> if the `securityAlgorithmConfig` is included in the `securityConfigHO`:
   2> derive the \( K_{RRC\text{int}} \) key associated with the `integrityProtAlgorithm`, as specified in TS 33.401 [32];
   2> if connected as an RN:
      3> derive the \( K_{UP\text{int}} \) key associated with the `integrityProtAlgorithm`, as specified in TS 33.401 [32];
   2> derive the \( K_{RRC\text{enc}} \) key and the \( K_{UP\text{enc}} \) key associated with the `cipheringAlgorithm`, as specified in TS 33.401 [32];
1> else:
   2> derive the \( K_{RRC\text{int}} \) key associated with the current integrity algorithm, as specified in TS 33.401 [32];
   2> if connected as an RN:
      3> derive the \( K_{UP\text{int}} \) key associated with the current integrity algorithm, as specified in TS 33.401 [32];
   2> derive the \( K_{RRC\text{enc}} \) key and the \( K_{UP\text{enc}} \) key associated with the current ciphering algorithm, as specified in TS 33.401 [32];
1> configure lower layers to apply the integrity protection algorithm and the \( K_{RRC\text{enc}} \) key, 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;
1> configure lower layers to apply the ciphering algorithm, the \( K_{RRC\text{enc}} \) key and the \( K_{UP\text{enc}} \) key, 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;
1> if connected as an RN:
   2> configure lower layers to apply the integrity protection algorithm and the \( K_{UP\text{int}} \) key, for current or subsequently established DRBs that are configured to apply integrity protection, if any;
1> if the received `RRCConnectionReconfiguration` includes the `sCellToAddModList`:
   2> perform SCell addition or modification as specified in 5.3.10.3b;
1> if the received `RRCConnectionReconfiguration` includes the `systemInformationBlockType1Dedicated`:
   2> perform the actions upon reception of the `SystemInformationBlockType1` message as specified in 5.2.2.7;
1> perform the measurement related actions as specified in 5.5.6.1;
1> if the `RRCConnectionReconfiguration` message includes the `measConfig`:
   2> perform the measurement configuration procedure as specified in 5.5.2;
1> perform the measurement identity autonomous removal as specified in 5.5.2.2a;
1> release `reportProximityConfig` and clear any associated proximity status reporting timer;
1> if the `RRCConnectionReconfiguration` message includes the `otherConfig`:
   2> perform the other configuration procedure as specified in 5.3.10.9;
1> if the `RRCConnectionReconfiguration` message includes the `sl-DiscConfig` or `sl-CommConfig`:
   2> perform the sidelink dedicated configuration procedure as specified in 5.3.10.15;
1> if the `RRCConnectionReconfiguration` message includes `wlan-OffloadInfo`:
   2> perform the dedicated WLAN offload configuration procedure as specified in 5.6.12.2;
1> release the LWA configuration, if configured, as described in 5.6.14.3;
1> release the LWIP configuration, if configured, as described in 5.6.17.3;
1. if the **RRCConnectionReconfiguration** message includes *rclwi-Configuration*:
   2. perform the WLAN traffic steering command procedure as specified in 5.6.16.2;

1. if the **RRCConnectionReconfiguration** message includes *lwa-Configuration*:
   2. perform the LWA configuration procedure as specified in 5.6.14.2;

1. if the **RRCConnectionReconfiguration** message includes *lwip-Configuration*:
   2. perform the LWIP reconfiguration procedure as specified in 5.6.17.2;

1. set the content of **RRCConnectionReconfigurationComplete** message as follows:
   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*:
      3. include *rlf-InfoAvailable*;
   2. if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport* and if T330 is not running:
      3. include *logMeasAvailableMBSFN*;
   2. else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
      3. include *logMeasAvailable*;
   2. if the UE has connection establishment failure information available in *VarConnEstFailReport* and if the RPLMN is equal to *plmn-Identity* stored in *VarConnEstFailReport*:
      3. include *connEstFailInfoAvailable*;

1. submit the **RRCConnectionReconfigurationComplete** message to lower layers for transmission;

1. if MAC successfully completes the random access procedure:
   2. stop timer T304;
   2. apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PCell, if any;
   2. apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PCell (e.g. measurement gaps, periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PCell;

**NOTE 3:** Whenever the UE shall setup or reconfigure a configuration in accordance with a field that is received it applies the new configuration, except for the cases addressed by the above statements.

2. if the UE is configured to provide IDC indications:
   3. if the UE has transmitted an *InDeviceCoexIndication* message during the last 1 second preceding reception of the **RRCConnectionReconfiguration** message including *mobilityControlInfo*:
      4. initiate transmission of the *InDeviceCoexIndication* message in accordance with 5.6.9.3;

2. if the UE is configured to provide power preference indications:
   3. if the UE has transmitted a *UEAssistanceInformation* message during the last 1 second preceding reception of the **RRCConnectionReconfiguration** message including *mobilityControlInfo*:
      4. initiate transmission of the *UEAssistanceInformation* message in accordance with 5.6.10.3;

2. if SystemInformationBlockType15 is broadcast by the PCell:
   3. if the UE has transmitted a *MBMSInterestIndication* message during the last 1 second preceding reception of the **RRCConnectionReconfiguration** message including *mobilityControlInfo*:
4> ensure having a valid version of SystemInformationBlockType15 for the PCell;
4> determine the set of MBMS frequencies of interest in accordance with 5.8.5.3;
4> determine the set of MBMS services of interest in accordance with 5.8.5.3a;
4> initiate transmission of the MBMSInterestIndication message in accordance with 5.8.5.4;

2> if SystemInformationBlockType18 is broadcast by the target PCell; and the UE transmitted a SidelinkUEInformation message indicating a change of sidelink communication related parameters relevant in target PCell (i.e. change of commRxInterestedFreq or commTxResourceReq, commTxResourceReqUC if SystemInformationBlockType18 includes commTxResourceUC-ReqAllowed or commTxResourceInfoReqRelay if PCell broadcasts SystemInformationBlockType19 including discConfigRelay) during the last 1 second preceding reception of the RRCConnectionReconfiguration message including mobilityControlInfo; or

2> if SystemInformationBlockType19 is broadcast by the target PCell; and the UE transmitted a SidelinkUEInformation message indicating a change of sidelink discovery related parameters relevant in target PCell (i.e. change of discRxInterest or discTxResourceReq, discTxResourceReqPS if SystemInformationBlockType19 includes discConfigPS or discRxGapReq or discTxGapReq if the UE is configured with gapRequestsAllowedDedicated set to true or if the UE is not configured with gapRequestsAllowedDedicated and SystemInformationBlockType19 includes gapRequestsAllowedCommon) during the last 1 second preceding reception of the RRCConnectionReconfiguration message including mobilityControlInfo:

3> initiate transmission of the SidelinkUEInformation message in accordance with 5.10.2.3;

2> the procedure ends;

NOTE 4: The UE is not required to determine the SFN of the target PCell by acquiring system information from that cell before performing RACH access in the target PCell, except for BL UEs or UEs in CE.

5.3.5.5 Reconfiguration failure

The UE shall:

1> if the UE is unable to comply with (part of) the configuration included in the RRCConnectionReconfiguration message:

2> continue using the configuration used prior to the reception of RRCConnectionReconfiguration message;

2> if security has not been activated:

3> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause other;

2> else:

3> initiate the connection re-establishment procedure as specified in 5.3.7, upon which the connection reconfiguration procedure ends;

NOTE 1: The UE may apply above failure handling also in case the RRCConnectionReconfiguration message causes a protocol error for which the generic error handling as defined in 5.7 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.

5.3.5.6 T304 expiry (handover failure)

The UE shall:

1> if T304 expires (handover failure):

NOTE 1: Following T304 expiry any dedicated preamble, if provided within the rach-ConfigDedicated, is not available for use by the UE anymore.
2> revert back to the configuration used in the source PCell, excluding the configuration configured by the
physicalConfigDedicated, the mac-MainConfig and the sps-Config;

2> store the following handover failure information in VarRLF-Report by setting its fields as follows:

3> clear the information included in VarRLF-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 measResultLastServCell to include the RSRP and RSRQ, if available, of the source PCell based on
measurements collected up to the moment the UE detected handover failure and in accordance with the
following;
4> if the UE includes rsrqResult, include the lastServCellRSRQ-Type;
3> set the measResultNeighCells to include the best measured cells, other than the source PCell, ordered such
that the best cell is listed first, and based on measurements collected up to the moment the UE detected
handover failure, and set its fields as follows:
4> if the UE was configured to perform measurements for one or more EUTRA frequencies, include the
measResultEUTRA;
4> if the UE includes rsrqResult, include the rsrq-Type;
4> if the UE was configured to perform measurement reporting for one or more neighbouring UTRA
frequencies, include the measResultUTRA;
4> if the UE was configured to perform measurement reporting for one or more neighbouring GERAN
frequencies, include the measResultGERAN;
4> if the UE was configured to perform measurement reporting for one or more neighbouring
CDMA2000 frequencies, include the measResultsCDMA2000;
4> for each neighbour cell included, include the optional fields that are available;

NOTE 2: 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. Blacklisted cells are not required to be reported.

3> if detailed location information is available, set the content of the locationInfo as follows:
4> include the locationCoordinates;
4> include the horizontalVelocity, if available;
3> set the failedPCellId to the global cell identity, if available, and otherwise to the physical cell identity and
carrier frequency of the target PCell of the failed handover;
3> include previousPCellId and set it to the global cell identity of the PCell where the last
RRConnectionReconfiguration message including mobilityControlInfo was received;
3> set the timeConnFailure to the elapsed time since reception of the last RRConnectionReconfiguration
message including the mobilityControlInfo;
3> set the connectionFailureType to 'hof';
3> set the c-RNTI to the C-RNTI used in the source PCell;

2> initiate the connection re-establishment procedure as specified in 5.3.7, upon which the RRC connection
reconfiguration procedure ends;

The UE may discard the handover failure information, i.e. release the UE variable VarRLF-Report, 48 hours after the
failure is detected, upon power off or upon detach.

NOTE 3: E-UTRAN may retrieve the handover failure information using the UE information procedure with rlf-
ReportReq set to true, as specified in 5.6.5.3.
5.3.5.7 Void

5.3.5.7a T307 expiry (SCG change failure)

The UE shall:

1> if T307 expires:

   NOTE 1: Following T307 expiry any dedicated preamble, if provided within the rach-ConfigDedicatedSCG, is not available for use by the UE anymore.

2> initiate the SCG failure information procedure as specified in 5.6.13 to report SCG change failure;

5.3.5.8 Radio Configuration involving full configuration option

The UE shall:

1> release/clear all current dedicated radio configurations except the MCG C-RNTI, the MCG security configuration and the PDCP, RLC, logical channel configurations for the RBs and the logged measurement configuration;

NOTE 1: Radio configuration is not just the resource configuration but includes other configurations like MeasConfig and OtherConfig.

1> if the RRCConnectionReconfiguration message includes the mobilityControlInfo:

   2> release/clear all current common radio configurations;

   2> use the default values specified in 9.2.5 for timer T310, T311 and constant N310, N311;

1> else:

   2> use values for timers T301, T310, T311 and constants N310, N311, as included in ue-TimersAndConstants received in SystemInformationBlockType2 (or SystemInformationBlockType2-NB in NB-IoT);

1> apply the default physical channel configuration as specified in 9.2.4;

1> apply the default semi-persistent scheduling configuration as specified in 9.2.3;

1> apply the default MAC main configuration as specified in 9.2.2;

1> if the UE is a NB-IoT UE; or

1> for each srb-Identity value included in the srb-ToAddModList (SRB reconfiguration):

   2> apply the specified configuration defined in 9.1.2 for the corresponding SRB;

   2> apply the corresponding default RLC configuration for the SRB specified in 9.2.1.1 for SRB1 or in 9.2.1.2 for SRB2;

   2> apply the corresponding default logical channel configuration for the SRB as specified in 9.2.1.1 for SRB1 or in 9.2.1.2 for SRB2;

NOTE 2: This is to get the SRBs (SRB1 and SRB2 for handover and SRB2 for reconfiguration after reestablishment) to a known state from which the reconfiguration message can do further configuration.

1> for each eps-BearerIdentity value included in the drb-ToAddModList that is part of the current UE configuration:

   2> release the PDCP entity;

   2> release the RLC entity or entities;

   2> release the DTCH logical channel;

   2> release the drb-identity;
NOTE 3: This will retain the eps-bearerIdentity but remove the DRBs including drb-identity of these bearers from the current UE configuration and trigger the setup of the DRBs within the AS in Section 5.3.10.3 using the new configuration. The eps-bearerIdentity 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 eps-BearerIdentity value that is part of the current UE configuration but not part of the drb-ToAddModList:

2> perform DRB release as specified in 5.3.10.2;

5.3.6 Counter check

5.3.6.1 General

![Diagram](#)

Figure 5.3.6.1-1: Counter check procedure

The counter check procedure is used by E-UTRAN 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 E-UTRAN.

NOTE: The procedure enables E-UTRAN to detect packet insertion by an intruder (a ‘man in the middle’).

5.3.6.2 Initiation

E-UTRAN initiates the procedure by sending a CounterCheck message.

NOTE: E-UTRAN 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 the corresponding COUNT;

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 the corresponding COUNT;

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

![Diagram of RRC connection re-establishment](image)

The purpose of this procedure is to re-establish the RRC connection, which involves the resumption of SRB1 operation, the re-activation of security and the configuration of only the PCell.

A UE in RRC_CONNECTED, for which security has been activated, may initiate the procedure in order to continue the RRC connection. The connection re-establishment succeeds only if the concerned cell is prepared i.e. has a valid UE context. In case E-UTRAN accepts the re-establishment, SRB1 operation resumes while the operation of other radio bearers remains suspended. If AS security has not been activated, the UE does not initiate the procedure but instead moves to RRC_IDLE directly.

E-UTRAN applies the procedure as follows:

- to reconfigure SRB1 and to resume data transfer only for this RB;
- to re-activate AS security without changing algorithms.

5.3.7.2 Initiation

The UE shall only initiate the procedure when AS security has been activated. The UE initiates the procedure when one of the following conditions is met:

1> upon detecting radio link failure, in accordance with 5.3.11; or

1> upon handover failure, in accordance with 5.3.5.6; or
Upon initiation of the procedure, the UE shall:

1. stop timer T310, if running;
2. stop timer T312, if running;
3. stop timer T313, if running;
4. stop timer T307, if running;
5. start timer T311;
6. stop timer T370, if running;
7. suspend all RBs except SRB0;
8. reset MAC;
9. release the MCG SCell(s), if configured, in accordance with 5.3.10.3a;
10. apply the default physical channel configuration as specified in 9.2.4;
11. except for NB-IoT, for the MCG, apply the default semi-persistent scheduling configuration as specified in 9.2.3;
12. for the MCG, apply the default MAC main configuration as specified in 9.2.2;
13. release powerPrefIndicationConfig, if configured and stop timer T340, if running;
14. release reportProximityConfig, if configured and clear any associated proximity status reporting timer;
15. release obtainLocationConfig, if configured;
16. release idc-Config, if configured;
17. release measSubframePatternPCell, if configured;
18. release the entire SCG configuration, if configured, except for the DRB configuration (as configured by drb-ToAddModListSCG);
19. release naics-Info for the PCell, if configured;
20. if connected as an RN and configured with an RN subframe configuration:
   20.1 release the RN subframe configuration;
21. release the LWA configuration, if configured, as described in 5.6.14.3;
22. release the LWIP configuration, if configured, as described in 5.6.17.3;
23. perform cell selection in accordance with the cell selection process as specified in TS 36.304 [4];

5.3.7.3 Actions following cell selection while T311 is running

Upon selecting a suitable E-UTRA cell, the UE shall:

1. stop timer T311;
2. start timer T301;
3. apply the timeAlignmentTimerCommon included in SystemInformationBlockType2;
4. initiate transmission of the RRConnectionReestablishmentRequest message in accordance with 5.3.7.4;
NOTE: This procedure applies also if the UE returns to the source PCell.

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

1> if the selected cell is a UTRA cell, and if the UE supports Radio Link Failure Report for Inter-RAT MRO, include selectedUTRA-CellId in the VarRLF-Report and set it to the physical cell identity and carrier frequency of the selected UTRA cell;

1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';

5.3.7.4 Actions related to transmission of \textit{RRCConnectionReestablishmentRequest} message

Except for NB-IoT, if the procedure was initiated due to radio link failure or handover failure, the UE shall:

1> set the reestablishmentCellId in the VarRLF-Report to the global cell identity of the selected cell;

The UE shall set the contents of \textit{RRCConnectionReestablishmentRequest} message as follows:

1> set the ue-Identity as follows:

2> set the c-RNTI to the C-RNTI used in the source PCell (handover and mobility from E-UTRA 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 (handover and mobility from E-UTRA 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 section 8 (i.e., a multiple of 8 bits) VarShortMAC-Input (or VarShortMAC-Input-NB in NB-IoT);

3> with the K_{RRCint} key and integrity protection algorithm that was used in the source PCell (handover and mobility from E-UTRA 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 5.3.5.5 (the UE is unable to comply with the reconfiguration):

3> set the reestablishmentCause to the value reconfigurationFailure;

2> else if the re-establishment procedure was initiated due to handover failure as specified in 5.3.5.6 (intra-LTE handover failure) or 5.4.3.5 (inter-RAT mobility from EUTRA failure):

3> set the reestablishmentCause to the value handoverFailure;

2> else:

3> set the reestablishmentCause to the value otherFailure;

The UE shall submit the \textit{RRCConnectionReestablishmentRequest} message to lower layers for transmission.

5.3.7.5 Reception of the \textit{RRCConnectionReestablishment} by the UE

NOTE 1: Prior to this, lower layer signalling is used to allocate a C-RNTI. For further details see TS 36.321 [6];

The UE shall:

1> stop timer T301;

1> consider the current cell to be the PCell;
1> re-establish PDCP for SRB1;
1> re-establish RLC for SRB1;
1> perform the radio resource configuration procedure in accordance with the received
   radioResourceConfigDedicated and as specified in 5.3.10;
1> resume SRB1;

NOTE 2: E-UTRAN should not transmit any message on SRB1 prior to receiving the
   RRCConnectionReestablishmentComplete message.

1> update the $K_{\text{CNB}}$ key based on the $K_{\text{ASME}}$ key to which the current $K_{\text{CNB}}$ is associated, using the
   nextHopChainingCount value indicated in the RRCConnectionReestablishment message, as specified in TS
   33.401 [32];
1> store the nextHopChainingCount value;
1> derive the $K_{\text{RRCint}}$ key associated with the previously configured integrity algorithm, as specified in TS 33.401
   [32];
1> derive the $K_{\text{RRCenc}}$ key and the $K_{\text{UPenc}}$ key associated with the previously configured ciphering algorithm, as
   specified in TS 33.401 [32];
1> if connected as an RN:
   2> derive the $K_{\text{UPint}}$ key associated with the previously configured integrity algorithm, as specified in TS 33.401
      [32];
1> configure lower layers to activate integrity protection using the previously configured algorithm and the $K_{\text{RRCint}}$
   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> if connected as an RN:
   2> configure lower layers to apply integrity protection using the previously configured algorithm and the $K_{\text{UPint}}$
      key, for subsequently resumed or subsequently established DRBs that are configured to apply integrity
      protection, if any;
1> configure lower layers to apply ciphering using the previously configured algorithm, the $K_{\text{RRCenc}}$ key and the
   $K_{\text{UPenc}}$ 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> if the UE is not a NB-IoT UE:
   2> set the content of RRCConnectionReestablishmentComplete message as follows:
      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:
         4> include the rlf-InfoAvailable;
      3> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in
         plmn-IdentityList stored in VarLogMeasReport and if T330 is not running:
         4> include logMeasAvailableMBSFN;
      3> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in plmn-
         IdentityList stored in VarLogMeasReport:
         4> include the logMeasAvailable;
      3> if the UE has connection establishment failure information available in VarConnEstFailReport and if the
         RPLMN is equal to plmn-Identity stored in VarConnEstFailReport:
         4> include the connEstFailInfoAvailable;
2> perform the measurement related actions as specified in 5.5.6.1;
2> perform the measurement identity autonomous removal as specified in 5.5.2.2a;
1> submit the `RRCConnectionReestablishmentComplete` message to lower layers for transmission;
1> if `SystemInformationBlockType15` is broadcast by the PCell:
2> if the UE has transmitted an `MBMSInterestIndication` message during the last 1 second preceding detection of radio link failure:
3> ensure having a valid version of `SystemInformationBlockType15` for the PCell;
3> determine the set of MBMS frequencies of interest in accordance with 5.8.5.3;
3> determine the set of MBMS services of interest in accordance with 5.8.5.3a;
3> initiate transmission of the `MBMSInterestIndication` message in accordance with 5.8.5.4;
1> if `SystemInformationBlockType18` is broadcast by the PCell; and the UE transmitted a `SidelinkUEInformation` message indicating a change of sidelink communication related parameters relevant in PCell (i.e. change of `commRxInterestedFreq` or `commTxResourceReq`, `commTxResourceReqUC` if `SystemInformationBlockType18` includes `commTxResourceUC-ReqAllowed` or `commTxResourceInfoReqRelay` if PCell broadcasts `SystemInformationBlockType19` including `discConfigRelay`) during the last 1 second preceding detection of radio link failure; or
1> if `SystemInformationBlockType19` is broadcast by the PCell; and the UE transmitted a `SidelinkUEInformation` message indicating a change of sidelink discovery related parameters relevant in PCell (i.e. change of `discRxInterest` or `discTxResourceReq`, `discTxResourceReqPS` if `SystemInformationBlockType19` includes `discConfigPS` or `discRxGapReq` or `discTxGapReq` if the UE is configured with `gapRequestsAllowedDedicated` set to true or if the UE is not configured with `gapRequestsAllowedDedicated` and `SystemInformationBlockType19` includes `gapRequestsAllowedCommon`) during the last 1 second preceding detection of radio link failure:
2> initiate transmission of the `SidelinkUEInformation` message in accordance with 5.10.2.3;
1> the procedure ends;

5.3.7.6 T311 expiry

Upon T311 expiry, the UE shall:

1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';

5.3.7.7 T301 expiry or selected cell 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 36.304 [4]:
2> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';

5.3.7.8 Reception of `RRCConnectionReestablishmentReject` by the UE

Upon receiving the `RRCConnectionReestablishmentReject` message, the UE shall:

1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';
5.3.8  RRC connection release

5.3.8.1  General

![Diagram of RRCConnectionRelease](image)

The purpose of this procedure is:

- to release the RRC connection, which includes the release of the established radio bearers as well as all radio resources;

or:

- to suspend the RRC connection, which includes the suspension of the established radio bearers.

5.3.8.2  Initiation

E-UTRAN initiates the RRC connection release procedure to a UE in RRC_CONNECTED.

5.3.8.3  Reception of the \textit{RRCConnectionRelease} by the UE

The UE shall:

1> except for NB-IoT, BL UEs or UEs in CE, delay the following actions defined in this sub-clause 60 ms from the moment the \textit{RRCConnectionRelease} message was received or optionally when lower layers indicate that the receipt of the \textit{RRCConnectionRelease} message has been successfully acknowledged, whichever is earlier;

1> for BL UEs or UEs in CE, delay the following actions defined in this sub-clause 1.25 seconds from the moment the \textit{RRCConnectionRelease} message was received or optionally when lower layers indicate that the receipt of the \textit{RRCConnectionRelease} message has been successfully acknowledged, whichever is earlier;

1> for NB-IoT, delay the following actions defined in this sub-clause 10 seconds from the moment the \textit{RRCConnectionRelease} message was received or optionally when lower layers indicate that the receipt of the \textit{RRCConnectionRelease} message has been successfully acknowledged, whichever is earlier;

1> if the \textit{RRCConnectionRelease} message includes the \textit{idleModeMobilityControlInfo}:

2> store the cell reselection priority information provided by the \textit{idleModeMobilityControlInfo};

2> if the \textit{t320} is included:

3> start timer T320, with the timer value set according to the value of \textit{t320};

1> else:

2> apply the cell reselection priority information broadcast in the system information;

1> if the \textit{releaseCause} received in the \textit{RRCConnectionRelease} message indicates \textit{loadBalancingTAURequired}:

2> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'load balancing TAU required';

1> else if the \textit{releaseCause} received in the \textit{RRCConnectionRelease} message indicates \textit{cs-FallbackHighPriority}:

2> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'CS Fallback High Priority';

1> else:
2> if the `extendedWaitTime` is present; and
2> if the UE supports delay tolerant access or the UE is a NB-IoT UE:
3> forward the `extendedWaitTime` to upper layers;
2> if the `releaseCause` received in the `RRCConnectionRelease` message indicates `rrc-Suspend`:
3> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause ‘RRC suspension’;
2> else:
3> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause ‘other’;

5.3.8.4 T320 expiry

The UE shall:
1> if T320 expires:
2> if stored, discard the cell reselection priority information provided by the `idleModeMobilityControlInfo` or inherited from another RAT;
2> apply the cell reselection priority information broadcast in the system information;

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.

NOTE: Upper layers invoke the procedure, e.g. upon determining that the network has failed an authentication check, see TS 24.301 [35].

5.3.9.2 Initiation

The UE initiates the procedure when upper layers request the release of the RRC connection. 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 36.304 [4];
1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause ‘other’;

5.3.10 Radio resource configuration

5.3.10.0 General

The UE shall:
1> if the received `radioResourceConfigDedicated` includes the `srb-ToAddModList`:
2> perform the SRB addition or reconfiguration as specified in 5.3.10.1;
1> if the received `radioResourceConfigDedicated` includes the `drb-ToReleaseList`:
2> perform DRB release as specified in 5.3.10.2;
1> if the received `radioResourceConfigDedicated` includes the `drb-ToAddModList`:
2> perform DRB addition or reconfiguration as specified in 5.3.10.3;
1> if the received `radioResourceConfigDedicated` includes the `mac-MainConfig`:
   2> perform MAC main reconfiguration as specified in 5.3.10.4;

1> if the received `radioResourceConfigDedicated` includes `sps-Config`:
   2> perform SPS reconfiguration according to 5.3.10.5;

1> if the received `radioResourceConfigDedicated` includes the `physicalConfigDedicated`:
   2> reconfigure the physical channel configuration as specified in 5.3.10.6.

1> if the received `radioResourceConfigDedicated` includes the `rlf-TimersAndConstants`:
   2> reconfigure the values of timers and constants as specified in 5.3.10.7;

1> if the received `radioResourceConfigDedicated` includes the `measSubframePatternPCell`:
   2> reconfigure the time domain measurement resource restriction for the serving cell as specified in 5.3.10.8;

1> if the received `radioResourceConfigDedicated` includes the `naics-Info`:
   2> perform NAICS neighbour cell information reconfiguration for the PCell as specified in 5.3.10.13;

1> if the received `RadioResourceConfigDedicatedPSCell` includes the `naics-Info`:
   2> perform NAICS neighbour cell information reconfiguration for the PSCell as specified in 5.3.10.13;

1> if the received `RadioResourceConfigDedicatedSCell-r10` includes the `naics-Info`:
   2> perform NAICS neighbour cell information reconfiguration for the SCell as specified in 5.3.10.13;

5.3.10.1 SRB addition/ modification

The UE shall:

1> if the UE is a NB-IoT UE and SRB1 is not established; or

1> for each `srb-Identity` value included in the `srb-ToAddModList` that is not part of the current UE configuration (SRB establishment):
   2> if the UE is not a NB-IoT UE that only supports the Control Plane CIoT EPS optimisation:
      3> apply the specified configuration defined in 9.1.2 for the corresponding SRB;
      3> establish a PDCP entity and configure it with the current (MCG) security configuration, if applicable;
      3> establish an (MCG) RLC entity in accordance with the received `rlc-Config`;
      3> establish a (MCG) DCCH logical channel in accordance with the received `logicalChannelConfig` and with the logical channel identity set in accordance with 9.1.2;
   2> if the UE is a NB-IoT UE:
      3> apply the specified configuration defined in 9.1.2 for SRB1bis;
      3> establish an (MCG) RLC entity in accordance with the received `rlc-Config`;
      3> establish a (MCG) DCCH logical channel in accordance with the received `logicalChannelConfig` and with the logical channel identity set in accordance with 9.1.2.1a;

1> if the UE is a NB-IoT UE and SRB1 is established; or

1> for each `srb-Identity` value included in the `srb-ToAddModList` that is part of the current UE configuration (SRB reconfiguration):
   2> reconfigure the RLC entity in accordance with the received `rlc-Config`;
2> reconfigure the DCCH logical channel in accordance with the received logicalChannelConfig;

5.3.10.2 DRB release

The UE shall:

1> for each drb-Identity value included in the drb-ToReleaseList that is part of the current UE configuration (DRB release); or

1> for each drb-identity value that is to be released as the result of full configuration option according to 5.3.5.8:

   2> release the PDCP entity;

   2> release the RLC entity or entities;

   2> release the DTCH logical channel;

1> if the procedure was triggered due to handover:

   2> indicate the release of the DRB(s) and the eps-BearerIdentity of the released DRB(s) to upper layers after successful handover;

1> else:

   2> indicate the release of the DRB(s) and the eps-BearerIdentity of the released DRB(s) to upper layers immediately.

NOTE: 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.

5.3.10.3 DRB addition/ modification

The UE shall:

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> if the concerned entry of drb-ToAddModList includes the drb-TypeLWA set to TRUE (i.e. add LWA DRB):

      3> perform the LWA specific DRB addition or reconfiguration as specified in 5.3.10.3a2;

   2> if the concerned entry of drb-ToAddModList includes the drb-TypeLWIP (i.e. add LWIP DRB):

      3> perform LWIP specific DRB addition or reconfiguration as specified in 5.3.10.3a3;

   2> else if drb-ToAddModListSCG is not received or does not include the drb-Identity value (i.e. add MCG DRB):

      3> establish a PDCP entity and configure it with the current MCG security configuration and in accordance with the received pdcp-Config;

      3> establish an MCG RLC entity or entities in accordance with the received rlc-Config;

      3> establish an MCG DTCH logical channel in accordance with the received logicalChannelIdentity and the received logicalChannelConfig;

   2> if the RRCCConnectionReconfiguration message includes the fullConfig IE:

      3> associate the established DRB with corresponding included eps-BearerIdentity;

   2> else:

      3> 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 (DRB reconfiguration):
2> if the DRB indicated by *drb-Identity* is an LWA DRB (i.e. LWA to LTE only or reconfigure LWA DRB):
   3> perform the LWA specific DRB reconfiguration as specified in 5.3.10.3a2;
2> else if the concerned entry of *drb-ToAddModList* includes the *drb-TypeLWA* set to *TRUE* (i.e. LTE only to LWA DRB):
   3> perform the LWA specific DRB reconfiguration as specified in 5.3.10.3a2;
2> if the concerned entry of *drb-ToAddModList* includes the *drb-TypeLWIP* (i.e. add or reconfigure LWIP DRB):
   3> perform LWIP specific DRB addition or reconfiguration as specified in 5.3.10.3a3;
2> if *drb-ToAddModListSCG* is not received or does not include the *drb-Identity* value:
   3> if the DRB indicated by *drb-Identity* is an MCG DRB (reconfigure MCG):
      4> if the *pdcp-Config* is included:
         5> reconfigure the PDCP entity in accordance with the received *pdcp-Config*;
      4> if the *rlc-Config* is included:
         5> reconfigure the RLC entity or entities in accordance with the received *rlc-Config*;
      4> if the *logicalChannelConfig* is included:
         5> reconfigure the DTCH logical channel in accordance with the received *logicalChannelConfig*;
   NOTE: Removal and addition of the same *drb-Identity* in a single radioResourceConfigDedicated is not supported. In case *drb-Identity* is removed and added due to handover or re-establishment with the full configuration option, the eNB can use the same value of *drb-Identity*.

### 5.3.10.3a1 DC specific DRB addition or reconfiguration

For the *drb-Identity* value for which this procedure is initiated, the UE shall:

1> if *drb-ToAddModListSCG* is received and includes the *drb-Identity* value; and *drb-Identity* value is not part of the current UE configuration (i.e. DC specific DRB establishment):
   2> if *drb-ToAddModList* is received and includes the *drb-Identity* value (i.e. add split DRB):
      3> establish a PDCP entity and configure it with the current MCG security configuration and in accordance with the *pdcp-Config* included in *drb-ToAddModList*;
      3> establish an MCG RLC entity and an MCG DTCH logical channel in accordance with the *rlc-Config*, *logicalChannelIdentity* and *logicalChannelConfig* included in *drb-ToAddModList*;
      3> establish an SCG RLC entity and an SCG DTCH logical channel in accordance with the *rlc-ConfigSCG*, *logicalChannelIdentitySCG* and *logicalChannelConfigSCG* included in *drb-ToAddModListSCG*;
   2> else (i.e. add SCG DRB):
      3> establish a PDCP entity and configure it with the current SCG security configuration and in accordance with the *pdcp-Config* included in *drb-ToAddModListSCG*;
      3> establish an SCG RLC entity or entities and an SCG DTCH logical channel in accordance with the *rlc-ConfigSCG*, *logicalChannelIdentitySCG* and *logicalChannelConfigSCG* included in *drb-ToAddModListSCG*;
   2> indicate the establishment of the DRB(s) and the *eps-BearerIdentity* of the established DRB(s) to upper layers;
1> else (i.e. DC specific DRB modification; *drb-ToAddModList* and/or *drb-ToAddModListSCG* received):
   2> if the DRB indicated by *drb-Identity* is a split DRB:
3> if `drb-ToAddModList` is received and includes the `drb-Identity` value, while for this entry `drb-TypeChange` is included and set to `toMCG` (i.e. split to MCG):
   
   4> release the SCG RLC entity and the SCG DTCH logical channel;
   
   4> reconfigure the PDCP entity in accordance with the `pdcp-Config`, if included in `drb-ToAddModList`;
   
   4> reconfigure the MCG RLC entity and/or the MCG DTCH logical channel in accordance with the `rlc-Config` and `logicalChannelConfig`, if included in `drb-ToAddModList`;
   
3> else (i.e. reconfigure split):
   
   4> reconfigure the PDCP entity in accordance with the `pdcp-Config`, if included in `drb-ToAddModList`;
   
   4> reconfigure the MCG RLC entity and/or the MCG DTCH logical channel in accordance with the `rlc-Config` and `logicalChannelConfig`, if included in `drb-ToAddModList`;
   
   4> reconfigure the SCG RLC entity and/or the SCG DTCH logical channel in accordance with the `rlc-ConfigSCG` and `logicalChannelConfigSCG`, if included in `drb-ToAddModListSCG`;

2> if the DRB indicated by `drb-Identity` is an SCG DRB:

3> if `drb-ToAddModList` is received and includes the `drb-Identity` value, while for this entry `drb-TypeChange` is included and set to `toMCG` (i.e. SCG to MCG):
   
   4> reconfigure the PDCP entity with the current MCG security configuration and in accordance with the `pdcp-Config`, if included in `drb-ToAddModList`;
   
   4> reconfigure the SCG RLC entity or entities and the SCG DTCH logical channel to be an MCG RLC entity or entities and an MCG DTCH logical channel;
   
   4> reconfigure the MCG RLC entity or entities and/or the MCG DTCH logical channel in accordance with the `rlc-Config`, `logicalChannelIdentity` and `logicalChannelConfig`, if included in `drb-ToAddModList`;
   
3> else (i.e. `drb-ToAddModListSCG` is received and includes the `drb-Identity` value i.e. reconfigure SCG):
   
   4> reconfigure the PDCP entity in accordance with the `pdcp-Config`, if included in `drb-ToAddModListSCG`;
   
   4> reconfigure the SCG RLC entity or entities and/or the SCG DTCH logical channel in accordance with the `rlc-ConfigSCG` and `logicalChannelConfigSCG`, if included in `drb-ToAddModListSCG`;

2> if the DRB indicated by `drb-Identity` is an MCG DRB:

3> if `drb-ToAddModListSCG` is received and includes the `drb-Identity` value, while for this entry `drb-Type` is included and set to `split` (i.e. MCG to split):
   
   4> reconfigure the PDCP entity in accordance with the `pdcp-Config`, if included in `drb-ToAddModListSCG`;
   
   4> reconfigure the MCG RLC entity and/or the MCG DTCH logical channel in accordance with the `rlc-Config` and `logicalChannelConfig`, if included in `drb-ToAddModListSCG`;
   
   4> establish an SCG RLC entity and an SCG DTCH logical channel in accordance with the `rlc-ConfigSCG`, `logicalChannelIdentitySCG` and `logicalChannelConfigSCG`, included in `drb-ToAddModListSCG`;
   
3> else (i.e. `drb-Type` is included and set to `scg` i.e. MCG to SCG):
   
   4> reconfigure the PDCP entity with the current SCG security configuration and in accordance with the `pdcp-Config`, if included in `drb-ToAddModListSCG`;
   
   4> reconfigure the MCG RLC entity or entities and the MCG DTCH logical channel to be an SCG RLC entity or entities and an SCG DTCH logical channel;
reconfigure the SCG RLC entity or entities and/ or the SCG DTCH logical channel in accordance with the rlc-ConfigSCG, logicalChannelIdentitySCG and logicalChannelConfigSCG, if included in drb-ToAddModListSCG;

5.3.10.3a2 LWA specific DRB addition or reconfiguration

For the drb-Identity value for which this procedure is initiated, the UE shall:

1> if the drb-Identity value is not part of the current UE configuration (i.e. add LWA DRB):

2> establish a PDCP entity and configure it with the current security configuration and in accordance with the pdcp-Config included in drb-ToAddModList;

2> establish an RLC entity and an DTCH logical channel in accordance with the rlc-Config, logicalChannelIdentity and logicalChannelConfig included in drb-ToAddModList;

2> enable data handling for this DRB at the LWAAP entity;

2> indicate the establishment of the DRB and the eps-BearerIdentity of the established DRB to upper layers;

1> else if the DRB indicated by drb-Identity is not an LWA DRB (i.e. LTE only to LWA DRB):

2> reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;

2> reconfigure the RLC entity and/ or the DTCH logical channel in accordance with the rlc-Config and logicalChannelConfig, if included in drb-ToAddModList;

2> enable data handling for this DRB at the LWAAP entity;

1> else if the concerned entry of drb-ToAddModList includes the drb-TypeLWA set to FALSE (i.e. LWA to LTE only DRB):

2> reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;

2> reconfigure the RLC entity and/ or the DTCH logical channel in accordance with the rlc-Config and logicalChannelConfig, if included in drb-ToAddModList;

2> perform PDCP data recovery as specified in TS 36.323 [8];

2> disable data handling for this DRB at the LWAAP entity;

1> else (i.e. reconfigure LWA DRB):

2> reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;

2> reconfigure the RLC entity and/ or the DTCH logical channel in accordance with the rlc-Config and logicalChannelConfig, if included in drb-ToAddModList;

5.3.10.3a3 LWIP specific DRB addition or reconfiguration

For the drb-Identity value for which this procedure is initiated, the UE shall:

1> if the drb-TypeLWIP is set to lwip:

2> indicate to higher layers to use LWIP resources in both UL and DL for the DRB associated with the drb-Identity;

1> if the drb-TypeLWIP is set to lwip-DL-only:

2> indicate to higher layers to use LWIP resources in the DL only for the DRB associated with the drb-Identity;

1> if the drb-TypeLWIP is set to lwip-UL-only:

2> indicate to higher layers to use LWIP resources in the UL only for the DRB associated with the drb-Identity;

1> if the drb-TypeLWIP is set to eutran:

2> indicate to higher layers to stop using LWIP resources for the DRB associated with the drb-Identity;
5.3.10.3a SCell release

The UE shall:

1> if the release is triggered by reception of the sCellToReleaseList or the sCellToReleaseListSCG:

2> for each sCellIndex value included either in the sCellToReleaseList or in the sCellToReleaseListSCG:

3> if the current UE configuration includes an SCell with value sCellIndex:

4> release the SCell;

1> if the release is triggered by RRC connection re-establishment:

2> release all SCells that are part of the current UE configuration;

5.3.10.3b SCell addition/ modification

The UE shall:

1> for each sCellIndex value included either in the sCellToAddModList or in the sCellToAddModListSCG that is not part of the current UE configuration (SCell addition):

2> add the SCell, corresponding to the cellIdentification, in accordance with the radioResourceConfigCommonSCell and radioResourceConfigDedicatedSCell, both included either in the sCellToAddModList or in the sCellToAddModListSCG;

2> 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;

1> for each sCellIndex value included either in the sCellToAddModList or in the sCellToAddModListSCG that is part of the current UE configuration (SCell modification):

2> modify the SCell configuration in accordance with the radioResourceConfigDedicatedSCell, included either in the sCellToAddModList or in the sCellToAddModListSCG;

5.3.10.3c PSCell addition or modification

The UE shall:

1> if the PSCell is not part of the current UE configuration (i.e. PSCell addition):

2> add the PSCell, corresponding to the cellIdentification, in accordance with the received radioResourceConfigCommonPSCell and radioResourceConfigDedicatedPSCell;

2> configure lower layers to consider the PSCell to be in activated state;

1> if the PSCell is part of the current UE configuration (i.e. PSCell modification):

2> modify the PSCell configuration in accordance with the received radioResourceConfigDedicatedPSCell;

5.3.10.4 MAC main reconfiguration

Except for NB-IoT, the UE shall:

1> if the procedure is triggered to perform SCG MAC main reconfiguration:

2> if SCG MAC is not part of the current UE configuration (i.e. SCG establishment):
3> create an SCG MAC entity;
2> reconfigure the SCG MAC main configuration as specified in the following i.e. assuming it concerns the SCG MAC whenever MAC main configuration is referenced and that it is based on the received mac-MainConfigSCG instead of mac-MainConfig:

1> reconfigure the MAC main configuration in accordance with the received mac-MainConfig other than stag-ToReleaseList and stag-ToAddModList;

1> if the received mac-MainConfig includes the stag-ToReleaseList:
2> for each STAG-Id value included in the stag-ToReleaseList that is part of the current UE configuration:
3> release the STAG indicated by STAG-Id;

1> if the received mac-MainConfig includes the stag-ToAddModList:
2> for each stag-Id value included in stag-ToAddModList that is not part of the current UE configuration (STAG addition):
3> add the STAG, corresponding to the stag-Id, in accordance with the received timeAlignmentTimerSTAG;
2> for each stag-Id value included in stag-ToAddModList that is part of the current UE configuration (STAG modification):
3> reconfigure the STAG, corresponding to the stag-Id, in accordance with the received timeAlignmentTimerSTAG;

For NB-IoT, the UE shall:

1> reconfigure the MAC main configuration in accordance with the received mac-MainConfig;

5.3.10.5 Semi-persistent scheduling reconfiguration

The UE shall:

1> reconfigure the semi-persistent scheduling in accordance with the received sps-Config;

5.3.10.6 Physical channel reconfiguration

Except for NB-IoT, the UE shall:

1> if the antennaInfo-r10 is included in the received physicalConfigDedicated and the previous version of this field that was received by the UE was antennaInfo (without suffix i.e. the version defined in REL-8):
2> apply the default antenna configuration as specified in 9.2.4;

1> if the cqi-ReportConfig-r10 is included in the received physicalConfigDedicated and the previous version of this field that was received by the UE was cqi-ReportConfig (without suffix i.e. the version defined in REL-8):
2> apply the default CQI reporting configuration as specified in 9.2.4;

NOTE: Application of the default configuration involves release of all extensions introduced in REL-9 and later.

1> reconfigure the physical channel configuration in accordance with the received physicalConfigDedicated;

1> if the antennaInfo is included and set to explicitValue:

2> if the configured transmissionMode is tm1, tm2, tm5, tm6 or tm7; or
2> if the configured transmissionMode is tm8 and pmi-RI-Report is not present; or
2> if the configured transmissionMode is tm9 and pmi-RI-Report is not present; or
2> if the configured transmissionMode is tm9 and pmi-RI-Report is present and antennaPortsCount within csi-RS is set to an1:
3> release ri-ConfigIndex in cqi-ReportPeriodic, if previously configured;
else if the `antennaInfo` is included and set to `defaultValue`:
  release `ri-ConfigIndex` in `cqi-ReportPeriodic`, if previously configured;

For NB-IoT, the UE shall:
  if the `carrierConfigDedicated` is not included in the received `physicalConfigDedicated`:
    if the UE is configured with a carrier configuration previously received in `carrierConfigDedicated`:
      use the carrier configuration received in `carrierConfigDedicated`;
    else:
      use the carrier configuration received for the anchor carrier in the system information;
  else:
    use the carrier configuration received in `carrierConfigDedicated`;
  start to use the new carrier immediately after the last transport block carrying the RRC message has been acknowledged by the MAC layer, and any subsequent RRC response message sent for the current RRC procedure is therefore sent on the new carrier;
  reconfigure the physical channel configuration in accordance with the received `physicalConfigDedicated`.

5.3.10.7 Radio Link Failure Timers and Constants reconfiguration

The UE shall:
  if the received `rlf-TimersAndConstants` is set to release:
    use values for timers T301, T310, T311 and constants N310, N311, as included in `ue-TimersAndConstants` received in `SystemInformationBlockType2` (or `SystemInformationBlockType2-NB` in NB-IoT);
  else:
    reconfigure the value of timers and constants in accordance with received `rlf-TimersAndConstants`;
  if the received `rlf-TimersAndConstantsSCG` is set to release:
    stop timer T313, if running, and
    release the value of timer `t313` as well as constants `n313` and `n314`;
  else:
    reconfigure the value of timers and constants in accordance with received `rlf-TimersAndConstantsSCG`;

5.3.10.8 Time domain measurement resource restriction for serving cell

The UE shall:
  if the received `measSubframePatternPCell` is set to release:
    release the time domain measurement resource restriction for the PCell, if previously configured
  else:
    apply the time domain measurement resource restriction for the PCell in accordance with the received `measSubframePatternPCell`;

5.3.10.9 Other configuration

The UE shall:
  if the received `otherConfig` includes the `reportProximityConfig`:...
if proximityIndicationEUTRA is set to enabled:
   consider itself to be configured to provide proximity indications for E-UTRA frequencies in accordance with 5.3.14;
else:
   consider itself not to be configured to provide proximity indications for E-UTRA frequencies;
if proximityIndicationUTRA is set to enabled:
   consider itself to be configured to provide proximity indications for UTRA frequencies in accordance with 5.3.14;
else:
   consider itself not to be configured to provide proximity indications for UTRA frequencies;

if the received otherConfig includes the obtainLocation:
   attempt to have detailed location information available for any subsequent measurement report;

NOTE: 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.

if the received otherConfig includes the idc-Config:
   if idc-Indication is included (i.e. set to setup):
      consider itself to be configured to provide IDC indications in accordance with 5.6.9;
   if idc-Indication-UL-CA is included (i.e. set to setup):
      consider itself to be configured to indicate UL CA related information in IDC indications in accordance with 5.6.9;
   if idc-HardwareSharingIndication is included (i.e. set to setup):
      consider itself to be configured to indicate IDC hardware sharing problem indications in IDC indications in accordance with 5.6.9;
else:
   consider itself not to be configured to provide IDC indications;
if autonomousDenialParameters is included:
   consider itself to be allowed to deny any transmission in a particular UL subframe if during the number of subframes indicated by autonomousDenialValidity, preceeding and including this particular subframe, it autonomously denied fewer UL subframes than indicated by autonomousDenialSubframes;
else:
   consider itself not to be allowed to deny any UL transmission;
if the received otherConfig includes the powerPrefIndicationConfig:
   if powerPrefIndicationConfig is set to setup:
      consider itself to be configured to provide power preference indications in accordance with 5.6.10;
else:
   consider itself not to be configured to provide power preference indications;
5.3.10.10 SCG reconfiguration

The UE shall:

1. if the received scg-Configuration is set to release or includes the mobilityControlInfoSCG (i.e. SCG release/ change):
   2. if mobilityControlInfo is not received (i.e. SCG release/ change without HO):
      3. reset SCG MAC, if configured;
      3. for each drb-Identity value that is part of the current UE configuration:
         4. if the DRB indicated by drb-Identity is an SCG DRB:
            5. re-establish the PDCP entity and the SCG RLC entity or entities;
         4. if the DRB indicated by drb-Identity is a split DRB:
            5. perform PDCP data recovery and re-establish the SCG RLC entity;
        4. if the DRB indicated by drb-Identity is an MCG DRB; and
           4. if drb-ToAddModListSCG is received and includes the drb-Identity value, while for this entry drb-Type is included and set to scg (i.e. MCG to SCG):
              5. re-establish the PDCP entity and the MCG RLC entity or entities;
      3. configure lower layers to consider the SCG SCell(s), except for the PSCell, to be in deactivated state;

1. if the received scg-Configuration is set to release:
   2. release the entire SCG configuration, except for the DRB configuration (i.e. as configured by drb-ToAddModListSCG);
      2. if the current UE configuration includes one or more split or SCG DRBs and the received RRCConnectionReconfiguration message includes radioResourceConfigDedicated including drb-ToAddModList:
         3. reconfigure the SCG or split DRB by drb-ToAddModList as specified in 5.3.10.12;
   2. stop timer T313, if running;
   2. stop timer T307, if running;
1. else:
   2. if the received scg-ConfigPartMCG includes the scg-Counter:
      3. update the S-K_{3NB} key based on the K_{3NB} key and using the received scg-Counter value, as specified in TS 33.401 [32];
      3. derive the K_{UPenc} key associated with the cipheringAlgorithmSCG included in mobilityControlInfoSCG within the received scg-ConfigPartSCG, as specified in TS 33.401 [32];
      3. configure lower layers to apply the ciphering algorithm and the K_{UPenc} key;
   2. if the received scg-ConfigPartSCG includes the radioResourceConfigDedicatedSCG:
      3. reconfigure the dedicated radio resource configuration for the SCG as specified in 5.3.10.11;
   2. if the current UE configuration includes one or more split or SCG DRBs and the received RRCConnectionReconfiguration message includes radioResourceConfigDedicated including drb-ToAddModList:
      3. reconfigure the SCG or split DRB by drb-ToAddModList as specified in 5.3.10.12;
   2. if the received scg-ConfigPartSCG includes the sCellToReleaseListSCG:
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5.3.10.10 SCG release

The UE shall:

1> perform SCell release for the SCG as specified in 5.3.10.3a;

2> if the received scg-ConfigPartSCG includes the pCellToAddMod:

3> perform PCell addition or modification as specified in 5.3.10.3c;

NOTE 0: This procedure is also used to release the PCell e.g. PCell change, SI change for the PCell.

2> if the received scg-ConfigPartSCG includes the sCellToAddModListSCG:

3> perform SCell addition or modification as specified in 5.3.10.3b;

2> configure lower layers in accordance with mobilityControlInfoSCG, if received;

2> if the received scg-ConfigPartSCG includes the mobilityControlInfoSCG (i.e. SCG change):

3> resume all SCG DRBs and resume SCG transmission for split DRBs, if suspended;

3> stop timer T313, if running;

3> start timer T307 with the timer value set to t307, as included in the mobilityControlInfoSCG;

3> start synchronising to the DL of the target PSCell;

3> initiate the random access procedure on the PSCell, as specified in TS 36.321 [6];

NOTE 1: The UE is not required to determine the SFN of the target PSCell by acquiring system information from that cell before performing RACH access in the target PSCell.

3> the procedure ends, except that the following actions are performed when MAC successfully completes the random access procedure on the PSCell:

4> stop timer T307;

4> apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PSCell, if any;

4> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PSCell (e.g. periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PSCell;

NOTE 2: Whenever the UE shall setup or reconfigure a configuration in accordance with a field that is received it applies the new configuration, except for the cases addressed by the above statements.

5.3.10.11 SCG dedicated resource configuration

The UE shall:

1> if the received radioResourceConfigDedicatedSCG includes the drb-ToAddModListSCG:

2> for each drb-Identity value included in the drb-ToAddModListSCG perform the DC specific DRB addition or reconfiguration as specified in 5.3.10.3a1

1> if the received radioResourceConfigDedicatedSCG includes the mac-MainConfigSCG:

2> perform the SCG MAC main reconfiguration as specified in 5.3.10.4;

1> if the received radioResourceConfigDedicatedSCG includes the rlf-TimersAndConstantsSCG:

2> reconfigure the values of timers and constants as specified in 5.3.10.7;

5.3.10.12 Reconfiguration SCG or split DRB by drb-ToAddModList

The UE shall:

1> for each split or SCG DRBs that is part of the current configuration:

2> if the corresponding drb-Identity value is included in the received drb-ToAddModList; and:
2> if the corresponding *drb-Identity* value is not included in the received *drb-ToAddModListSCG* (i.e. reconfigure split, split to MCG or SCG to MCG):

3> perform the DC specific DRB addition or reconfiguration as specified in 5.3.10.3a1;

### 5.3.10.13 Neighbour cell information reconfiguration

The UE shall:

1> if the received *naics-Info* is set to *release*:

2> instruct lower layer to release all the NAICS neighbour cell information for the concerned cell, if previously configured;

1> if the received *naics-Info* includes the *neighCellsToReleaseList-r12*:

2> for each *physCellId-r12* value included in the *neighCellsToReleaseList-r12* that is part of the current NAICS neighbour cell information of the concerned cell:

3> instruct lower layer to release the NAICS neighbour cell information for the concerned cell;

1> if the received *naics-Info* includes the *NeighCellsToAddModList-r12*:

2> for each *physCellId-r12* value included in the *neighCellsToAddModList-r12* that is not part of the current NAICS neighbour cell information of the concerned cell:

3> instruct lower layer to add the NAICS neighbour cell information for the concerned cell;

2> for each *physCellId-r12* value included in the *neighCellsToAddModList-r12* that is part of the current NAICS neighbour cell information of the concerned cell:

3> instruct lower layer to modify the NAICS neighbour cell information in accordance with the received *NeighCellsInfo* for the concerned cell;

### 5.3.10.14 Void

### 5.3.10.15 Sidelink dedicated configuration

The UE shall:

1> if the *RRCConnectionReconfiguration* message includes the *sl-CommConfig*:

2> if *commTxResources* is included and set to *setup*:

3> from the next SC period use the resources indicated by *commTxResources* for sidelink communication transmission, as specified in 5.10.4;

2> else if *commTxResources* is included and set to *release*:

3> from the next SC period, release the resources allocated for sidelink communication transmission previously configured by *commTxResources*;

1> if the *RRCConnectionReconfiguration* message includes the *sl-DiscConfig*:

2> if *discTxResources* is included and set to *setup*:

3> from the next discovery period, as defined by *discPeriod*, use the resources indicated by *discTxResources* for sidelink discovery announcement, as specified in 5.10.6;

2> else if *discTxResources* is included and set to *release*:

3> from the next discovery period, as defined by *discPeriod*, release the resources allocated for sidelink discovery announcement previously configured by *discTxResources*;

2> if *discTxResourcesPS* is included and set to *setup*:
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5.3.10.16 T370 expiry

The UE shall:

1> if T370 expires:

2> release discSysInfoToReportConfig;

5.3.11 Radio link failure related actions

5.3.11.1 Detection of physical layer problems in RRC_CONNECTED

The UE shall:

1> upon receiving N310 consecutive "out-of-sync" indications for the PCell from lower layers while neither T300, T301, T304 nor T311 is running:

2> start timer T310;

1> upon receiving N313 consecutive "out-of-sync" indications for the PSCell from lower layers while T307 is not running:
2> start T313;

NOTE: Physical layer monitoring and related autonomous actions do not apply to SCells except for the PSCell.

5.3.11.2 Recovery of physical layer problems

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

1> stop timer T310;
1> stop timer T312, 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 layer 1 do not affect the evaluation of the number of consecutive "in-sync" or "out-of-sync" indications.

Upon receiving N314 consecutive "in-sync" indications for the PSCell from lower layers while T313 is running, the UE shall:

1> stop timer T313;

5.3.11.3 Detection of radio link failure

The UE shall:

1> upon T310 expiry; or
1> upon T312 expiry; or
1> upon random access problem indication from MCG MAC while neither T300, T301, T304 nor T311 is running; or
1> upon indication from MCG RLC that the maximum number of retransmissions has been reached for an SRB or for an MCG or split DRB:

2> consider radio link failure to be detected for the MCG i.e. RLF;
2> except for NB-IoT, store the following radio link failure information in the VarRLF-Report by setting its fields as follows:

3> clear the information included in VarRLF-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 measResultLastServCell to include the RSRP and RSRQ, if available, of the PCell based on measurements collected up to the moment the UE detected radio link failure;
3> set the measResultNeighCells to include the best measured cells, other than the PCell, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected radio link failure, and set its fields as follows:
4> if the UE was configured to perform measurements for one or more EUTRA frequencies, include the measResultListEUTRA;
4> if the UE was configured to perform measurement reporting for one or more neighbouring UTRA frequencies, include the measResultListUTRA;
4> if the UE was configured to perform measurement reporting for one or more neighbouring GERAN frequencies, include the measResultListGERAN;
4> if the UE was configured to perform measurement reporting for one or more neighbouring CDMA2000 frequencies, include the measResultsCDMA2000;
4> 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. Blacklisted cells are not required to be reported.

3> if detailed location information is available, set the content of the locationInfo as follows:
   4> include the locationCoordinates;
   4> include the horizontalVelocity, if available;
3> set the failedPCellId to the global cell identity, if available, and otherwise to the physical cell identity and carrier frequency of the PCell where radio link failure is detected;
3> set the tac-FailedPCell to the tracking area code, if available, of the PCell where radio link failure is detected;
3> if an RRCConnectionReconfiguration message including the mobilityControlInfo was received before the connection failure:
   4> if the last RRCConnectionReconfiguration message including the mobilityControlInfo concerned an intra E-UTRA handover:
      5> include the previousPCellId and set it to the global cell identity of the PCell where the last RRCConnectionReconfiguration message including mobilityControlInfo was received;
      5> set the timeConnFailure to the elapsed time since reception of the last RRCConnectionReconfiguration message including mobilityControlInfo;
   4> if the last RRCConnectionReconfiguration message including the mobilityControlInfo concerned a handover to E-UTRA from UTRA and if the UE supports Radio Link Failure Report for Inter-RAT MRO:
      5> include the previousUTRA-CellId and set it to the physical cell identity, the carrier frequency and the global cell identity, if available, of the UTRA Cell in which the last RRCConnectionReconfiguration message including mobilityControlInfo was received;
      5> set the timeConnFailure to the elapsed time since reception of the last RRCConnectionReconfiguration message including mobilityControlInfo;
3> if the UE supports QCI1 indication in Radio Link Failure Report and has a DRB for which QCI is 1:
   4> include the drb-EstablishedWithQCI-1;
3> set the connectionFailureType to rlf;
3> set the c-RNTI to the C-RNTI used in the PCell;
3> set the rlf-Cause to the trigger for detecting radio link failure;
2> if AS security has not been activated:
   3> if the UE is a NB-IoT UE:
      4> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';
   3> else:
      4> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'other';
2> else:
   3> initiate the connection re-establishment procedure as specified in 5.3.7;

The UE shall:
1> upon T313 expiry; 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 for an SCG or split DRB:

2> consider radio link failure to be detected for the SCG i.e. SCG-RLF;

2> initiate the SCG failure information procedure as specified in 5.6.13 to report SCG radio link failure;

The UE may discard the radio link failure information, i.e. release the UE variable VarRLF-Report, 48 hours after the radio link failure is detected, upon power off or upon detach.

5.3.12 UE actions upon leaving RRC_CONNECTED

Upon leaving RRC_CONNECTED, the UE shall:

1> reset MAC;

1> stop all timers that are running except T320, T325 and T330;

1> if leaving RRC_CONNECTED was triggered by suspension of the RRC:

2> re-establish RLC entities for all SRBs and DRBs;

2> store the UE AS Context including the current RRC configuration, the current security context, the PDCP state including ROHC state, C-RNTI used in the source PCell, the cellIdentity and the physical cell identity of the source PCell;

2> store the following information provided by E-UTRAN:

3> the resumIdentity;

2> suspend all SRB(s) and DRB(s) , except SRB0;

2> indicate the suspension of the RRC connection to upper layers;

2> configure lower layers to suspend integrity protection and ciphering;

NOTE: Ciphering is not applied for the subsequent RRCConnectionResume message used to resume the connection. An integrity check is performed by lower layers, but merely upon request from RRC.

1> else:

2> release all radio resources, including release of the RLC entity, the MAC configuration and the associated PDCP entity for all established RBs;

2> indicate the release of the RRC connection to upper layers together with the release cause;

1> if leaving RRC_CONNECTED was triggered neither by reception of the MobilityFromEUTRACommand message nor by selecting an inter-RAT cell while T311 was running:

2> if timer T350 is configured:

3> start timer T350;

3> apply rclwi-Configuration if configured, otherwise apply the wlan-Id-List corresponding to the RPLMN included in SystemInformationBlockType17;

2> else:

3> release the wlan-OffloadConfigDedicated, if received;

3> if the wlan-OffloadConfigCommon corresponding to the RPLMN is broadcast by the cell:

4> apply the wlan-OffloadConfigCommon corresponding to the RPLMN included in SystemInformationBlockType17;
4> apply steerToWLAN if configured, otherwise apply the wlan-Id-List corresponding to the RPLMN included in SystemInformationBlockType17;

2> enter RRC_IDLE and perform procedures as specified in TS 36.304 [4, 5.2.7];

1> else:
2> release the wlan-OffloadConfigDedicated, if received;

NOTE: BL UEs or UEs in CE verifies validity of SI when released to RRC_IDLE.

1> release the LWA configuration, if configured, as described in 5.6.14.3;

1> release the LWIP configuration, if configured, as described in 5.6.17.3;

5.3.13 UE actions upon PUCCH/ SRS release request

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

1> apply the default physical channel configuration for cqi-ReportConfig for the indicated serving cell as specified in 9.2.4 and release cqi-ReportConfigSCell, for each SCell that sends HARQ feedback on the indicated serving cell, if any;

1> apply the default physical channel configuration for schedulingRequestConfig as specified in 9.2.4, for the concerned CG;

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

1> apply the default physical channel configuration for soundingRS-UL-ConfigDedicated, as specified in 9.2.4;

NOTE: Upon PUCCH/ SRS release request, the UE does not modify the soundingRS-UL-ConfigDedicatedAperiodic i.e. it does not apply the default for this field (release).

5.3.14 Proximity indication

5.3.14.1 General

![Figure 5.3.14.1-1: Proximity indication](image)

The purpose of this procedure is to indicate that the UE is entering or leaving the proximity of one or more CSG member cells. The detection of proximity is based on an autonomous search function as defined in TS 36.304 [4].

5.3.14.2 Initiation

A UE in RRC_CONNECTED shall:

1> if the UE enters the proximity of one or more CSG member cell(s) on an E-UTRA frequency while proximity indication is enabled for such E-UTRA cells; or

1> if the UE enters the proximity of one or more CSG member cell(s) on an UTRA frequency while proximity indication is enabled for such UTRA cells; or

1> if the UE leaves the proximity of all CSG member cell(s) on an E-UTRA frequency while proximity indication is enabled for such E-UTRA cells; or
if the UE leaves the proximity of all CSG member cell(s) on an UTRA frequency while proximity indication is enabled for such UTRA cells:

2> if the UE has previously not transmitted a ProximityIndication for the RAT and frequency during the current RRC connection, or if more than 5 s has elapsed since the UE has last transmitted a ProximityIndication (either entering or leaving) for the RAT and frequency:

3> initiate transmission of the ProximityIndication message in accordance with 5.3.14.3;

NOTE: In the conditions above, "if the UE enters the proximity of one or more CSG member cell(s)" includes the case of already being in the proximity of such cell(s) at the time proximity indication for the corresponding RAT is enabled.

5.3.14.3 Actions related to transmission of ProximityIndication message

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

1> if the UE applies the procedure to report entering the proximity of CSG member cell(s):

2> set type to entering;

1> else if the UE applies the procedure to report leaving the proximity of CSG member cell(s):

2> set type to leaving;

1> if the proximity indication was triggered for one or more CSG member cell(s) on an E-UTRA frequency:

2> set the carrierFreq to eutra with the value set to the E-ARFCN value of the E-UTRA cell(s) for which proximity indication was triggered;

1> else if the proximity indication was triggered for one or more CSG member cell(s) on a UTRA frequency:

2> set the carrierFreq to utra with the value set to the ARFCN value of the UTRA cell(s) for which proximity indication was triggered;

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

5.3.15 Void

5.4 Inter-RAT mobility

5.4.1 Introduction

The general principles of connected mode mobility are described in 5.3.1.3. The general principles of the security handling upon connected mode mobility are described in 5.3.1.2.

For the (network controlled) inter RAT mobility from E-UTRA for a UE in RRC_CONNECTED, a single procedure is defined that supports both handover, cell change order with optional network assistance (NACC) and enhanced CS fallback to CDMA2000 1xRTT. In case of mobility to CDMA2000, the eNB decides when to move to the other RAT while the target RAT determines to which cell the UE shall move.
5.4.2 Handover to E-UTRA

5.4.2.1 General

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. GERAN or UTRAN) to E-UTRAN.

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

5.4.2.2 Initiation

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

E-UTRAN applies the procedure as follows:

- to activate ciphering, possibly using NULL algorithm, if not yet activated in the other RAT;
- to establish SRB1, SRB2 and one or more DRBs, i.e. at least the DRB associated with the default EPS bearer is established;

5.4.2.3 Reception of the RRCConnectionReconfiguration by the UE

If the UE is able to comply with the configuration included in the RRCConnectionReconfiguration message, the UE shall:

1. apply the default physical channel configuration as specified in 9.2.4;
1. apply the default semi-persistent scheduling configuration as specified in 9.2.3;
1. apply the default MAC main configuration as specified in 9.2.2;
1. start timer T304 with the timer value set to t304, as included in the mobilityControlInfo;
1. consider the target PCell to be one on the frequency indicated by the carrierFreq with a physical cell identity indicated by the targetPhysCellId;
1. start synchronising to the DL of the target PCell;
1. set the C-RNTI to the value of the newUE-Identity;
1. for the target PCell, apply the downlink bandwidth indicated by the dl-Bandwidth;
1. for the target PCell, apply the uplink bandwidth indicated by (the absence or presence of) the ul-Bandwidth;
1. configure lower layers in accordance with the received radioResourceConfigCommon;
1. configure lower layers in accordance with any additional fields, not covered in the previous, if included in the received mobilityControlInfo;
1> perform the radio resource configuration procedure as specified in 5.3.10;
1> forward the nas-SecurityParamToEUTRA to the upper layers;
1> derive the K_{NB} key, as specified in TS 33.401 [32];
1> derive the K_{RRC} key associated with the integrityProtAlgorithm, as specified in TS 33.401 [32];
1> derive the K_{RRC} and the K_{UP} key associated with the cipheringAlgorithm, as specified in TS 33.401 [32];
1> configure lower layers to apply the indicated integrity protection algorithm and the K_{RRC} key immediately, i.e. the indicated 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;
1> configure lower layers to apply the indicated ciphering algorithm, the K_{RRC} key and the K_{UP} key immediately, i.e. the indicated 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;
1> if the received RRConnectionReconfiguration includes the sCellToAddModList:
   2> perform SCell addition as specified in 5.3.10.3b;
1> if the RRConnectionReconfiguration message includes the measConfig:
   2> perform the measurement configuration procedure as specified in 5.5.2;
1> perform the measurement identity autonomous removal as specified in 5.5.2.2a;
1> if the RRConnectionReconfiguration message includes the otherConfig:
   2> perform the other configuration procedure as specified in 5.3.10.9;
1> if the RRConnectionReconfiguration message includes wlan-OffloadInfo:
   2> perform the dedicated WLAN offload configuration procedure as specified in 5.6.12.2;
1> if the RRConnectionReconfiguration message includes rclwi-Configuration:
   2> perform the WLAN traffic steering command procedure as specified in 5.6.16.2;
1> if the RRConnectionReconfiguration message includes lwa-Configuration:
   2> perform the LWA configuration procedure as specified in 5.6.14.2;
1> if the RRConnectionReconfiguration message includes lwip-Configuration:
   2> perform the LWIP reconfiguration procedure as specified in 5.6.17.2;
1> set the content of RRConnectionReconfigurationComplete message as follows:
   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:
      3> include rlf-InfoAvailable;
   2> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport and if T330 is not running:
      3> include logMeasAvailableMBSFN;
   2> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport:
      3> include the logMeasAvailable;
   2> if the UE has connection establishment failure information available in VarConnEstFailReport and if the RPLMN is equal to plmn-Identity stored in VarConnEstFailReport:
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5.4.2.3 Configuration failure

The UE shall:

1> if the UE is unable to comply with (part of) the configuration included in the RRCConnectionReconfiguration message:

2> 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 RRCConnectionReconfiguration message causes a protocol error for which the generic error handling as defined in 5.7 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.

5.4.2.4 Reconfiguration failure

The UE shall:

3> include connEstFailInfoAvailable;

1> submit the RRCConnectionReconfigurationComplete message to lower layers for transmission using the new configuration;

1> if the RRCConnectionReconfiguration message does not include rlf-TimersAndConstants set to setup:

2> use the default values specified in 9.2.5 for timer T310, T311 and constant N310, N311;

1> if MAC successfully completes the random access procedure:

2> stop timer T304;

2> apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PCell, if any;

2> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PCell (e.g. measurement gaps, periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PCell;

NOTE 1: Whenever the UE shall setup or reconfigure a configuration in accordance with a field that is received it applies the new configuration, except for the cases addressed by the above statements.

2> enter E-UTRA RRC_CONNECTED, upon which the procedure ends;

NOTE 2: The UE is not required to determine the SFN of the target PCell by acquiring system information from that cell before performing RACH access in the target PCell.

5.4.2.5 T304 expiry (handover to E-UTRA failure)

The UE shall:

1> upon T304 expiry (handover to E-UTRA failure):

2> reset MAC;

2> perform the actions defined for this failure case as defined in the specifications applicable for the other RAT;
5.4.3 Mobility from E-UTRA

5.4.3.1 General

![Figure 5.4.3.1-1: Mobility from E-UTRA, successful](image)

![Figure 5.4.3.1-2: Mobility from E-UTRA, failure](image)

The purpose of this procedure is to move a UE in RRC_CONNECTED to a cell using another Radio Access Technology (RAT), e.g. GERAN, UTRA or CDMA2000 systems. The mobility from E-UTRA procedure covers the following type of mobility:

- handover, i.e. the `MobilityFromEUTRACommand` message includes radio resources that have been allocated for the UE in the target cell;
- cell change order, i.e. the `MobilityFromEUTRACommand` message may include information facilitating access of and/or connection establishment in the target cell, e.g. system information. Cell change order is applicable only to GERAN; and
- enhanced CS fallback to CDMA2000 1xRTT, i.e. the `MobilityFromEUTRACommand` message includes radio resources that have been allocated for the UE in the target cell. The enhanced CS fallback to CDMA2000 1xRTT may be combined with concurrent handover or redirection to CDMA2000 HRPD.

NOTE: For the case of dual receiver/transmitter enhanced CS fallback to CDMA2000 1xRTT, the `DLInformationTransfer` message is used instead of the `MobilityFromEUTRACommand` message (see TS 36.300 [9]).

5.4.3.2 Initiation

E-UTRAN initiates the mobility from E-UTRA procedure to a UE in RRC_CONNECTED, possibly in response to a `MeasurementReport` message or in response to reception of CS fallback indication for the UE from MME, by sending a `MobilityFromEUTRACommand` message. E-UTRAN applies the procedure as follows:

- the procedure is initiated only when AS-security has been activated, and SRB2 with at least one DRB are setup and not suspended;

5.4.3.3 Reception of the `MobilityFromEUTRACommand` by the UE

The UE shall be able to receive a `MobilityFromEUTRACommand` message and perform a cell change order to GERAN, even if no prior UE measurements have been performed on the target cell.

The UE shall:
1> stop timer T310, if running;
1> stop timer T312, if running;
1> if the MobilityFromEUTRACommand message includes the purpose set to handover:
   2> if the targetRAT-Type is set toutra or geran:
      3> consider inter-RAT mobility as initiated towards the RAT indicated by the targetRAT-Type included in the MobilityFromEUTRACommand message;
      3> forward the nas-SecurityParamFromEUTRA to the upper layers;
      3> access the target cell indicated in the inter-RAT message in accordance with the specifications of the target RAT;
      3> if the targetRAT-Type is set to geran:
         4> use the contents of systemInformation, if provided for PS Handover, as the system information to begin access on the target GERAN cell;
   NOTE 1: If there are DRBs for which no radio bearers are established in the target RAT as indicated in the targetRAT-MessageContainer in the message, the E-UTRA RRC part of the UE does not indicate the release of the concerned DRBs to the upper layers. Upper layers may derive which bearers are not established from information received from the AS of the target RAT.
   NOTE 2: In case of SR-VCC, the DRB to be replaced is specified in [61].
2> else if the targetRAT-Type is set to cdma2000-1XRTT or cdma2000-HRPD:
   3> forward the targetRAT-Type and the targetRAT-MessageContainer to the CDMA2000 upper layers for the UE to access the cell(s) indicated in the inter-RAT message in accordance with the specifications of the CDMA2000 target-RAT;
1> else if the MobilityFromEUTRACommand message includes the purpose set to cellChangeOrder:
2> start timer T304 with the timer value set to t304, as included in the MobilityFromEUTRACommand message;
2> if the targetRAT-Type is set to geran:
   3> if networkControlOrder is included in the MobilityFromEUTRACommand message:
      4> apply the value as specified in TS 44.060 [36];
   3> else:
      4> acquire networkControlOrder and apply the value as specified in TS 44.060 [36];
   3> use the contents of systemInformation, if provided, as the system information to begin access on the target GERAN cell;
   2> establish the connection to the target cell indicated in the CellChangeOrder;
   NOTE 3: The criteria for success or failure of the cell change order to GERAN are specified in TS 44.060[36].
1> if the MobilityFromEUTRACommand message includes the purpose set to e-CSFB:
2> if messageContCDMA2000-1XRTT is present:
   3> forward the messageContCDMA2000-1XRTT to the CDMA2000 upper layers for the UE to access the cell(s) indicated in the inter-RAT message in accordance with the specification of the target RAT;
2> if mobilityCDMA2000-HRPD is present and is set to handover:
   3> forward the messageContCDMA2000-HRPD to the CDMA2000 upper layers for the UE to access the cell(s) indicated in the inter-RAT message in accordance with the specification of the target RAT;
2> if mobilityCDMA2000-HRPD is present and is set to redirection:
3> forward the redirectCarrierCDMA2000-HRPD to the CDMA2000 upper layers;

NOTE 4: When the CDMA2000 upper layers in the UE receive both the messageContCDMA2000-1XRTT and messageContCDMA2000-HRPD the UE performs concurrent access to both CDMA2000 1xRTT and CDMA2000 HRPD RAT.

NOTE 5: The UE should perform the handover, the cell change order or enhanced 1xRTT CS fallback as soon as possible following the reception of the RRC message MobilityFromEUTRACommand, which could be before confirming successful reception (HARQ and ARQ) of this message.

5.4.3.4 Successful completion of the mobility from E-UTRA

Upon successfully completing the handover, the cell change order or enhanced 1xRTT CS fallback, the UE shall:

1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'other';

NOTE: If the UE performs enhanced 1xRTT CS fallback along with concurrent mobility to CDMA2000 HRPD and the connection to either CDMA2000 1xRTT or CDMA2000 HRPD succeeds, then the mobility from E-UTRA is considered successful.

5.4.3.5 Mobility from E-UTRA failure

The UE shall:

1> if T304 expires (mobility from E-UTRA failure); or

1> if the UE does not succeed in establishing the connection to the target radio access technology; or

1> if the UE is unable to comply with (part of) the configuration included in the MobilityFromEUTRACommand message; or

1> if there is a protocol error in the inter RAT information included in the MobilityFromEUTRACommand message, causing the UE to fail the procedure according to the specifications applicable for the target RAT:

2> stop T304, if running;

2> if the cs-FallbackIndicator in the MobilityFromEUTRACommand message was set to TRUE or e-CSFB was present:

3> indicate to upper layers that the CS fallback procedure has failed;

2> revert back to the configuration used in the source PCell, excluding the configuration configured by the physicalConfigDedicated, mac-MainConfig and sps-Config;

2> initiate the connection re-establishment procedure as specified in 5.3.7;

NOTE: For enhanced CS fallback to CDMA2000 1xRTT, the above UE behavior applies only when the UE is attempting the enhanced 1xRTT CS fallback and connection to the target radio access technology fails or if the UE is attempting enhanced 1xRTT CS fallback along with concurrent mobility to CDMA2000 HRPD and connection to both the target radio access technologies fails.

5.4.4 Handover from E-UTRA preparation request (CDMA2000)

5.4.4.1 General

![Figure 5.4.4.1-1: Handover from E-UTRA preparation request](image-url)
The purpose of this procedure is to trigger the UE to prepare for handover or enhanced 1xRTT CS fallback to CDMA2000 by requesting a connection with this network. The UE may use this procedure to concurrently prepare for handover to CDMA2000 HRPD along with preparation for enhanced CS fallback to CDMA2000 1xRTT. This procedure applies to CDMA2000 capable UEs only.

This procedure is also used to trigger the UE which supports dual Rx/Tx enhanced 1xCSFB to redirect its second radio to CDMA2000 1xRTT.

The handover from E-UTRA preparation request procedure applies when signalling radio bearers are established.

5.4.4.2 Initiation

E-UTRAN initiates the handover from E-UTRA preparation request procedure to a UE in RRC_CONNECTED, possibly in response to a MeasurementReport message or CS fallback indication for the UE, by sending a HandoverFromEUTRAPreparationRequest message. E-UTRA initiates the procedure only when AS security has been activated.

5.4.4.3 Reception of the HandoverFromEUTRAPreparationRequest by the UE

Upon reception of the HandoverFromEUTRAPreparationRequest message, the UE shall:

1. if dualRxTxRedirectIndicator is present in the received message:
   2. forward dualRxTxRedirectIndicator to the CDMA2000 upper layers;
   3. forward redirectCarrierCDMA2000-1XRTT to the CDMA2000 upper layers, if included;
2. else:
   3. indicate the request to prepare handover or enhanced 1xRTT CS fallback and forward the cdma2000-Type to the CDMA2000 upper layers;
   4. if cdma2000-Type is set to type1XRTT:
      1. forward the rand and the mobilityParameters to the CDMA2000 upper layers;
   5. if concurrPrepCDMA2000-HRPD is present in the received message:
      1. forward concurrPrepCDMA2000-HRPD to the CDMA2000 upper layers;
   6. else:
      1. forward concurrPrepCDMA2000-HRPD, with its value set to FALSE, to the CDMA2000 upper layers;

5.4.5 UL handover preparation transfer (CDMA2000)

5.4.5.1 General

The purpose of this procedure is to tunnel the handover related CDMA2000 dedicated information or enhanced 1xRTT CS fallback related CDMA2000 dedicated information from UE to E-UTRAN when requested by the higher layers. The procedure is triggered by the higher layers on receipt of HandoverFromEUTRAPreparationRequest message. If preparing for enhanced CS fallback to CDMA2000 1xRTT and handover to CDMA2000 HRPD, the UE sends two consecutive ULHandoverPreparationTransfer messages to E-UTRAN, one per addressed CDMA2000 RAT Type. This procedure applies to CDMA2000 capable UEs only.
5.4.5.2 Initiation

A UE in RRC_CONNECTED initiates the UL handover preparation transfer procedure whenever there is a need to transfer handover or enhanced 1xRTT CS fallback related non-3GPP dedicated information. The UE initiates the UL handover preparation transfer procedure by sending the **ULHandoverPreparationTransfer** message.

5.4.5.3 Actions related to transmission of the **ULHandoverPreparationTransfer** message

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

1> include the *cdma2000-Type* and the *dedicatedInfo*;
1> if the *cdma2000-Type* is set to *type1XRTT*:
   2> include the *meid* and set it to the value received from the CDMA2000 upper layers;
1> submit the **ULHandoverPreparationTransfer** message to lower layers for transmission, upon which the procedure ends;

5.4.5.4 Failure to deliver the **ULHandoverPreparationTransfer** message

The UE shall:

1> if the UE is unable to guarantee successful delivery of **ULHandoverPreparationTransfer** messages:
   2> inform upper layers about the possible failure to deliver the information contained in the concerned **ULHandoverPreparationTransfer** message;

5.4.6 Inter-RAT cell change order to E-UTRAN

5.4.6.1 General

The purpose of the inter-RAT cell change order to E-UTRAN procedure is to transfer, under the control of the source radio access technology, a connection between the UE and another radio access technology (e.g. GSM/ GPRS) to E-UTRAN.

5.4.6.2 Initiation

The procedure is initiated when a radio access technology other than E-UTRAN, e.g. GSM/GPRS, using procedures specific for that RAT, orders the UE to change to an E-UTRAN cell. In response, upper layers request the establishment of an RRC connection as specified in subclause 5.3.3.

NOTE: Within the message used to order the UE to change to an E-UTRAN cell, the source RAT should specify the identity of the target E-UTRAN cell as specified in the specifications for that RAT.

The UE shall:

1> upon receiving an **RRCConnectionSetup** message:
   2> consider the inter-RAT cell change order procedure to have completed successfully;

5.4.6.3 UE fails to complete an inter-RAT cell change order

If the inter-RAT cell change order fails the UE shall return to the other radio access technology and proceed as specified in the appropriate specifications for that RAT.

The UE shall:

1> upon failure to establish the RRC connection as specified in subclause 5.3.3:
   2> consider the inter-RAT cell change order procedure to have failed;

NOTE: The cell change was network ordered. Therefore, failure to change to the target PCell should not cause the UE to move to UE-controlled cell selection.
5.5 Measurements

5.5.1 Introduction

The UE reports measurement information in accordance with the measurement configuration as provided by E-UTRAN. E-UTRAN provides the measurement configuration applicable for a UE in RRC_CONNECTED by means of dedicated signalling, i.e. using the RRCConnectionReconfiguration or RRCConnectionResume message.

The UE can be requested to perform the following types of measurements:

- Intra-frequency measurements: measurements at the downlink carrier frequency(ies) of the serving cell(s).
- Inter-frequency measurements: measurements at frequencies that differ from any of the downlink carrier frequency(ies) of the serving cell(s).
- Inter-RAT measurements of UTRA frequencies.
- Inter-RAT measurements of GERAN frequencies.
- Inter-RAT measurements of CDMA2000 HRPD or CDMA2000 1xRTT or WLAN frequencies.

The measurement configuration includes the following parameters:

1. **Measurement objects**: The objects on which the UE shall perform the measurements.
   - For intra-frequency and inter-frequency measurements a measurement object is a single E-UTRA carrier frequency. Associated with this carrier frequency, E-UTRAN can configure a list of cell specific offsets, a list of ‘blacklisted’ cells and a list of ‘whitelisted’ cells. Blacklisted cells are not considered in event evaluation or measurement reporting.
   - For inter-RAT UTRA measurements a measurement object is a set of cells on a single UTRA carrier frequency.
   - For inter-RAT GERAN measurements a measurement object is a set of GERAN carrier frequencies.
   - For inter-RAT CDMA2000 measurements a measurement object is a set of cells on a single (HRPD or 1xRTT) carrier frequency.
   - For inter-RAT WLAN measurements a measurement object is a set of WLAN identifiers and optionally a set of WLAN frequencies.

2. **Reporting configurations**: A list of reporting configurations where each 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.
   - Reporting format: The quantities that the UE includes in the measurement report and associated information (e.g. number of cells to report).

3. **Measurement identities**: 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 used as a reference number in the measurement report.

4. **Quantity configurations**: One quantity configuration is configured per RAT type. The quantity configuration defines the measurement quantities and associated filtering used for all event evaluation and related reporting of that measurement type. One filter can be configured per measurement quantity.

NOTE 1: Some measurements using the above mentioned measurement objects, only concern a single cell, e.g. measurements used to report neighbouring cell system information, PCell UE Rx-Tx time difference, or a pair of cells, e.g. SSTD measurements between the PCell and the PSCell.
5. Measurement gaps: Periods that the UE may use to perform measurements, i.e. no (UL, DL) transmissions are scheduled.

E-UTRAN only configures a single measurement object for a given frequency (except for WLAN), i.e. it is not possible to configure two or more measurement objects for the same frequency with different associated parameters, e.g. different offsets and/or blacklists. E-UTRAN may configure multiple instances of the same event e.g. by configuring two reporting configurations with different thresholds.

The UE maintains a single measurement object list, a single reporting configuration list, and a single measurement identities list. The measurement object list includes measurement objects, that are specified per RAT type, possibly including intra-frequency object(s) (i.e. the object(s) corresponding to the serving frequency(ies)), inter-frequency object(s) and inter-RAT objects. Similarly, the reporting configuration list includes E-UTRA and inter-RAT 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 serving cell(s) - these are the PCell and one or more SCells, if configured for a UE supporting CA.
2. Listed cells - these are cells listed within the measurement object(s) or, for inter-RAT WLAN, the WLANs matching the WLAN identifiers configured in the measurement object or the WLAN the UE is connected to.
3. Detected cells - these are cells that are not listed within the measurement object(s) but are detected by the UE on the carrier frequency(ies) indicated by the measurement object(s).

For E-UTRA, the UE measures and reports on the serving cell(s), listed cells, detected cells and, for RSSI and channel occupancy measurements, the UE measures and reports on any reception on the indicated frequency. For inter-RAT UTRA, the UE measures and reports on listed cells and optionally on cells that are within a range for which reporting is allowed by E-UTRAN. For inter-RAT GERAN, the UE measures and reports on detected cells. For inter-RAT CDMA2000, the UE measures and reports on listed cells. For inter-RAT WLAN, the UE measures and reports on listed cells.

NOTE 2: For inter-RAT UTRA and CDMA2000, the UE measures and reports also on detected cells for the purpose of SON.

NOTE 3: This specification is based on the assumption that typically CSG cells of home deployment type are not indicated within the neighbour list. Furthermore, the assumption is that for non-home deployments, the physical cell identity is unique within the area of a large macro cell (i.e. as for UTRAN).

Whenever the procedural specification, other than contained in sub-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.

5.5.2 Measurement configuration

5.5.2.1 General

E-UTRAN applies the procedure as follows:

- to ensure that, whenever the UE has a measConfig, it includes a measObject for each serving frequency;
- to configure at most one measurement identity using a reporting configuration with the purpose set to reportCGI;
- for serving frequencies, set the EARFCN within the corresponding measObject according to the band as used for reception/transmission;
- to configure at most one measurement identity using a reporting configuration with ul-DelayConfig;

The UE shall:

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 s-Measure:
   2> set the parameter s-Measure within VarMeasConfig to the lowest value of the RSRP ranges indicated by the received value of s-Measure;

1> if the received measConfig includes the preRegistrationInfoHRPD:
   2> forward the preRegistrationInfoHRPD to CDMA2000 upper layers;

1> if the received measConfig includes the speedStatePars:
   2> set the parameter speedStatePars within VarMeasConfig to the received value of speedStatePars;

1> if the received measConfig includes the allowInterruptions:
   2> set the parameter allowInterruptions within VarMeasConfig to the received value of allowInterruptions;

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, 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.

5.5.2.2a Measurement identity autonomous removal

The UE shall:

1> for each measId included in the measIdList within VarMeasConfig:
if the associated reportConfig concerns an event involving a serving cell while the concerned serving cell is not configured; or

if the associated reportConfig concerns an event involving a WLAN mobility set while the concerned WLAN mobility set is not configured:

1> remove the measId from the_measIdList within the VarMeasConfig;
2> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
3> stop the periodical reporting timer if running, and reset the associated information (e.g. timeToTrigger) for this measId;

NOTE 1: The above UE autonomous removal of measIds applies only for measurement events A1, A2, A6, and also applies for events A3 and A5 if configured for PSCell and W2 and W3, if configured.

NOTE 2: When performed during re-establishment, the UE is only configured with a primary frequency (i.e. the SCell(s) and WLAN mobility set are released, if configured).

5.5.2.3 Measurement identity addition/ modification

E-UTRAN 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;

The UE shall:

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, whichever one is running, and reset the associated information (e.g. timeToTrigger) for this measId;
   2> if the triggerType is set to periodical and the purpose 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 si-RequestForHO is included in the reportConfig associated with this measId:
            5> if the UE is a category 0 UE according to TS 36.306 [5]:
               6> start timer T321 with the timer value set to 190 ms for this measId;
            5> else:
               6> start timer T321 with the timer value set to 150 ms for this measId;
         4> else:
            5> start timer T321 with the timer value set to 1 second for this measId;
      3> else if the measObject associated with this measId concerns UTRA:
         4> if the si-RequestForHO is included in the reportConfig associated with this measId:
            5> for UTRA FDD, start timer T321 with the timer value set to 2 seconds for this measId;
for UTRA TDD, start timer T321 with the timer value set to [1 second] for this measId;

else:

start timer T321 with the timer value set to 8 seconds for this measId;

else:

start timer T321 with the timer value set to 8 seconds for this measId;

5.5.2.4 Measurement object removal

The UE shall:

for each measObjectId included in the received measObjectToRemoveList that is part of the current UE configuration in VarMeasConfig:

remove the entry with the matching measObjectId from the measObjectList within the VarMeasConfig;

remove all measId associated with this measObjectId from the measIdList within the VarMeasConfig, if any;

if a measId is removed from the measIdList:

remove the measurement reporting entry for this measId from the VarMeasReportList, if included;

stop the periodical reporting timer or timer T321, 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 measObjectToRemoveList includes any measObjectId value that is not part of the current UE configuration.

5.5.2.5 Measurement object addition/ modification

The UE shall:

for each measObjectId included in the received measObjectToAddModList:

if an entry with the matching measObjectId exists in the measObjectList within the VarMeasConfig, for this entry:

reconfigure the entry with the value received for this measObject, except for the fields cellsToAddModList, blackCellsToAddModList, whiteCellsToAddModList, altTTT-CellsToAddModList, cellsToRemoveList, blackCellsToRemoveList, whiteCellsToRemoveList, altTTT-CellsToRemoveList, measSubframePatternConfigNeigh, measDS-Config, wlan-ToAddModList and wlan-ToRemoveList;

if the received measObject includes the cellsToRemoveList:

for each cellIndex included in the cellsToRemoveList:

remove the entry with the matching cellIndex from the cellsToAddModList;

if the received measObject includes the cellsToAddModList:

for each cellIndex value included in the cellsToAddModList:

if an entry with the matching cellIndex exists in the cellsToAddModList:

replace the entry with the value received for this cellIndex;

else:

add a new entry for the received cellIndex to the cellsToAddModList;

if the received measObject includes the blackCellsToRemoveList:

for each cellIndex included in the blackCellsToRemoveList:

remove the entry with the matching cellIndex from the blackCellsToAddModList;
NOTE 1: For each cellIndex included in the blackCellsToRemoveList that concerns overlapping ranges of cells, a cell is removed from the black list of cells only if all cell indexes containing it are removed.

3> if the received measObject includes the blackCellsToAddModList:
4> for each cellIndex included in the blackCellsToAddModList:
5> if an entry with the matching cellIndex is included in the blackCellsToAddModList:
6> replace the entry with the value received for this cellIndex;
5> else:
6> add a new entry for the received cellIndex to the blackCellsToAddModList;

NOTE 2: For each cellIndex included in the whiteCellsToRemoveList that concerns overlapping ranges of cells, a cell is removed from the white list of cells only if all cell indexes containing it are removed.

3> if the received measObject includes the whiteCellsToRemoveList:
4> for each cellIndex included in the whiteCellsToRemoveList:
5> remove the entry with the matching cellIndex from the whiteCellsToAddModList;

NOTE 3: For each cellIndex included in the altTTT-CellsToRemoveList that concerns overlapping ranges of cells, a cell is removed from the list of cells only if all cell indexes containing it are removed.

3> if the received measObject includes the altTTT-CellsToRemoveList:
4> for each cellIndex included in the altTTT-CellsToRemoveList:
5> remove the entry with the matching cellIndex from the altTTT-CellsToAddModList;

3> if the received measObject includes the measSubframePatternConfigNeigh:
4> set measSubframePatternConfigNeigh within the VarMeasConfig to the value of the received field

3> if the received measObject includes measDS-Config:
4> if measDS-Config is set to setup:
5> if the received measDS-Config includes the measCSI-RS-ToRemoveList:
6> for each measCSI-RS-Id included in the measCSI-RS-ToRemoveList:
7> remove the entry with the matching measCSI-RS-Id from the measCSI-RS-ToAddModList;
5> if the received measDS-Config includes the measCSI-RS-ToAddModList, for each measCSI-RS-Id value included in the measCSI-RS-ToAddModList:
6> if an entry with the matching measCSI-RS-Id exists in the measCSI-RS-ToAddModList:
7> replace the entry with the value received for this measCSI-RS-Id;
6> else:
7> add a new entry for the received measCSI-RS-Id to the measCSI-RS-ToAddModList;
5> set other fields of the measDS-Config within the VarMeasConfig to the value of the received fields;
5> perform the discovery signals measurement timing configuration procedure as specified in 5.5.2.10;
4> else:
5> release the discovery signals measurement configuration;
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, whichever one is running, and reset the associated information (e.g. timeToTrigger) for this measId;
3> if the received measObject includes the wlan-ToRemoveList:
4> for each WLAN-Identifiers included in the wlan-ToRemoveList:
5> remove the entry with the matching WLAN-Identifiers from the wlan-ToAddModList;
NOTE 3a: Matching of WLAN-Identifiers requires that all WLAN identifier fields should be same.
3> if the received measObject includes the wlan-ToAddModList:
4> for each WLAN-Identifiers included in the wlan-ToAddModList:
5> add a new entry for the received WLAN-Identifiers to the wlan-ToAddModList;
2> else:
3> add a new entry for the received measObject to the measObjectList within VarMeasConfig;
NOTE 4: UE does not need to retain cellForWhichToReportCGI in the measObject after reporting cgi-Info.

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, 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 in VarMeasReportList, if included;

4> stop the periodical reporting timer or timer T321, 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

The UE shall:

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, whichever one is running, and reset the associated information (e.g. timeToTrigger) for this measId;

5.5.2.9 Measurement gap configuration

The UE shall:

1> if measGapConfig is set to setup:

2> if a measurement gap configuration is already setup, release the measurement gap configuration;

2> setup the measurement gap configuration indicated by the measGapConfig 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 and subframe of MCG cells):

\[
\text{SFN mod } T = \text{FLOOR}(\text{gapOffset}/10);
\]

\[
\text{subframe } = \text{gapOffset} \mod 10;
\]

with \( T = \text{MGRP}/10 \) as defined in TS 36.133 [16];

NOTE: The UE applies a single gap, which timing is relative to the MCG cells, even when configured with DC.

1> else:

2> release the measurement gap configuration;
5.5.2.10 Discovery signals measurement timing configuration

The UE shall setup the discovery signals measurement timing configuration (DMTC) in accordance with the received dmtc-PeriodOffset, i.e., the first subframe of each DMTC occasion occurs at an SFN and subframe of the PCell meeting the following condition:

\[
\text{SFN mod } T = \text{FLOOR}(\text{dmtc-Offset}/10); \\
\text{subframe} = \text{dmtc-Offset mod 10}; \\
\text{with } T = \text{dmtc-Periodicity}/10;
\]

On the concerned frequency, the UE shall not consider discovery signals transmission in subframes outside the DMTC occasion for measurements including RRM measurements.

5.5.2.11 RSSI measurement timing configuration

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

\[
\text{SFN mod } T = \text{FLOOR}(\text{rmtc-SubframeOffset}/10); \\
\text{subframe} = \text{rmtc-SubframeOffset mod 10}; \\
\text{with } T = \text{rmtc-Period}/10;
\]

On the concerned frequency, the UE shall not consider RSSI measurements outside the configured RMTC occasion which lasts for measDuration for RSSI and channel occupancy measurements.

5.5.3 Performing measurements

5.5.3.1 General

For all measurements, except for UE Rx–Tx time difference measurements, RSSI, UL PDCP Packet Delay per QCI measurement, channel occupancy measurements, and except for WLAN measurements of Band, Carrier Info, Available Admission Capacity, Backhaul Bandwidth, Channel Utilization, and Station Count, the UE applies the layer 3 filtering as specified in 5.5.3.2, before using the measured results for evaluation of reporting criteria or for measurement reporting.

The UE shall:

1> whenever the UE has a measConfig, perform RSRP and RSRQ measurements for each serving cell as follows:
   2> for the PCell, apply the time domain measurement resource restriction in accordance with measSubframePatternPCell, if configured;
   2> if the UE supports CRS based discovery signals measurement:
      3> for each SCell in deactivated state, apply the discovery signals measurement timing configuration in accordance with measDS-Config, if configured within the measObject corresponding to the frequency of the SCell;
1> if the UE has a measConfig with rs-sinr-Config configured, perform RS-SINR (as indicated in the associated reportConfig) measurements as follows:
   2> perform the corresponding measurements on the frequency indicated in the associated measObject using available idle periods or using autonomous gaps as necessary;
1> for each measId included in the measIdList within VarMeasConfig:
   2> if the purpose for the associated reportConfig is set to reportCGI:
      3> if si-RequestForHO 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 or using autonomous gaps as necessary;

NOTE 1: If autonomous gaps are used to perform measurements, the UE is allowed to temporarily abort
communication with all serving cell(s), i.e. create autonomous gaps to perform the corresponding
measurements within the limits specified in TS 36.133 [16]. Otherwise, the UE only supports the
measurements with the purpose set to reportCGI only if E-UTRAN has provided sufficient idle periods.

3> try to acquire the global cell identity of the cell indicated by the cellForWhichToReportCGI in the
associated measObject by acquiring the relevant system information from the concerned cell;

3> if the cell indicated by the cellForWhichToReportCGI included in the associated measObject is an E-
UTRAN cell:
4> try to acquire the CSG identity, if the CSG identity is broadcast in the concerned cell;
4> try to acquire the trackingAreaCode in the concerned cell;
4> try to acquire the list of additional PLMN Identities, as included in the plmn-IdentityList, if multiple
PLMN identities are broadcast in the concerned cell;
4> if the includeMultiBandInfo is configured:
5> try to acquire the freqBandIndicator in the SystemInformationBlockType1of the concerned cell;
5> try to acquire the list of additional frequency band indicators, as included in the multiBandInfoList,
if multiple frequency band indicators are included in the SystemInformationBlockType1of the
concerned cell;
5> try to acquire the freqBandIndicatorPriority, if the freqBandIndicatorPriority is included in the
SystemInformationBlockType1of the concerned cell;

NOTE 2: The 'primary' PLMN is part of the global cell identity.

3> if the cell indicated by the cellForWhichToReportCGI included in the associated measObject is a UTRAN
cell:
4> try to acquire the LAC, the RAC and the list of additional PLMN Identities, if multiple PLMN
identities are broadcast in the concerned cell;
4> try to acquire the CSG identity, if the CSG identity is broadcast in the concerned cell;
3> if the cell indicated by the cellForWhichToReportCGI included in the associated measObject is a GERAN
cell:
4> try to acquire the RAC in the concerned cell;
3> if the cell indicated by the cellForWhichToReportCGI included in the associated measObject is a CDMA2000 cell and the cdma2000-Type included in the measObject is typeHRPD:
4> try to acquire the Sector ID in the concerned cell;
3> if the cell indicated by the cellForWhichToReportCGI included in the associated measObject is a CDMA2000 cell and the cdma2000-Type included in the measObject is type1XRTT:
4> try to acquire the BASE ID, SID and NID in the concerned cell;
2> if the ul-DelayConfig is configured for the associated reportConfig:
3> ignore the measObject;
3> configure the PDCP layer to perform UL PDCP Packet Delay per QCI measurement;
else:

if a measurement gap configuration is setup; or

if the UE does not require measurement gaps to perform the concerned measurements:

if \( s\text{-Measure} \) is not configured; or

if \( s\text{-Measure} \) is configured and the PCell RSRP, after layer 3 filtering, is lower than this value; or

if \( \text{measDS-Config} \) is configured in the associated \( \text{measObject} \):

if the UE supports CSI-RS based discovery signals measurement; and

if the \( \text{eventId} \) in the associated \( \text{reportConfig} \) is set to \( \text{eventC1} \) or \( \text{eventC2} \), or if \( \text{reportStrongestCSI-RSs} \) is included in the associated \( \text{reportConfig} \):

perform the corresponding measurements of CSI-RS resources on the frequency indicated in the concerned \( \text{measObject} \), applying the discovery signals measurement timing configuration in accordance with \( \text{measDS-Config} \) in the concerned \( \text{measObject} \);

if \( \text{reportCRS-Meas} \) is included in the associated \( \text{reportConfig} \), perform the corresponding measurements of neighbouring cells on the frequencies indicated in the concerned \( \text{measObject} \) as follows:

for neighbouring cells on the primary frequency, apply the time domain measurement resource restriction in accordance with \( \text{measSubframePatternConfigNeigh} \), if configured in the concerned \( \text{measObject} \);

apply the discovery signals measurement timing configuration in accordance with \( \text{measDS-Config} \) in the concerned \( \text{measObject} \);

else:

perform the corresponding measurements of neighbouring cells on the frequencies and RATs indicated in the concerned \( \text{measObject} \) as follows:

for neighbouring cells on the primary frequency, apply the time domain measurement resource restriction in accordance with \( \text{measSubframePatternConfigNeigh} \), if configured in the concerned \( \text{measObject} \);

if the UE supports CRS based discovery signals measurement, apply the discovery signals measurement timing configuration in accordance with \( \text{measDS-Config} \), if configured in the concerned \( \text{measObject} \);

if the \( \text{ue-RxTxTimeDiffPeriodical} \) is configured in the associated \( \text{reportConfig} \):

perform the UE Rx–Tx time difference measurements on the PCell;

if the \( \text{reportSSTD-Meas} \) is set to \( \text{true} \) in the associated \( \text{reportConfig} \):

perform SSTD measurements between the PCell and the PSCell;

if the \( \text{measRSSI-ReportConfig} \) is configured in the associated \( \text{reportConfig} \):

perform the RSSI and channel occupancy measurements on the frequency indicated in the associated \( \text{measObject} \);

perform the evaluation of reporting criteria as specified in 5.5.4;

NOTE 3: The \( s\text{-Measure} \) defines when the UE is required to perform measurements. The UE is however allowed to perform measurements also when the PCell RSRP exceeds \( s\text{-Measure} \), e.g., to measure cells broadcasting a CSG identity following use of the autonomous search function as defined in TS 36.304 [4].

NOTE 4: The UE may not perform the WLAN measurements it is configured with e.g. due to connection to another WLAN based on user preferences as specified in TS 23.402 [75] or due to turning off WLAN.
5.5.3.2 Layer 3 filtering

The UE shall:

1> for each measurement quantity that the UE performs measurements according to 5.5.3.1:

   NOTE 1: This does not include quantities configured solely for UE Rx-Tx time difference, SSTD measurements and RSSI, channel occupancy measurements, WLAN measurements of Band, Carrier Info, Available Admission Capacity, Backhaul Bandwidth, Channel Utilization, and Station Count, and UL PDCP Packet Delay per QCI measurement i.e. for those types of measurements the UE ignores the triggerQuantity and reportQuantity.

2> filter the measured result, before using for evaluation of reporting criteria or for measurement reporting, by the following formula:

\[
F_n = (1 - a) \cdot F_{n-1} + a \cdot M_n
\]

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
- \( a = 1/2^k \), where \( k \) is the filterCoefficient for the corresponding measurement quantity received by 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 200 ms;

   NOTE 2: If \( k \) is set to 0, no layer 3 filtering is applicable.

   NOTE 3: 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 4: The filter input rate is implementation dependent, to fulfil the performance requirements set in [16]. For further details about the physical layer measurements, see TS 36.133 [16].

5.5.4 Measurement report triggering

5.5.4.1 General

If 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 purpose set to reportStrongestCellsForSON:

   3> consider any neighbouring cell detected on the associated frequency to be applicable;

   2> else if the corresponding reportConfig includes a purpose set to reportCGI:

   3> consider any neighbouring cell detected on the associated frequency/ set of frequencies (GERAN) which has a physical cell identity matching the value of the cellForWhichToReportCGI included in the corresponding measObject within the VarMeasConfig to be applicable;

   2> else:

   3> if the corresponding measObject concerns E-UTRA:

   4> if the ue-RxTxTimeDiffPeriodical is configured in the corresponding reportConfig:

   5> consider only the PCell to be applicable;
else if the `reportSTD-Meas` is set to `true` in the corresponding `reportConfig`:

consider the PSCell to be applicable;

else if the `eventA1` or `eventA2` is configured in the corresponding `reportConfig`:

consider only the serving cell to be applicable;

else if `eventC1` or `eventC2` is configured in the corresponding `reportConfig`; or if `reportStrongestCSI-RSs` is included in the corresponding `reportConfig`:

consider a CSI-RS resource on the associated frequency to be applicable when the concerned CSI-RS resource is included in the `measCSI-RS-ToAddModList` defined within the `VarMeasConfig` for this `measId`;

else if `measRSSI-ReportConfig` is configured in the corresponding `reportConfig`:

consider the resource indicated by the `rmtc-Config` on the associated frequency to be applicable;

else:

if `useWhiteCellList` is set to `TRUE`:

consider any neighbouring cell detected on the associated frequency to be applicable when the concerned cell is included in the `whiteCellsToAddModList` defined within the `VarMeasConfig` for this `measId`;

else:

consider any neighbouring cell detected on the associated frequency to be applicable when the concerned cell is not included in the `blackCellsToAddModList` defined within the `VarMeasConfig` for this `measId`;

for events involving a serving cell on one frequency and neighbours on another frequency, consider the serving cell on the other frequency as a neighbouring cell;

if the corresponding `reportConfig` includes `alternativeTimeToTrigger` and if the UE supports `alternativeTimeToTrigger`:

use the value of `alternativeTimeToTrigger` as the time to trigger instead of the value of `timeToTrigger` in the corresponding `reportConfig` for cells included in the `altTTT-CellsToAddModList` of the corresponding `measObject`;

else if the corresponding `measObject` concerns UTRA or CDMA2000:

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` (i.e. the cell is included in the white-list);

NOTE 0: The UE may also consider a neighbouring cell on the associated UTRA frequency to be applicable when the concerned cell is included in the `csg-allowedReportingCells` within the `VarMeasConfig` for this `measId`, if configured in the corresponding `measObjectUTRA` (i.e. the cell is included in the range of physical cell identities for which reporting is allowed).

else if the corresponding `measObject` concerns GERAN:

consider a neighbouring cell on the associated set of frequencies to be applicable when the concerned cell matches the `ncc-Permitted` defined within the `VarMeasConfig` for this `measId`;

else if the corresponding `measObject` concerns WLAN:

consider a WLAN on the associated set of frequencies, as indicated by `carrierFreq` or on all WLAN frequencies when `carrierFreq` is not present, to be applicable if the WLAN matches all WLAN identifiers of at least one entry within `wlan-Id-List` for this `measId`;

if the `triggerType` is set to `event` 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 an 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 the UE supports T312 and if useT312 is included for this event and if T310 is running:
   4> if T312 is not running:
      5> start timer T312 with the value configured in the corresponding measObject;
3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> if the triggerType is set to event 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 the UE supports T312 and if useT312 is included for this event and if T310 is running:
   4> if T312 is not running:
      5> start timer T312 with the value configured in the corresponding measObject;
3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> if the triggerType is set to event 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 the UE supports T312 and if useT312 is included for this event and if T310 is running:
   4> if T312 is not running:
      5> start timer T312 with the value configured in the corresponding measObject;
3> if reportOnLeave is set to TRUE for the corresponding reporting configuration or if a6-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 triggerType is set to event 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 CSI-RS resources for all measurements after layer 3 filtering taken during timeToTrigger...
defined for this event within the VarMeasConfig, while the VarMeasReportList does not include an measurement reporting entry for this measId (i.e. a first CSI-RS 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 CSI-RS resource(s) in the csi-RS-TriggeredList defined within the
VarMeasReportList for this measId;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> if the triggerType is set to event 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 CSI-RS resources not included in the csi-RS-TriggeredList for all measurements after layer 3 filtering taken during timeToTrigger defined for this event within the VarMeasConfig (i.e. a subsequent CSI-RS resource triggers the event):

3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;

3> include the concerned CSI-RS resource(s) in the csi-RS-TriggeredList defined within the
VarMeasReportList for this measId;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> if the triggerType is set to event and if the leaving condition applicable for this event is fulfilled for one or more of the CSI-RS resources included in the csi-RS-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 CSI-RS resource(s) in the csi-RS-TriggeredList defined within the
VarMeasReportList for this measId;

3> if c1-ReportOnLeave is set to TRUE for the corresponding reporting configuration or if c2-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 csi-RS-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 measRSSI-ReportConfig is included 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 when RSSI sample values are reported by the physical layer after the first L1 measurement duration;

2> else if the purpose is included and set to reportStrongestCells or to reportStrongestCellsForSON 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 purpose is set to reportStrongestCells and reportStrongestCSI-RSs is not included:

4> if the triggerType is set to periodical and the corresponding reportConfig includes the ul-DelayConfig:

5> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after a first measurement result is provided by lower layers;
else if the `reportAmount` exceeds 1:

5> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the PCell;

4> else (i.e. the `reportAmount` is equal to 1):

5> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the PCell and for the strongest cell among the applicable cells, or becomes available for the pair of PCell and the PSCell in case of SSTD measurements;

3> else:

4> initiate the measurement reporting procedure, as specified in 5.5.5, when it has determined the strongest cells on the associated frequency;

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 `purpose` is included and set to `reportCGI` and if the UE acquired the information needed to set all fields of `cgi-Info` for the requested cell:

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> stop timer T321;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> upon expiry of the 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;

NOTE 2: The UE does not stop the periodical reporting with `triggerType` set to `event` or to `periodical` while the corresponding measurement is not performed due to the PCell RSRP being equal to or better than `s-Measure` or due to the measurement gap not being setup.

NOTE 3: If the UE is configured with DRX, the UE may delay the measurement reporting for event triggered and periodical triggered measurements until the Active Time, which is defined in TS 36.321 [6].

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 primary or secondary cell that is configured on the frequency indicated in the associated `measObjectEUTRA` to be the serving cell;

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 reportConfigEUTRA for this event).

\textbf{Threshold} is the threshold parameter for this event (i.e. \textit{a1-Threshold} as defined within reportConfigEUTRA for this event).

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

\textit{Hys} is expressed in dB.

\textit{Threshold} is expressed in the same unit as \textit{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 primary or secondary cell that is configured on the frequency indicated in the associated \textit{measObjectEUTRA} to be the serving cell;

\textbf{Inequality A2-1 (Entering condition)}

\textit{Ms}+\textit{Hys}<\textit{Threshold}

\textbf{Inequality A2-2 (Leaving condition)}

\textit{Ms}−\textit{Hys}>\textit{Threshold}

The variables in the formula are defined as follows:

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

\textit{Hys} is the hysteresis parameter for this event (i.e. \textit{hysteresis} as defined within reportConfigEUTRA for this event).

\textit{Threshold} is the threshold parameter for this event (i.e. \textit{a1-Threshold} as defined within reportConfigEUTRA for this event).

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

\textit{Hys} is expressed in dB.

\textit{Threshold} is expressed in the same unit as \textit{Ms}.

5.5.4.4  Event A3 (Neighbour becomes offset better than PCell/ PSCell)

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. if \textit{usePSCell} of the corresponding \textit{reportConfig} is set to \textit{true}:
2. use the PSCell for \textit{Mp}, \textit{Ofp} and \textit{Ocp};
1. else:
2. use the PCell for \textit{Mp}, \textit{Ofp} and \textit{Ocp};

\textbf{NOTE} The cell(s) that triggers the event is on the frequency indicated in the associated \textit{measObject} which may be different from the frequency used by the PCell/ PSCell.

\textbf{Inequality A3-1 (Entering condition)}
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 frequency specific offset of the frequency of the neighbour cell (i.e. offsetFreq as defined within measObjectEUTRA corresponding to the frequency of the neighbour cell).
- \( Ocn \) is the cell specific offset of the neighbour cell (i.e. cellIndividualOffset as defined within measObjectEUTRA 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 PCell/ PSCell, not taking into account any offsets.
- \( Ofp \) is the frequency specific offset of the frequency of the PCell/ PSCell (i.e. offsetFreq as defined within measObjectEUTRA corresponding to the frequency of the PCell/ PSCell).
- \( Ocp \) is the cell specific offset of the PCell/ PSCell (i.e. cellIndividualOffset as defined within measObjectEUTRA corresponding to the frequency of the PCell/ PSCell), and is set to zero if not configured for the PCell/ PSCell.
- \( Hys \) is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).
- \( Off \) is the offset parameter for this event (i.e. a3-Offset as defined within reportConfigEUTRA 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.

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

Inequality A4-1 (Entering condition)
\[ Mn + Ofn + Ocn - Hys > \text{Thresh} \]

Inequality A4-2 (Leaving condition)
\[ Mn + Ofn + Ocn + Hys < \text{Thresh} \]

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 frequency specific offset of the frequency of the neighbour cell (i.e. offsetFreq as defined within measObjectEUTRA corresponding to the frequency of the neighbour cell).
- \( Ocn \) is the cell specific offset of the neighbour cell (i.e. cellIndividualOffset as defined within measObjectEUTRA corresponding to the frequency of 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 reportConfigEUTRA for this event).
- \( \text{Thresh} \) is the threshold parameter for this event (i.e. a4-Threshold as defined within reportConfigEUTRA 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.
5.5.4.6 Event A5 (PCell/ PSCell 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> if usePSCell of the corresponding reportConfig is set to true:

2> use the PSCell for $M_p$;

1> else:

2> use the PCell for $M_p$;

NOTE: The cell(s) that triggers the event is on the frequency indicated in the associated measObject which may be different from the frequency used by the PCell/ PSCell.

Inequality A5-1 (Entering condition 1)

$$M_p + \text{Hys} < \text{Thresh}1$$

Inequality A5-2 (Entering condition 2)

$$M_n + O_{fn} + O_{cn} - \text{Hys} > \text{Thresh}2$$

Inequality A5-3 (Leaving condition 1)

$$M_p - \text{Hys} > \text{Thresh}1$$

Inequality A5-4 (Leaving condition 2)

$$M_n + O_{fn} + O_{cn} + \text{Hys} < \text{Thresh}2$$

The variables in the formula are defined as follows:

$M_p$ is the measurement result of the PCell/ PSCell, not taking into account any offsets.

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

$O_{fn}$ is the frequency specific offset of the frequency of the neighbour cell (i.e. offsetFreq as defined within measObjectEUTRA corresponding to the frequency of the neighbour cell).

$O_{cn}$ is the cell specific offset of the neighbour cell (i.e. cellIndividualOffset as defined within measObjectEUTRA corresponding to the frequency of 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 reportConfigEUTRA for this event).

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

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

$M_n, M_p$ are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

$O_{fn}, O_{cn}, \text{Hys}$ are expressed in dB.

Thresh1 is expressed in the same unit as $M_p$.

Thresh2 is expressed in the same unit as $M_n$. 

**Thresh** is expressed in the same unit as $M_n$. 

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5.5.4.6a  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 that is configured on the frequency indicated in the associated measObjectEUTRA to be the serving cell;

NOTE: The neighbour(s) is on the same frequency as the SCell i.e. both are on the frequency indicated in the associated measObject.

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 measObjectEUTRA corresponding to the frequency of the neighbour cell), 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 measObjectEUTRA corresponding to the serving frequency), 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 reportConfigEUTRA for this event).
- \( Off \) is the offset parameter for this event (i.e. a6-Offset as defined within reportConfigEUTRA 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.

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

The UE shall:

1> for UTRA and CDMA2000, only trigger the event for cells included in the corresponding measurement object;
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)

\[ Mn + Ofn - Hys > Thresh \]

Inequality B1-2 (Leaving condition)

\[ Mn + Ofn + Hys < Thresh \]

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. For CDMA 2000 measurement result, pilotStrength is divided by -2.
- \( Ofn \) is the frequency specific offset of the frequency of the inter-RAT neighbour cell (i.e. offsetFreq as defined within the measObject corresponding to the frequency of the neighbour inter-RAT 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-Threshold* as defined within *reportConfigInterRAT* for this event). For CDMA2000, *b1-Threshold* is divided by -2.

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

**Ofn, Hys** are expressed in dB.

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

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

The UE shall:

1. for UTRA and CDMA2000, only trigger the event for cells included in the corresponding measurement object;

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)**

\[ M_p + Hys < Thresh1 \]

**Inequality B2-2 (Entering condition 2)**

\[ M_n + Ofn - Hys > Thresh2 \]

**Inequality B2-3 (Leaving condition 1)**

\[ M_p - Hys > Thresh1 \]

**Inequality B2-4 (Leaving condition 2)**

\[ M_n + Ofn + Hys < Thresh2 \]

The variables in the formula are defined as follows:

- **M_p** is the measurement result of the PCell, not taking into account any offsets.
- **M_n** is the measurement result of the inter-RAT neighbour cell, not taking into account any offsets. For CDMA2000 measurement result, *pilotStrength* is divided by -2.
- **Ofn** is the frequency specific offset of the frequency of the inter-RAT neighbour cell (i.e. *offsetFreq* as defined within the *measObject* corresponding to the frequency of the inter-RAT 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-Threshold2* as defined within *reportConfigInterRAT* for this event). For CDMA2000, *b2-Threshold2* is divided by -2.

**M_p** is expressed in dBm in case of RSRP, or in dB in case of RSRQ.

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

**Ofn, Hys** are expressed in dB.

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

**Thresh2** is expressed in the same unit as **M_n**.
5.5.4.9 Event C1 (CSI-RS resource becomes better than 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)

\[ \text{Mcr} + \text{Ocr} - \text{Hys} > \text{Thresh} \]

Inequality C1-2 (Leaving condition)

\[ \text{Mcr} + \text{Ocr} + \text{Hys} < \text{Thresh} \]

The variables in the formula are defined as follows:

- \( \text{Mcr} \) is the measurement result of the CSI-RS resource, not taking into account any offsets.
- \( \text{Ocr} \) is the CSI-RS specific offset (i.e. csi-RS-IndividualOffset as defined within measObjectEUTRA corresponding to the frequency of the CSI-RS resource), and set to zero if not configured for the CSI-RS resource.
- \( \text{Hys} \) is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).
- \( \text{Thresh} \) is the threshold parameter for this event (i.e. c1-Threshold as defined within reportConfigEUTRA for this event).

\( \text{Mcr, Thresh} \) are expressed in dBm.

\( \text{Ocr, Hys} \) are expressed in dB.

5.5.4.10 Event C2 (CSI-RS resource becomes offset better than reference CSI-RS resource)

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;

NOTE: The CSI-RS resource(s) that triggers the event is on the same frequency as the reference CSI-RS resource, i.e. both are on the frequency indicated in the associated measObject.

Inequality C2-1 (Entering condition)

\[ \text{Mcr} + \text{Ocr} - \text{Hys} > \text{Mref} + \text{Oref} + \text{Off} \]

Inequality C2-2 (Leaving condition)

\[ \text{Mcr} + \text{Ocr} + \text{Hys} < \text{Mref} + \text{Oref} + \text{Off} \]

The variables in the formula are defined as follows:

- \( \text{Mcr} \) is the measurement result of the CSI-RS resource, not taking into account any offsets.
- \( \text{Ocr} \) is the CSI-RS specific offset of the CSI-RS resource (i.e. csi-RS-IndividualOffset as defined within measObjectEUTRA corresponding to the frequency of the CSI-RS resource), and set to zero if not configured for the CSI-RS resource.
- \( \text{Mref} \) is the measurement result of the reference CSI-RS resource (i.e. c2-Ref CSI-RS as defined within reportConfigEUTRA for this event), not taking into account any offsets.
- \( \text{Oref} \) is the CSI-RS specific offset of the reference CSI-RS resource (i.e. csi-RS-IndividualOffset as defined within measObjectEUTRA corresponding to the frequency of the reference CSI-RS resource), and is set to zero if not configured for the reference CSI-RS resource.
**5.5.4.11 Event W1 (WLAN becomes better than a threshold)**

The UE shall:

1. consider the entering condition for this event to be satisfied when \( wlan-MobilitySet \) within \( VarWLAN-MobilityConfig \) does not contain any entries and condition W1-1, as specified below, is fulfilled;
2. consider the leaving condition for this event to be satisfied when condition W1-2, as specified below, is fulfilled;

Inequality W1-1 (Entering condition)

\[ Mn - Hys > Thresh \]

Inequality W1-2 (Leaving condition)

\[ Mn + Hys < Thresh \]

The variables in the formula are defined as follows:

- **Mn** is the measurement result of WLAN(s) configured in the measurement object, not taking into account any offsets.
- **Hys** is the hysteresis parameter for this event.
- **Thresh** is the threshold parameter for this event (i.e. \( w1-Threshold \) as defined within \( reportConfigInterRAT \) for this event).

- **Mn** is expressed in dBm.
- **Hys** is expressed in dB.
- **Thresh** is expressed in the same unit as **Mn**.

**5.5.4.12 Event W2 (All WLAN inside WLAN mobility set becomes worse than threshold1 and a WLAN outside WLAN mobility set becomes better than threshold2)**

The UE shall:

1. consider the entering condition for this event to be satisfied when both conditions W2-1 and W2-2 as specified below are fulfilled;
2. consider the leaving condition for this event to be satisfied when condition W2-3 or condition W2-4, i.e. at least one of the two, as specified below is fulfilled;

Inequality W2-1 (Entering condition 1)

\[ Ms + Hys < Thresh1 \]

Inequality W2-2 (Entering condition 2)

\[ Mn - Hys > Thresh2 \]

Inequality W2-3 (Leaving condition 1)

\[ Ms - Hys > Thresh1 \]

Inequality W2-4 (Leaving condition 2)
\[ Mn + \text{Hys} < \text{Thresh}_2 \]

The variables in the formula are defined as follows:

- \( Ms \) is the measurement result of WLAN(s) which matches all WLAN identifiers of at least one entry within \( \text{wlan-MobilitySet} \) in \( \text{VarWLAN-MobilityConfig} \), not taking into account any offsets.

- \( Mn \) is the measurement result of WLAN(s) configured in the measurement object which does not match all WLAN identifiers of any entry within \( \text{wlan-MobilitySet} \) in \( \text{VarWLAN-MobilityConfig} \), not taking into account any offsets.

- \( \text{Hys} \) is the hysteresis parameter for this event.

- \( \text{Thresh}_1 \) is the threshold parameter for this event (i.e. \( \text{w2-Threshold1} \) as defined within \( \text{reportConfigInterRAT} \) for this event).

- \( \text{Thresh}_2 \) is the threshold parameter for this event (i.e. \( \text{w2-Threshold2} \) as defined within \( \text{reportConfigInterRAT} \) for this event).

\( Mn, Ms \) are expressed in dBm.

\( \text{Hys} \) is expressed in dB.

\( \text{Thresh}_1 \) is expressed in the same unit as \( Ms \).

\( \text{Thresh}_2 \) is expressed in the same unit as \( Mn \).

5.5.4.13 Event W3 (All WLAN inside WLAN mobility set becomes worse than a threshold)

The UE shall:

1. consider the entering condition for this event to be satisfied when condition W3-1, as specified below, is fulfilled;
2. consider the leaving condition for this event to be satisfied when condition W3-2, as specified below, is fulfilled;

Inequality W3-1 (Entering condition)

\[ Ms + \text{Hys} < \text{Thresh} \]

Inequality W3-2 (Leaving condition)

\[ Ms - \text{Hys} > \text{Thresh} \]

The variables in the formula are defined as follows:

- \( Ms \) is the measurement result of WLAN(s) which matches all WLAN identifiers of at least one entry within \( \text{wlan-MobilitySet} \) in \( \text{VarWLAN-MobilityConfig} \), not taking into account any offsets.

- \( \text{Hys} \) is the hysteresis parameter for this event.

- \( \text{Thresh} \) is the threshold parameter for this event (i.e. \( \text{w3-Threshold} \) as defined within \( \text{reportConfigInterRAT} \) for this event).

\( Ms \) is expressed in dBm.

\( \text{Hys} \) is expressed in dB.

\( \text{Thresh} \) is expressed in the same unit as \( Ms \).
5.5.5 Measurement reporting

The purpose of this procedure is to transfer measurement results from the UE to E-UTRAN. The UE shall initiate this procedure only after successful 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;
2. set the measResultPCell to include the quantities of the PCell;
3. set the measResultServFreqList to include for each SCell that is configured, if any, within measResultSCell the quantities of the concerned SCell, if available according to performance requirements in [16];
4. if the reportConfig associated with the measId that triggered the measurement reporting includes reportAddNeighMeas:
   1. for each serving frequency for which measObjectId is referenced in the measIdList, other than the frequency corresponding with the measId that triggered the measurement reporting:
      1. set the measResultServFreqList to include within measResultBestNeighCell the physCellId and the quantities of the best non-serving cell, based on RSRP, on the concerned serving frequency;
   2. if there is at least one applicable neighbouring cell to report:
      1. set the measResultNeighCells to include the best neighbouring cells up to maxReportCells in accordance with the following:
         1. if the triggerType is set to event:
            1. include the cells included in the cellsTriggeredList as defined within the VarMeasReportList for this measId;
         3. else:
            4. 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;

NOTE 1: The reliability of the report (i.e. the certainty it contains the strongest cells on the concerned frequency) depends on the measurement configuration i.e. the reportInterval. The related performance requirements are specified in TS 36.133 [16].

3. for each cell that is included in the measResultNeighCells, include the physCellId;
4. if the triggerType is set to event; or the purpose is set to reportStrongestCells or to reportStrongestCellsForSON:
   1. for each included cell, include the layer 3 filtered measured results in accordance with the reportConfig for this measId, ordered as follows:
   5. if the measObject associated with this measId concerns E-UTRA:
6> set the measResult to include the quantity(ies) indicated in the reportQuantity within the concerned reportConfig in order of decreasing triggerQuantity, i.e. the best cell is included first;

5> if the measObject associated with this measId concerns UTRA FDD and if ReportConfigInterRAT includes the reportQuantityUTRA-FDD:

6> set the measResult to include the quantities indicated by the reportQuantityUTRA-FDD in order of decreasing measQuantityUTRA-FDD within the quantityConfig, i.e. the best cell is included first;

5> if the measObject associated with this measId concerns UTRA FDD and if ReportConfigInterRAT does not include the reportQuantityUTRA-FDD; or

5> if the measObject associated with this measId concerns UTRA TDD, GERAN or CDMA2000:

6> set the measResult to include the quantities indicated by the reportQuantityUTRA-FDD in order of decreasing measQuantityUTRA-FDD within the quantityConfig, i.e. the best cell is included first;

3> else if the purpose is set to reportCGI:

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> if the includeMultiBandInfo is configured:

6> include the freqBandIndicator;

6> if the cell broadcasts the multiBandInfoList, include the multiBandInfoList;

6> if the cell broadcasts the freqBandIndicatorPriority, include the freqBandIndicatorPriority;

5> if the cell broadcasts a CSG identity:

6> include the csg-Identity;

6> include the csg-MemberStatus and set it to member if the cell is a CSG member cell;

5> if the si-RequestForHO is configured within the reportConfig associated with this measId:

6> include the cgi-Info containing all the fields other than the plmn-IdentityList that have been successfully acquired;

6> include, within the cgi-Info, the field plmn-IdentityList in accordance with the following:

7> if the cell is a CSG member cell, determine the subset of the PLMN identities, starting from the second entry of PLMN identities in the broadcast information, that meet the following conditions:

a) equal to the RPLMN or an EPLMN; and

b) the CSG whitelist of the UE includes an entry comprising of the concerned PLMN identity and the CSG identity broadcast by the cell;

7> if the subset of PLMN identities determined according to the previous includes at least one PLMN identity, include the plmn-IdentityList and set it to include this subset of the PLMN identities;

7> if the cell is a CSG member cell, include the primaryPLMN-Suitable if the primary PLMN meets conditions a) and b) specified above;

5> else:

6> include the cgi-Info containing all the fields that have been successfully acquired and in accordance with the following:
include in the `plmn-IdentityList` the list of identities starting from the second entry of PLMN Identities in the broadcast information;

for the cells included according to the previous (i.e. covering the PCell, the SCells, the best non-serving cells on serving frequencies as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in 36.133 [16];

if there is at least one applicable CSI-RS resource to report:

set the `measResultCSI-RS-List` to include the best CSI-RS resources up to `maxReportCells` in accordance with the following:

if the `triggerType` is set to `event`:

include the CSI-RS resources included in the `csi-RS-TriggeredList` as defined within the `VarMeasReportList` for this `measId`;

else:

include the applicable CSI-RS resources for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;

NOTE 2: The reliability of the report (i.e. the certainty it contains the strongest CSI-RS resources on the concerned frequency) depends on the measurement configuration i.e. the `reportInterval`. The related performance requirements are specified in TS 36.133 [16].

for each CSI-RS resource that is included in the `measResultCSI-RS-List`:

include the `measCSI-RS-Id`;

include the layer 3 filtered measured results in accordance with the `reportConfig` for this `measId`, ordered as follow:

set the `csi-RSRP-Result` to include the quantity indicated in the `reportQuantity` within the concerned `reportConfig` in order of decreasing `triggerQuantityCSI-RS`, i.e. the best CSI-RS resource is included first;

if `reportCRS-Meas` is included within the associated `reportConfig`, and the cell indicated by `physCellId` of this CSI-RS resource is not a serving cell:

set the `measResultNeighCells` to include the cell indicated by `physCellId` of this CSI-RS resource, and include the `physCellId`;

set the `rsrpResult` to include the RSRP of the concerned cell, if available according to performance requirements in [16];

set the `rsrqResult` to include the RSRQ of the concerned cell, if available according to performance requirements in [16];

if the `ue-RxTxTimeDiffPeriodical` is configured within the corresponding `reportConfig` for this `measId`:

set the `ue-RxTxTimeDiffResult` to the measurement result provided by lower layers;

set the `currentSFN`;

if the `measRSSI-ReportConfig` is configured within the corresponding `reportConfig` for this `measId`:

set the `rssi-Result` to the average of sample value(s) provided by lower layers in the `reportInterval`;

set the `channelOccupancy` to the rounded percentage of sample values which are beyond to the `channelOccupancyThreshold` within all the sample values in the `reportInterval`;

if uplink PDCP delay results are available:

set the `ul-PDCP-DelayResultList` to include the uplink PDCP delay results available;
1> if the `includeLocationInfo` is configured in the corresponding `reportConfig` for this `measId` and detailed location information that has not been reported is available, set the content of the `locationInfo` as follows:

2> include the `locationCoordinates`;
2> if available, include the `gnss-TOD-msec`;
1> if the `reportSSTD-Meas` is set to `true` within the corresponding `reportConfig` for this `measId`:
2> set the `measResultSSTD` to the measurement results provided by lower layers;
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 `triggerType` is set to `periodical`:
3> remove the entry within the `VarMeasReportList` for this `measId`;
3> remove this `measId` from the `measIdList` within `VarMeasConfig`;
1> if the measured results are for CDMA2000 HRPD:
2> set the `preRegistrationStatusHRPD` to the UE’s CDMA2000 upper layer’s HRPD `preRegistrationStatus`;
1> if the measured results are for CDMA2000 1xRTT:
2> set the `preRegistrationStatusHRPD` to `FALSE`;
1> if the measured results are for WLAN:
2> set the `measResultListWLAN` to include the quantities within the `quantityConfigWLAN` for the following WLAN(s) up to `maxReportCells`:
3> include WLAN the UE is connected to, if any;
3> include WLAN in order of decreasing WLAN RSSI, i.e. the best WLAN is included first, for WLANs which do not match all WLAN identifiers of any entry within `wlan-MobilitySet` in `VarWLAN-MobilityConfig`;
2> for each included WLAN:
3> set `wlan-Identifiers` to include all WLAN identifiers that can be acquired for the WLAN measured;
3> set `connectedWLAN` to `TRUE` if the UE is connected to the WLAN measured;
3> if `reportQuantityWLAN` exists within the `ReportConfigInterRAT` within the `VarMeasConfig` for this `measId`:
4> if `bandRequestWLAN` is set to `TRUE`:
5> set `bandWLAN` to include WLAN band of the WLAN measured;
4> if `carrierInfoRequestWLAN` is set to `TRUE`:
5> set `carrierInfoWLAN` to include WLAN carrier information of the WLAN measured if it can be acquired;
4> if `availableAdmissionCapacityRequestWLAN` is set to `TRUE`:
5> set the measResult to include availableAdmissionCapacityWLAN if it can be acquired;
4> if backhaulDL-BandwidthRequestWLAN is set to TRUE:
5> set the measResult to include backhaulDL-BandwidthWLAN if it can be acquired;
4> if backhaulUL-BandwidthRequestWLAN is set to TRUE:
5> set the measResult to include backhaulUL-BandwidthWLAN if it can be acquired;
4> if channelUtilizationRequestWLAN is set to TRUE:
5> set the measResult to include channelUtilizationWLAN if it can be acquired;
4> if stationCountRequestWLAN is set to TRUE:
5> set the measResult to include stationCountWLAN if it can be acquired;
1> submit the MeasurementReport message to lower layers for transmission, upon which the procedure ends;

5.5.6 Measurement related actions

5.5.6.1 Actions upon handover and re-establishment

E-UTRAN applies the handover procedure as follows:
- when performing the handover procedure, as specified in 5.3.5.4, ensure that a measObjectId corresponding to each handover target serving frequency is configured as a result of the procedures described in this sub-clause and in 5.3.5.4;
- when changing the band while the physical frequency remains unchanged, E-UTRAN releases the measObject corresponding to the source frequency and adds a measObject corresponding to the target frequency (i.e. it does not reconfigure the measObject);

E-UTRAN applies the re-establishment procedure as follows:
- when performing the connection re-establishment procedure, as specified in 5.3.7, ensure that a measObjectId corresponding each target serving frequency is configured as a result of the procedure described in this sub-clause and the subsequent connection reconfiguration procedure immediately following the re-establishment procedure;
- in the first reconfiguration following the re-establishment when changing the band while the physical frequency remains unchanged, E-UTRAN releases the measObject corresponding to the source frequency and adds a measObject corresponding to the target frequency (i.e. it does not reconfigure the measObject);

The UE shall:
1> for each measId included in the measIdList within VarMeasConfig:
  2> if the triggerType is set to periodical:
    3> remove this measId from the measIdList within VarMeasConfig:
1> if the procedure was triggered due to a handover or successful re-establishment and the procedure involves a change of primary frequency, update the measId values in the measIdList within VarMeasConfig as follows:
  2> if a measObjectId value corresponding to the target primary frequency exists in the measObjectIdList within VarMeasConfig:
    3> for each measId value in the measIdList:
      4> if the measId value is linked to the measObjectId value corresponding to the source primary frequency:
        5> link this measId value to the measObjectId value corresponding to the target primary frequency:
4> else if the measId value is linked to the measObjectId value corresponding to the target primary frequency:
5> link this measId value to the measObjectId value corresponding to the source primary frequency;
2> else:
3> remove all measId values that are linked to the measObjectId value corresponding to the source primary frequency;
1> remove all measurement reporting entries within VarMeasReportList;
1> stop the periodical reporting timer or timer T321, whichever one is running, as well as associated information (e.g. timeToTrigger) for all measId;
1> release the measurement gaps, if activated;

NOTE: If the UE requires measurement gaps to perform inter-frequency or inter-RAT measurements, the UE resumes the inter-frequency and inter-RAT measurements after the E-UTRAN has setup the measurement gaps.

5.5.6.2 Speed dependent scaling of measurement related parameters

The UE shall adjust the value of the following parameter configured by the E-UTRAN depending on the UE speed: timeToTrigger. The UE shall apply 3 different levels, which are selected as follows:

The UE shall:
1> perform mobility state detection using the mobility state detection as specified in TS 36.304 [4] with the following modifications:
2> counting handovers instead of cell reselections;
2> applying the parameter applicable for RRC_CONNECTED as included in speedStatePars within VarMeasConfig;
1> if high mobility state is detected:
2> use the timeToTrigger value multiplied by sf-High within VarMeasConfig;
1> else if medium mobility state is detected:
2> use the timeToTrigger value multiplied by sf-Medium within VarMeasConfig;
1> else:
2> no scaling is applied;

5.5.7 Inter-frequency RSTD measurement indication

5.5.7.1 General

The purpose of this procedure is to indicate to the network that the UE is going to start/stop OTDOA inter-frequency RSTD measurements which require measurement gaps as specified in [16, 8.1.2.6].
NOTE: It is a network decision to configure the measurement gap.

5.5.7.2 Initiation

The UE shall:

1> if and only if upper layers indicate to start performing inter-frequency RSTD measurements and the UE requires measurement gaps for these measurements while measurement gaps are either not configured or not sufficient:

2> initiate the procedure to indicate start;

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 if the provided measurement gaps are insufficient.

1> if and only if upper layers indicate to stop performing inter-frequency RSTD measurements:

2> initiate the procedure to indicate stop;

NOTE 2: The UE may initiate the procedure to indicate stop even if it did not previously initiate the procedure to indicate start.

5.5.7.3 Actions related to transmission of InterFreqRSTDMeasurementIndication message

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

1> set the rstd-InterFreqIndication as follows:

2> if the procedure is initiated to indicate start of inter-frequency RSTD measurements:

3> set the rstd-InterFreqInfoList according to the information received from upper layers;

2> else if the procedure is initiated to indicate stop of inter-frequency RSTD measurements:

3> set the rstd-InterFreqIndication to the value stop;

1> submit the InterFreqRSTDMeasurementIndication message to lower layers for transmission, upon which the procedure ends;

5.6 Other

5.6.0 General

For NB-IoT, only a subset of the procedures described in this sub-clause apply.

Table 5.6.0-1 specifies the procedures that are applicable to NB-IoT. All other procedures are not applicable to NB-IoT; this is not further stated in the corresponding procedures.

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5.6.1 DL information transfer

5.6.1.1 General

The purpose of this procedure is to transfer NAS or (tunnelled) non-3GPP dedicated information from E-UTRAN to a UE in RRC_CONNECTED.

5.6.1.2 Initiation

E-UTRAN initiates the DL information transfer procedure whenever there is a need to transfer NAS or non-3GPP dedicated information. E-UTRAN initiates the DL information transfer procedure by sending the DLInformationTransfer message.

5.6.1.3 Reception of the DLInformationTransfer by the UE

Upon receiving DLInformationTransfer message, the UE shall:

1. If the UE is a NB-IoT UE; or
2. If the dedicatedInfoType is set to dedicatedInfoNAS:
   1. Forward the dedicatedInfoNAS to the NAS upper layers.
3. If the dedicatedInfoType is set to dedicatedInfoCDMA2000-1XRTT or to dedicatedInfoCDMA2000-HRPD:
   1. Forward the dedicatedInfoCDMA2000 to the CDMA2000 upper layers;

5.6.2 UL information transfer

5.6.2.1 General

The purpose of this procedure is to transfer NAS or (tunnelled) non-3GPP dedicated information from the UE to E-UTRAN.

5.6.2.2 Initiation

A UE in RRC_CONNECTED initiates the UL information transfer procedure whenever there is a need to transfer NAS or non-3GPP dedicated information, except at RRC connection establishment or resume in which case the NAS information is piggybacked to the RRCConnectionSetupComplete or RRCConnectionResumeComplete message correspondingly. The UE initiates the UL information transfer procedure by sending the ULInformationTransfer message. When CDMA2000 information has to be transferred, the UE shall initiate the procedure only if SRB2 is established.
5.6.2.3 Actions related to transmission of \textit{ULInformationTransfer} message

The UE shall set the contents of the \textit{ULInformationTransfer} message as follows:

1> if there is a need to transfer NAS information:

2> if the UE is a NB-IoT UE:

   3> set the \textit{dedicatedInfoNAS} to include the information received from upper layers;

2> else, set the \textit{dedicatedInfoType} to include the \textit{dedicatedInfoNAS};

1> if there is a need to transfer CDMA2000 1XRTT information:

2> set the \textit{dedicatedInfoType} to include the \textit{dedicatedInfoCDMA2000-1XRTT};

1> if there is a need to transfer CDMA2000 HRPD information:

2> set the \textit{dedicatedInfoType} to include the \textit{dedicatedInfoCDMA2000-HRPD};

1> upon RRC connection establishment, if UE supports the Control Plane CIoT EPS optimisation and UE does not need UL gaps during continuous uplink transmission:

2> configure lower layers to stop using UL gaps during continuous uplink transmission in FDD for \textit{ULInformationTransfer} message and subsequent uplink transmission in RRC\_CONNECTED except for UL transmissions as specified in TS36.211 [21];

1> submit the \textit{ULInformationTransfer} message to lower layers for transmission, upon which the procedure ends;

5.6.2.4 Failure to deliver \textit{ULInformationTransfer} message

The UE shall:

1> if the UE is a NB-IoT UE, AS security is not started and radio link failure occurs before the successful delivery of \textit{ULInformationTransfer} messages has been confirmed by lower layers; or

1> if mobility (i.e. handover, RRC connection re-establishment) occurs before the successful delivery of \textit{ULInformationTransfer} messages has been confirmed by lower layers:

2> inform upper layers about the possible failure to deliver the information contained in the concerned \textit{ULInformationTransfer} messages;

5.6.3 UE capability transfer

5.6.3.1 General

![Figure 5.6.3.1-1: UE capability transfer](image)

The purpose of this procedure is to transfer UE radio access capability information from the UE to E-UTRAN.

If the UE has changed its E-UTRAN radio access capabilities, the UE shall request higher layers to initiate the necessary NAS procedures (see TS 23.401 [41]) that would result in the update of UE radio access capabilities using a new RRC connection.
NOTE: Change of the UE's GERAN UE radio capabilities in RRC_IDLE is supported by use of Tracking Area Update.

5.6.3.2 Initiation

E-UTRAN initiates the procedure to a UE in RRC_CONNECTED when it needs (additional) UE radio access capability information.

5.6.3.3 Reception of the $UECapabilityEnquiry$ by the UE

The UE shall:

1> for NB-IoT, set the contents of $UECapabilityInformation$ message as follows:
   2> include the UE Radio Access Capability Parameters within the $ue-Capability-Container$;
   2> include $ue-RadioPagingInfo$;
   2> submit the $UECapabilityInformation$ message to lower layers for transmission, upon which the procedure ends;

1> else, set the contents of $UECapabilityInformation$ message as follows:
   2> if the $ue-CapabilityRequest$ includes $eutra$:
      3> include the $UE-EUTRA-Capability$ within a $ue-CapabilityRAT-Container$ and with the $rat-Type$ set to $eutra$;
      3> if the UE supports FDD and TDD:
         4> set all fields of $UECapabilityInformation$, except field $fdd-Add-UE-EUTRA-Capabilities$ and $tdd-Add-UE-EUTRA-Capabilities$ (including their sub-fields), to include the values applicable for both FDD and TDD (i.e. functionality supported by both modes);
      4> if (some of) the UE capability fields have a different value for FDD and TDD:
         5> if for FDD, the UE supports additional functionality compared to what is indicated by the previous fields of $UECapabilityInformation$:
            6> include field $fdd-Add-UE-EUTRA-Capabilities$ and set it to include fields reflecting the additional functionality applicable for FDD;
         5> if for TDD, the UE supports additional functionality compared to what is indicated by the previous fields of $UECapabilityInformation$:
            6> include field $tdd-Add-UE-EUTRA-Capabilities$ and set it to include fields reflecting the additional functionality applicable for TDD;

NOTE 1: The UE includes fields of $XDD-Add-UE-EUTRA-Capabilities$ in accordance with the following:
- The field is included only if one or more of its sub-fields (or bits in the feature group indicators string) has a value that is different compared to the value signalled elsewhere within $UE-EUTRA-Capability$; (this value signalled elsewhere is also referred to as the Common value, that is supported for both XDD modes)
- For the fields that are included in $XDD-Add-UE-EUTRA-Capabilities$, the UE sets:
   - the sub-fields (or bits in the feature group indicators string) that are not allowed to be different to the same value as the Common value;
   - the sub-fields (or bits in the feature group indicators string) that are allowed to be different to a value indicating at least the same functionality as indicated by the Common value;

3> else (UE supports single xDD mode):
   4> set all fields of $UECapabilityInformation$, except field $fdd-Add-UE-EUTRA-Capabilities$ and $tdd-Add-UE-EUTRA-Capabilities$ (including their sub-fields), to include the values applicable for the xDD mode supported by the UE;
3> compile a list of band combinations, candidate for inclusion in the \textit{UECapabilityInformation} message, comprising of band combinations supported by the UE according to the following priority order (i.e. listed in order of decreasing priority):

4> include all non-CA bands, regardless of whether UE supports carrier aggregation, only:
   - if the UE includes \textit{ue-Category-v1020} (i.e. indicating category 6 to 8); or
   - if for at least one of the non-CA bands, the UE supports more MIMO layers with TM9 and TM10 than implied by the UE category; or
   - if the UE supports TM10 with one or more CSI processes;

4> if the \textit{UECapabilityEnquiry} message includes \textit{requestedFrequencyBands} and UE supports \textit{requestedFrequencyBands}:

5> include all 2DL+1UL CA band combinations, only consisting of bands included in \textit{requestedFrequencyBands};

5> include all other CA band combinations, only consisting of bands included in \textit{requestedFrequencyBands}, and prioritized in the order of \textit{requestedFrequencyBands}, (i.e. first include remaining band combinations containing the first-listed band, then include remaining band combinations containing the second-listed band, and so on);

4> else (no requested frequency bands):

5> include all 2DL+1UL CA band combinations;

5> include all other CA band combinations;

4> if UE supports \textit{maximumCCsRetrieval} and if the \textit{UECapabilityEnquiry} message includes \textit{requestedMaxCCsDL} and the \textit{requestedMaxCCsUL} (i.e. both UL and DL maximums are given):

5> remove from the list of candidates the band combinations for which the number of CCs in DL exceeds the value indicated in the \textit{requestedMaxCCsDL} or for which the number of CCs in UL exceeds the value indicated in the \textit{requestedMaxCCsUL};

5> indicate in \textit{requestedCCsUL} the same value as received in \textit{requestedMaxCCsUL};

5> indicate in \textit{requestedCCsDL} the same value as received in \textit{requestedMaxCCsDL};

4> else if UE supports \textit{maximumCCsRetrieval} and if the \textit{UECapabilityEnquiry} message includes the \textit{requestedMaxCCsDL} (i.e. only DL maximum limit is given):

5> remove from the list of candidates the band combinations for which the number of CCs in DL exceeds the value indicated in the \textit{requestedMaxCCsDL};

5> indicate value in \textit{requestedCCsDL} the same value as received in \textit{requestedMaxCCsDL};

4> else if UE supports \textit{maximumCCsRetrieval} and if the \textit{UECapabilityEnquiry} message includes the \textit{requestedMaxCCsUL} (i.e. only UL maximum limit is given):

5> remove from the list of candidates the band combinations for which the number of CCs in UL exceeds the value indicated in the \textit{requestedMaxCCsUL};

5> indicate in \textit{requestedCCsUL} the same value as received in \textit{requestedMaxCCsUL};

4> if the UE supports \textit{reducedIntNonContComb} and the \textit{UECapabilityEnquiry} message includes \textit{requestReducedIntNonContComb}:

5> set \textit{reducedIntNonContCombRequested} to true;

5> remove from the list of candidates the intra-band non-contiguous CA band combinations which support is implied by another intra-band non-contiguous CA band combination included in the list of candidates as specified in TS 36.306 [5, 4.3.5.21]:

\textit{ETSI}
if the UE supports requestReducedFormat and UE supports skipFallbackCombinations and UECapabilityEnquiry message includes requestSkipFallbackComb:

5> set skipFallbackCombRequested to true;

5> for each band combination included in the list of candidates (including 2DL+1UL CA band combinations), starting with the ones with the lowest number of DL and UL carriers, that concerns a fallback band combination of another band combination included in the list of candidates as specified in TS 36.306 [5]:

6> remove the band combination from the list of candidates;

6> include differentFallbackSupported in the band combination included in the list of candidates whose fallback concerns the removed band combination, if its capabilities differ from the removed band combination;

3> if the UECapabilityEnquiry message includes requestReducedFormat and UE supports requestReducedFormat:

4> include in supportedBandCombinationReduced as many as possible of the band combinations included in the list of candidates, including the non-CA combinations, determined according to the rules and priority order defined above;

3> else

4> if the UECapabilityEnquiry message includes requestedFrequencyBands and UE supports requestedFrequencyBands:

5> include in supportedBandCombination as many as possible of the band combinations included in the list of candidates, including the non-CA combinations and up to 5DL+5UL CA band combinations, determined according to the rules and priority order defined above;

5> include in supportedBandCombinationAdd as many as possible of the remaining band combinations included in the list of candidates, (i.e. the candidates not included in supportedBandCombination), up to 5DL+5UL CA band combinations, determined according to the rules and priority order defined above;

4> else

5> include in supportedBandCombination as many as possible of the band combinations included in the list of candidates, including the non-CA combinations and up to 5DL+5UL CA band combinations, determined according to the rules defined above;

5> if it is not possible to include in supportedBandCombination all the band combinations to be included according to the above, selection of the subset of band combinations to be included is left up to UE implementation;

3> indicate in requestedBands the same bands and in the same order as included in requestedFrequencyBands, if received;

3> if the UE is a category 0 or M1 UE, or supports any UE capability information in ue-RadioPagingInfo, according to TS 36.306 [5]:

4> include ue-RadioPagingInfo and set the fields according to TS 36.306 [5];

2> if the ue-CapabilityRequest includes geran-cs and if the UE supports GERAN CS domain:

3> include the UE radio access capabilities for GERAN CS within a ue-CapabilityRAT-Container and with the rat-Type set to geran-cs;

2> if the ue-CapabilityRequest includes geran-ps and if the UE supports GERAN PS domain:

3> include the UE radio access capabilities for GERAN PS within a ue-CapabilityRAT-Container and with the rat-Type set to geran-ps;

2> if the ue-CapabilityRequest includes utra and if the UE supports UTRA:
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5.6.4 CSFB to 1x Parameter transfer

5.6.4.1 General

The purpose of this procedure is to transfer the CDMA2000 1xRTT parameters required to register the UE in the CDMA2000 1xRTT network for CSFB support.

5.6.4.2 Initiation

A UE in RRC_CONNECTED initiates the CSFB to 1x parameter transfer procedure upon request from the CDMA2000 upper layers. The UE initiates the CSFB to 1x parameter transfer procedure by sending the \texttt{CSFBParametersRequestCDMA2000} message.

5.6.4.3 Actions related to transmission of \texttt{CSFBParametersRequestCDMA2000} message

The UE shall:

1> submit the \texttt{CSFBParametersRequestCDMA2000} message to lower layers for transmission using the current configuration;

5.6.4.4 Reception of the \texttt{CSFBParametersResponseCDMA2000} message

Upon reception of the \texttt{CSFBParametersResponseCDMA2000} message, the UE shall:

1> forward the \textit{rand} and the \textit{mobilityParameters} to the CDMA2000 1xRTT upper layers;
5.6.5 UE Information

5.6.5.1 General

The UE information procedure is used by E-UTRAN to request the UE to report information.

5.6.5.2 Initiation

E-UTRAN initiates the procedure by sending the UEInformationRequest message. E-UTRAN should initiate this procedure only after successful security activation.

5.6.5.3 Reception of the UEInformationRequest message

Upon receiving the UEInformationRequest message, the UE shall, only after successful security activation:

1> if rach-ReportReq is set to true, set the contents of the rach-Report in the UEInformationResponse message as follows:

- set the numberOfPreamblesSent to indicate the number of preambles sent by MAC for the last successfully completed random access procedure;
- if contention resolution was not successful as specified in TS 36.321 [6] for at least one of the transmitted preambles for the last successfully completed random access procedure:
  - set the contentionDetected to true;
- else:
  - set the contentionDetected to false;

2> if rlf-ReportReq is set to true and 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:

- set timeSinceFailure in VarRLF-Report to the time that elapsed since the last radio link or handover failure in E-UTRA;
- set the rlf-Report in the UEInformationResponse message to the value of rlf-Report in VarRLF-Report;
- discard the rlf-Report from VarRLF-Report upon successful delivery of the UEInformationResponse message confirmed by lower layers;

3> if connEstFailReportReq is set to true and the UE has connection establishment failure information in VarConnEstFailReport and if the RPLMN is equal to plmn-Identity stored in VarConnEstFailReport:

- set timeSinceFailure in VarConnEstFailReport to the time that elapsed since the last connection establishment failure in E-UTRA;
- set the connEstFailReport in the UEInformationResponse message to the value of connEstFailReport in VarConnEstFailReport;
- discard the connEstFailReport from VarConnEstFailReport upon successful delivery of the UEInformationResponse message confirmed by lower layers;

Figure 5.6.5.1-1: UE information procedure
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 VarLogMeasReport starting from the entries logged first;

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;

1. if mobilityHistoryReportReq is set to true:

2. include the mobilityHistoryReport and set it to include entries from VarMobilityHistoryReport;

2. include in the mobilityHistoryReport an entry for the current cell, possibly after removing the oldest entry if required, and set its fields as follows:

3. set visitedCellId to the global cell identity of the current cell:

3. set field timeSpent to the time spent in the current cell;

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;

### 5.6.6 Logged Measurement Configuration

#### 5.6.6.1 General

![LoggedMeasurementConfiguration](image)

**Figure 5.6.6.1-1: Logged measurement configuration**

The purpose of this procedure is to configure the UE to perform logging of measurement results while in RRC_IDLE and to perform logging of measurement results for MBSFN in both RRC_IDLE and RRC_CONNECTED. The procedure applies to logged measurements capable UEs that are in RRC_CONNECTED.
NOTE E-UTRAN may retrieve stored logged measurement information by means of the UE information procedure.

5.6.6.2 Initiation

E-UTRAN initiates the logged measurement configuration procedure to UE in RRC_CONNECTED by sending the LoggedMeasurementConfiguration message.

5.6.6.3 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 5.6.7;
2. store the received loggingDuration, loggingInterval and areaConfiguration, if included, in VarLogMeasConfig;
3. if the LoggedMeasurementConfiguration message includes plmn-IdentityList:
   1. set plmn-IdentityList in VarLogMeasReport to include the RPLMN as well as the PLMNs included in plmn-IdentityList;
   2. else:
      1. set plmn-IdentityList in VarLogMeasReport to include the RPLMN;
4. store the received absoluteTimeInfo, traceReference, traceRecordingSessionRef and tce-Id in VarLogMeasReport;
5. store the received targetMBSFN-AreaList, if included, in VarLogMeasConfig;
6. start timer T330 with the timer value set to the loggingDuration;

5.6.6.4 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.

5.6.7 Release of Logged Measurement Configuration

5.6.7.1 General

The purpose of this procedure is to release the logged measurement configuration as well as the logged measurement information.

5.6.7.2 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 detach.

The UE shall:

1. stop timer T330, if running;
2. if stored, discard the logged measurement configuration as well as the logged measurement information, i.e. release the UE variables VarLogMeasConfig and VarLogMeasReport;
5.6.8 Measurements logging

5.6.8.1 General

This procedure specifies the logging of available measurements by a UE in RRC_IDLE that has a logged measurement configuration and the logging of available measurements by a UE in both RRC_IDLE and RRC_CONNECTED if targetMBSFN-AreaList is included in VarLogMeasConfig.

5.6.8.2 Initiation

While T330 is running, 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 targetMBSFN-AreaList is included in VarLogMeasConfig:

3> if the UE is camping normally on an E-UTRA cell or is connected to E-UTRA; and

3> if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport; and

3> if the PCell (in RRC_CONNECTED) or cell where the UE is camping (in RRC_IDLE) is part of the area indicated by areaConfiguration if configured in VarLogMeasConfig:

4> for MBSFN areas, indicated in targetMBSFN-AreaList, from which the UE is receiving MBMS service:

5> perform MBSFN measurements in accordance with the performance requirements as specified in TS 36.133 [16];

NOTE 1: When configured to perform MBSFN measurement logging by targetMBSFN-AreaList, the UE is not required to receive additional MBSFN subframes, i.e. logging is based on the subframes corresponding to the MBMS services the UE is receiving.

5> perform logging at regular time intervals as defined by the loggingInterval in VarLogMeasConfig, but only for those intervals for which MBSFN measurement results are available as specified in TS 36.133 [16];

2> else if the UE is camping normally on an E-UTRA cell and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport and, if the cell is part of the area indicated by areaConfiguration if configured in VarLogMeasConfig:

3> perform the logging at regular time intervals, as defined by the loggingInterval in VarLogMeasConfig;

2> when adding a logged measurement entry in VarLogMeasReport, include the fields in accordance with the following:

3> if measResultServCell in VarLogMeasReport is not empty:

4> include InDeviceCoexDetected;

5> suspend measurement logging from the next logging interval;

4> else:

5> suspend measurement logging;

NOTE 1A: The UE may detect the start of IDC problems as early as Phase 1 as described in 23.4 of TS 36.300 [9].

3> set the relativeTimeStamp to indicate the elapsed time since the moment at which the logged measurement configuration was received;
3> if detailed location information became available during the last logging interval, set the content of the locationInfo as follows:

4> include the locationCoordinates;

3> if targetMBSFN-AreaList is included in VarLogMeasConfig:

4> for each MBSFN area, for which the mandatory measurements result fields became available during the last logging interval:

5> set the rsrpResultMBSFN, rsrqResultMBSFN to include measurement results that became available during the last logging interval;

5> include the fields signallingBLER-Result or dataBLER-MCH-ResultList if the concerned BLER results are available,

5> set the mbsfn-AreaId and carrierFrequency to indicate the MBSFN area in which the UE is receiving MBSFN transmission;

4> if in RRC_CONNECTED:

5> set the servCellIdentity to indicate global cell identity of the PCell;

5> set the measResultServCell to include the layer 3 filtered measured results of the PCell;

5> if available, set the measResultNeighCells to include the layer 3 filtered measured results of SCell(s) and neighbouring cell(s) measurements that became available during the last logging interval, in order of decreasing RSRP, for at most the following number of cells: 6 intra-frequency and 3 inter-frequency cells per frequency and according to the following:

6> for each cell included, include the optional fields that are available;

5> if available, optionally set the measResultNeighCells to include the layer 3 filtered measured results of neighbouring cell(s) measurements that became available during the last logging interval, in order of decreasing RSCP(UTRA)/RSSI(GERAN)/PilotStrength(cdma2000), for at most the following number of cells: 3 inter-RAT cells per frequency (UTRA, cdma2000)/set of frequencies (GERAN), and according to the following:

6> for each cell included, include the optional fields that are available;

4> if in RRC_IDLE:

5> set the servCellIdentity to indicate global cell identity of the serving cell;

5> set the measResultServCell to include the quantities of the serving cell;

5> if available, set the measResultNeighCells, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements that became available during the last logging interval for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency and according to the following:

6> for each neighbour cell included, include the optional fields that are available;

5> if available, optionally set the measResultNeighCells, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements that became available during the last logging interval, for at most the following number of cells: 3 inter-RAT cells per frequency (UTRA, cdma2000)/set of frequencies (GERAN), and according to the following:

6> for each cell included, include the optional fields that are available;

4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in TS 36.133 [16];
4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include RSRQ type if the result was based on measurements using a wider band or using all OFDM symbols;

NOTE 2: The UE includes the latest results in accordance with the performance requirements as specified in TS 36.133 [16]. E.g. RSRP and RSRQ results are available only if the UE has a sufficient number of results/receives a sufficient number of subframes during the logging interval.

3> else:

4> set the servCellIdentity to indicate global cell identity of the cell the UE is camping on;

4> set the measResultServCell to include the quantities of the cell the UE is camping on;

4> if available, set the measResultNeighCells, in order of decreasing ranking-criterion as used for cell reselection, to include neighbouring cell measurements that became available during the last logging interval 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 (GERAN) per RAT and according to the following:

5> for each neighbour cell included, include the optional fields that are available;

4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in TS 36.133 [16];

4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include RSRQ type if the result was based on measurements using a wider band or using all OFDM symbols;

NOTE 3: The UE includes the latest results of the available measurements as used for cell reselection evaluation in RRC_IDLE or as used for evaluation of reporting criteria or for measurement reporting according to 5.5.3 in RRC_CONNECTED, which are performed in accordance with the performance requirements as specified in TS 36.133 [16].

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 5.6.6.4:

5.6.9  In-device coexistence indication

5.6.9.1  General

![Diagram of In-device coexistence indication](image)

Figure 5.6.9.1-1: In-device coexistence indication

The purpose of this procedure is to inform E-UTRAN about (a change of) the In-Device Coexistence (IDC) problems experienced by the UE in RRC_CONNECTED, as described in TS 36.300 [9], and to provide the E-UTRAN with information in order to resolve them.

5.6.9.2  Initiation

A UE capable of providing IDC indications may initiate the procedure when it is configured to provide IDC indications and upon change of IDC problem information.
Upon initiating the procedure, the UE shall:

1> if configured to provide IDC indications:

2> if the UE did not transmit an `InDeviceCoexIndication` message since it was configured to provide IDC indications:

3> if on one or more frequencies for which a `measObjectEUTRA` is configured, the UE is experiencing IDC problems that it cannot solve by itself; or

3> if configured to provide IDC indications for UL CA; and if on one or more supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, the UE is experiencing IDC problems that it cannot solve by itself:

4> initiate transmission of the `InDeviceCoexIndication` message in accordance with 5.6.9.3;

2> else:

3> if the set of frequencies, for which a `measObjectEUTRA` is configured and on which the UE is experiencing IDC problems that it cannot solve by itself, is different from the set indicated in the last transmitted `InDeviceCoexIndication` message; or

3> if for one or more of the frequencies in the previously reported set of frequencies, the `interferenceDirection` is different from the value indicated in the last transmitted `InDeviceCoexIndication` message; or

3> if the TDM assistance information is different from the assistance information included in the last transmitted `InDeviceCoexIndication` message; or

3> if configured to provide IDC indications for UL CA; and if the `victimSystemType` is different from the value indicated in the last transmitted `InDeviceCoexIndication` message; or

3> if configured to provide IDC indications for UL CA; and if the set of supported UL CA combinations on which the UE is experiencing IDC problems that it cannot solve by itself and that the UE includes in `affectedCarrierFreqCombList` according to 5.6.9.3, is different from the set indicated in the last transmitted `InDeviceCoexIndication` message:

4> initiate transmission of the `InDeviceCoexIndication` message in accordance with 5.6.9.3;

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 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.

5.6.9.3 Actions related to transmission of `InDeviceCoexIndication` message

The UE shall set the contents of the `InDeviceCoexIndication` message as follows:

1> if there is at least one E-UTRA carrier frequency, for which a measurement object is configured, that is affected by IDC problems:

2> include the field `affectedCarrierFreqList` with an entry for each affected E-UTRA carrier frequency for which a measurement object is configured;

2> for each E-UTRA carrier frequency included in the field `affectedCarrierFreqList`, include `interferenceDirection` and set it accordingly;
include Time Domain Multiplexing (TDM) based assistance information, unless idc-HardwareSharingIndication is configured and the UE has no Time Domain Multiplexing based assistance information that could be used to resolve the IDC problems:

3> if the UE has DRX related assistance information that could be used to resolve the IDC problems:
   4> include drx-CycleLength, drx-Offset and drx-ActiveTime;

3> else (the UE has desired subframe reservation patterns related assistance information that could be used to resolve the IDC problems):
   4> include idc-SubframePatternList;

3> use the MCG as timing reference if TDM based assistance information regarding the SCG is included;

1> if the UE is configured to provide UL CA information and there is a supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, that is affected by IDC problems:

2> include victimSystemType in ul-CA-AssistanceInfo;

2> if the UE sets victimSystemType to wlan or Bluetooth:
   3> include affectedCarrierFreqCombList in ul-CA-AssistanceInfo with an entry for each supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, that is affected by IDC problems;

2> else:
   3> optionally include affectedCarrierFreqCombList in ul-CA-AssistanceInfo with an entry for each supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, that is affected by IDC problems;

1> if idc-HardwareSharingIndication is configured, and there is at least one E-UTRA carrier frequency, for which a measurement object is configured, the UE is experiencing hardware sharing problems that it cannot solve by itself:

2> include the hardwareSharingProblem and set it accordingly;

NOTE 1: When sending an InDeviceCoexIndication message to inform E-UTRAN the IDC problems, the UE includes all assistance information (rather than providing e.g. the changed part(s) of the 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 InDeviceCoexIndication message (e.g. by an empty message).

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

5.6.10 UE Assistance Information

5.6.10.1 General

![Figure 5.6.10.1-1: UE Assistance Information](image-url)
The purpose of this procedure is to inform E-UTRAN of the UE's power saving preference. Upon configuring the UE to provide power preference indications E-UTRAN may consider that the UE does not prefer a configuration primarily optimised for power saving until the UE explicitly indicates otherwise.

5.6.10.2 Initiation

A UE capable of providing power preference indications in RRC_CONNECTED may initiate the procedure in several cases including upon being configured to provide power preference indications and upon change of power preference.

Upon initiating the procedure, the UE shall:

1> if configured to provide power preference indications:
   2> if the UE did not transmit a UEAssistanceInformation message since it was configured to provide power preference indications; or
   2> if the current power preference is different from the one indicated in the last transmission of the UEAssistanceInformation message and timer T340 is not running:
      3> initiate transmission of the UEAssistanceInformation message in accordance with 5.6.10.3;

5.6.10.3 Actions related to transmission of UEAssistanceInformation message

The UE shall set the contents of the UEAssistanceInformation message:

1> if the UE prefers a configuration primarily optimised for power saving:
   2> set powerPrefIndication to lowPowerConsumption;
1> else:
   2> start or restart timer T340 with the timer value set to the powerPrefIndicationTimer;
   2> set powerPrefIndication to normal;

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

5.6.11 Mobility history information

5.6.11.1 General

This procedure specifies how the mobility history information is stored by the UE, covering RRC_CONNECTED and RRC_IDLE.

5.6.11.2 Initiation

If the UE supports storage of mobility history information, the UE shall:

1> Upon change of cell, consisting of PCell in RRC_CONNECTED or serving cell in RRC_IDLE, to another E-UTRA or inter-RAT cell or when entering out of service:
   2> include an entry in 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;
1> upon entering E-UTRA (in RRC_CONNECTED or RRC_IDLE) while previously out of service and/ or using another RAT:
include an entry in variable VarMobilityHistoryReport possibly after removing the oldest entry, if necessary, according to following:

set the field timeSpent of the entry as the time spent outside E-UTRA;

5.6.12 RAN-assisted WLAN interworking

5.6.12.1 General

The purpose of this procedure is to facilitate access network selection and traffic steering between E-UTRAN and WLAN.

If required by upper layers (see TS 24.312 [66], the UE shall provide an up-to-date set of the applicable parameters provided by wlan-OffloadConfigCommon or wlan-OffloadConfigDedicated to upper layers, and inform upper layers when no parameters are configured. The parameter set from either wlan-OffloadConfigCommon or wlan-OffloadConfigDedicated is selected as specified in subclauses 5.2.2.24, 5.3.12, 5.6.12.2 and 5.6.12.4.

5.6.12.2 Dedicated WLAN offload configuration

The UE shall:

1> if the received wlan-OffloadInfo is set to release:

2> release wlan-OffloadConfigDedicated and t350;

2> if the wlan-OffloadConfigCommon corresponding to the RPLMN is broadcast by the cell:

3> apply the wlan-OffloadConfigCommon corresponding to the RPLMN included in SystemInformationBlockType17;

1> else:

2> apply the received wlan-OffloadConfigDedicated;

5.6.12.3 WLAN offload RAN evaluation

The UE shall:

1> if the UE is configured with either wlan-OffloadConfigCommon or wlan-OffloadConfigDedicated; and

1> if the UE is in RRC_IDLE or none of rclwi-Configuration, lwa-Configuration and lwip-Configuration is configured:

2> provide measurement results required for the evaluation of the network selection and traffic steering rules as defined in TS 24.312 [66] to upper layers;

2> evaluate the network selection and traffic steering rules as defined in TS 36.304 [4] using WLAN identifiers as indicated in other subclauses (either provided in steerToWLAN included in rclwi-Configuration or in wlan-Id-List included in SystemInformationBlockType17);

5.6.12.4 T350 expiry or stop

The UE shall:

1> if T350 expires or is stopped:

2> release the wlan-OffloadConfigDedicated and t350;

2> release rclwi-Configuration if configured;

2> if the wlan-OffloadConfigCommon corresponding to the RPLMN is broadcast by the cell:

3> apply the wlan-OffloadConfigCommon and the wlan-Id-List corresponding to the RPLMN included in SystemInformationBlockType17;
5.6.12.5 Cell selection/ re-selection while T350 is running

The UE shall:

1> if, while T350 is running, the UE selects/ reselects a cell which is not the PCell when the wlan-OffloadDedicated was configured:

2> stop timer T350;

2> perform the actions as specified in 5.6.12.4;

5.6.13 SCG failure information

5.6.13.1 General

The purpose of this procedure is to inform E-UTRAN about an SCG failure the UE has experienced i.e. SCG radio link failure, SCG change failure.

5.6.13.2 Initiation

A UE initiates the procedure to report SCG failures when SCG transmission is not suspended and when one of the following conditions is met:

1> upon detecting radio link failure for the SCG, in accordance with 5.3.11; or

1> upon SCG change failure, in accordance with 5.3.5.7a; or

1> upon stopping uplink transmission towards the PSCell due to exceeding the maximum uplink transmission timing difference when powerControlMode is configured to 1, in accordance with subclause 7.17.2 of TS 36.133 [29].

Upon initiating the procedure, the UE shall:

1> suspend all SCG DRBs and suspend SCG transmission for split DRBs;

1> reset SCG-MAC;

1> stop T307;

1> initiate transmission of the SCGFailureInformation message in accordance with 5.6.13.3;

5.6.13.3 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 to provide SCG radio link failure information:

2> include failureType and set it to the trigger for detecting SCG radio link failure;

1> else if the UE initiates transmission of the SCGFailureInformation message to provide SCG change failure information:
2> include failureType and set it to scg-ChangeFailure;

1> else if the UE initiates transmission of the SCGFailureInformation message due to exceeding maximum uplink transmission timing difference:

2> include failureType and set it to maxUL-TimingDiff;

1> set the measResultServFreqList to include for each SCG cell that is configured, if any, within measResultSCell the quantities of the concerned SCell, if available according to performance requirements in [16];

1> for each SCG serving frequency included in measResultServFreqList, include within measResultBestNeighCell the physCellId and the quantities of the best non-serving cell, based on RSRP, on the concerned serving frequency;

1> set the measResultNeighCells to include the best measured cells on non-serving E-UTRA frequencies, 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:

2> if the UE was configured to perform measurements for one or more non-serving EUTRA frequencies and measurement results are available, include the measResultListEUTRA;

2> for each neighbour cell included, include the optional fields that are available;

NOTE 2: 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. Blacklisted cells are not required to be reported.

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

5.6.14 LTE-WLAN Aggregation

5.6.14.1 Introduction

E-UTRAN can configure the UE to connect to a WLAN and configure bearers for LWA (referred to as LWA DRBs). The UE uses the WLAN parameters received from E-UTRAN in performing WLAN measurements. The UE also performs WLAN connection management as described in 5.6.15 while LWA is configured.

5.6.14.2 Reception of LWA configuration

Upon reception of LWA configuration, the UE shall:

1> if the received lwa-Configuration is set to release:

2> release the LWA configuration as described in 5.6.14.3;

1> else:

2> if the received lwa-Config includes lwa-WT-Counter:

3> determine the S-KWT key based on the K_{NB} key and received lwa-WT-Counter value, as specified in TS 33.401 [32];

3> forward the S-KWT key to upper layers to be used as a PMK or PSK for WLAN authentication;

2> if the received lwa-Config includes lwa-MobilityConfig:

3> if the received lwa-MobilityConfig includes wlan-ToReleaseList:

4> for each WLAN-Identifiers included in wlan-ToReleaseList:

5> remove the WLAN-Identifiers if already part of the current wlan-MobilitySet in VarWLAN-MobilityConfig;

3> if the received lwa-MobilityConfig includes wlan-ToAddList:

4> for each WLAN-Identifiers included in wlan-ToAddList:
5> add the WLAN-Identifiers to the current wlan-MobilitySet in VarWLAN-MobilityConfig;

3> if the received lwa-MobilityConfig includes associationTimer:
   4> start or restart timer T351 with the timer value set to the associationTimer;

3> if the received lwa-MobilityConfig includes successReportRequested:
   4> set successReportRequested in VarWLAN-MobilityConfig to the value of successReportRequested;

2> start WLAN Status Monitoring as described in 5.6.15.4;

5.6.14.3 Release of LWA configuration

To release the LWA configuration, the UE shall:

1> for each LWA DRB that is part of the current UE configuration:
   2> disable data handling for this DRB at the LWAAP entity;
   2> perform PDCP data recovery as specified in TS 36.323 [8];

1> delete any existing values in VarWLAN-MobilityConfig and VarWLAN-Status;

1> stop timer T351, if running;

1> stop WLAN status monitoring and WLAN connection attempts for LWA;

1> indicate the release of LWA configuration, if configured, to upper layers;

5.6.15 WLAN connection management

5.6.15.1 Introduction

WLAN connection management procedures in this section are triggered as specified in other sections where the UE is using a WLAN connection for LWA, RCLWI or LWIP.

The UE stores the current WLAN mobility set, which is a set of one or more WLAN identifier(s) (e.g. BSSID, SSID, HESSID) in wlan-MobilitySet in VarWLAN-MobilityConfig. This WLAN mobility set can be configured and updated by the eNB. A WLAN is considered to be inside the WLAN mobility set if its identifiers match all WLAN identifiers of at least one entry in wlan-MobilitySet and outside the WLAN mobility set otherwise. When the UE receives a new or updated WLAN mobility set, it initiates connection to a WLAN inside the WLAN mobility set, if not already connected to such a WLAN, and starts WLAN status monitoring as described in 5.6.15.4. The UE can perform WLAN mobility within the WLAN mobility set (connect or reconnect to a WLAN inside the WLAN mobility set) without any signalling to E-UTRAN.

The UE reports the WLAN connection status information to E-UTRAN as described in 5.6.15.2. The information in this report is based on the monitoring of WLAN connection as described in 5.6.15.4.

5.6.15.2 WLAN connection status reporting

5.6.15.2.1 General

```
UE

WLANConnectionStatusReport

EUTRAN
```

Figure 5.6.15.2.1-1: WLAN connection status reporting
The purpose of this procedure is to inform E-UTRAN about the status of WLAN connection for LWA, RCLWI, or LWIP.

5.6.15.2.2 Initiation

The UE in RRC_CONNECTED initiates the WLAN status reporting procedure when it connects successfully to a WLAN inside WLAN mobility set while T351 is running after a WLAN mobility set change or after a lwa-WT-Counter update or after a lwip-Counter update (if success report is requested by the eNB) or its connection or connection attempts to all WLAN(s) inside WLAN mobility set fails in accordance with WLAN Status Monitoring described in 5.6.15.4 or when T351 expires.

Upon initiating the procedure, the UE shall:

1> initiate transmission of the WLANConnectionStatusReport message in accordance with 5.6.15.2.3;

5.6.15.2.3 Actions related to transmission of WLANConnectionStatusReport message

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

1> set wlan-status to status in VarWLAN-Status;
1> submit the WLANConnectionStatusReport message to lower layers for transmission, upon which the procedure ends;

5.6.15.3 T351 Expiry (WLAN connection attempt timeout)

Upon T351 expiry, the UE shall:

1> set the status in VarWLAN-Status to failureTimeout;
1> perform WLAN connection status reporting procedure in 5.6.15.2;
1> stop WLAN status monitoring and WLAN connection attempts;

5.6.15.4 WLAN status monitoring

To perform WLAN status monitoring, the UE shall:

1> if UE is not configured with rclwi-Configuration and WLAN connection to a WLAN inside the WLAN mobility set is successfully established or maintained after a WLAN mobility set configuration update, after a lwa-WT-Counter update or after a lwip-Counter update:
2> set the status in VarWLAN-Status to successfulAssociation;
2> stop timer T351, if running;
2> if successReportRequested in VarWLAN-MobilityConfig is set to TRUE:
3> perform WLAN Connection Status Reporting procedure in 5.6.15.2;
1> if WLAN connection or connection attempts to all WLAN(s) inside WLAN mobility set fails:
2> if the failure is due to WLAN radio link issues:
3> set the status in VarWLAN-Status to failureWlanRadioLink;
2> else if the failure is due to UE internal problems related to WLAN:
3> set the status in VarWLAN-Status to failureWlanUnavailable;

NOTE 1: The UE internal problems related to WLAN includes connection to another WLAN based on user preferences or turning off WLAN connection or connection rejection from WLAN or other WLAN problems.

3> remove all WLAN related measurement reporting entries within VarMeasReportList;
2> stop timer T351, if running;
2> perform WLAN Connection Status Reporting procedure in 5.6.15.2;

2> if the UE is configured with rclwi-Configuration:
   3> release rclwi-Configuration and inform upper layers of a move-traffic-from-WLAN indication (see TS 24.302 [74]);
   2> stop WLAN Status Monitoring and WLAN connection attempts;

5.6.16 RAN controlled LTE-WLAN interworking

5.6.16.1 General
The purpose of this procedure is to perform RAN-controlled LTE-WLAN interworking (RCLWI) i.e. control access network selection and traffic steering between E-UTRAN and WLAN.

5.6.16.2 WLAN traffic steering command
The UE shall:

1> if the received rclwi-Configuration is set to setup:
   2> if the command is set to steerToWLAN:
      3> inform the upper layers of a move-traffic-to-WLAN indication along with the WLAN identifier lists in steerToWLAN (see TS 24.302 [74]);
      3> store steerToWLAN in wlan-MobilitySet in VarWLAN-MobilityConfig;
      3> perform the WLAN status monitoring procedure as specified in 5.6.15.4 using steerToWLAN as the WLAN mobility set;
   2> else:
      3> inform the upper layers of a move-traffic-from-WLAN indication (see TS 24.302 [74]);
      3> clear wlan-MobilitySet in VarWLAN-MobilityConfig;
      3> stop performing the WLAN status monitoring procedure as specified in 5.6.15.4;
      3> delete any existing values in VarWLAN-Status;
1> else (the rclwi-Configuration is released):
   2> clear wlan-MobilitySet in VarWLAN-MobilityConfig;
   2> stop performing the WLAN status monitoring procedure as specified in 5.6.15.4;
   2> delete any existing values in VarWLAN-Status;
   2> inform the upper layers of release of the rclwi-Configuration.

5.6.17 LTE-WLAN aggregation with IPsec tunnel

5.6.17.1 General
The WLAN resources that are used over the LWIP tunnel as described in TS 36.300 [9] established as part of LWIP procedures are referred to as 'LWIP resources'. The purpose of this section is to specify procedures to indicate to higher layers to initiate the establishment/ release of the LWIP tunnel over WLAN and to indicate which DRB(s) shall use the LWIP resources.

5.6.17.2 LWIP reconfiguration
The UE shall:

1> if the received lwip-Configuration is set to release:
2> release the LWIP configuration, if configured, as described in 5.6.17.3;

1> else:

2> if lwip-MobilityConfig is included:

3> if the received lwip-MobilityConfig includes wlan-ToReleaseList:

4> for each WLAN-Identifiers included in wlan-ToReleaseList:

5> remove the WLAN-Identifiers if already part of the current wlan-MobilitySet in VarWLAN-MobilityConfig;

3> if the received lwip-MobilityConfig includes wlan-ToAddList:

4> for each WLAN-Identifiers included in wlan-ToAddList:

5> add the WLAN-Identifiers to the current wlan-MobilitySet in VarWLAN-MobilityConfig;

3> if the received lwip-MobilityConfig includes associationTimer:

4> start timer T351 with the timer value set according to the value of associationTimer;

3> if the received lwip-MobilityConfig includes successReportRequested:

4> set successReportRequested in VarWLAN-MobilityConfig to the value of successReportRequested;

2> if tunnelConfigLWIP is included:

3> indicate to higher layers to configure the LWIP tunnel according to the received tunnelConfigLWIP [32];

3> if lwip-Counter is included:

4> determine the LWIP-PSK based on the K_eNB key and received lwip-Counter value, as specified in TS 33.401 [32];

4> forward the LWIP-PSK to upper layers for LWIP tunnel establishment;

2> start WLAN Status Monitoring as described in 5.6.15.4;

5.6.17.3 LWIP release

The UE shall:

1> delete any existing values in VarWLAN-MobilityConfig and VarWLAN-Status;

1> stop timer T351, if running;

1> release the lwip-Configuration;

1> indicate to higher layers to stop all DRBs from using the LWIP resources;

1> indicate to higher layers to release the LWIP tunnel [32];

1> stop WLAN status monitoring and WLAN connection attempts for LWIP;

5.7 Generic error handling

5.7.1 General

The generic error handling defined in the subsequent sub-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.

### 5.7.2 ASN.1 violation or encoding error

The UE shall:

1> when receiving an RRC message on the BCCH, BR-BCCH, PCCH, CCCH, MCCH, SC-MCCH or SBCCH for which the abstract syntax is invalid [13]:

2> ignore the message;

**NOTE:** This section 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.

### 5.7.3 Field set to a not comprehended value

The UE shall, when receiving an 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 sub-clause 5.7.4;

### 5.7.4 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 received on DCCH or CCCH:

3> ignore the message;

2> else:

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 not present;

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):
NOTE 1: The error handling defined in these sub-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 and CCCH applies for errors in extensions also, even for errors that can be regarded as invalid E-UTRAN operation e.g. E-UTRAN not observing conditional presence.

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

ItemInfoList ::= SEQUENCE {SIZE (1..max)} OF ItemInfo

ItemInfo ::= SEQUENCE { itemIdentity INTEGER (1..max), field1 Field1, field2 Field2 OPTIONAL, -- Need ON ...
[[ field3-r9 Field3-r9 OPTIONAL, -- Cond Cond1
  field4-r9 Field4-r9 OPTIONAL -- Need ON
  ]]
}

-- Example with traditional non-critical extension (empty sequence)

BroadcastInfoBlock1 ::= SEQUENCE { itemIdentity INTEGER (1..max), field1 Field1, field2 Field2 OPTIONAL, -- Need ON
  nonCriticalExtension BroadcastInfoBlock1-v940-IEs OPTIONAL
}

BroadcastInfoBlock1-v940-IEs ::= SEQUENCE { field3-r9 Field3-r9 OPTIONAL, -- Cond Cond1
  field4-r9 Field4-r9 OPTIONAL, -- Need ON
  nonCriticalExtension SEQUENCE {} OPTIONAL -- Need OP
}

-- ASN1STOP
```

The UE shall, apply the following principles regarding the levels applicable in case of nested error handling:

- an extension additon 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, a 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).

### 5.7.5 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 section 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 section 5.7.3.
5.8 MBMS

5.8.1 Introduction

5.8.1.1 General

In general the control information relevant only for UEs supporting MBMS is separated as much as possible from unicast control information. Most of the MBMS control information is provided on a logical channel specific for MBMS common control information: the MCCH. E-UTRA employs one MCCH logical channel per MBSFN area. In case the network configures multiple MBSFN areas, the UE acquires the MBMS control information from the MCCHs that are configured to identify if services it is interested to receive are ongoing. The action applicable when the UE is unable to simultaneously receive MBMS and unicast services is up to UE implementation. In this release of the specification, an MBMS capable UE is only required to support reception of a single MBMS service at a time, and reception of more than one MBMS service (also possibly on more than one MBSFN area) in parallel is left for UE implementation. The MCCH carries the \textit{MBSFNAreaConfiguration} message, which indicates the MBMS sessions that are ongoing as well as the (corresponding) radio resource configuration. The MCCH may also carry the \textit{MBMSCountingRequest} message, when E-UTRAN wishes to count the number of UEs in RRC\_CONNECTED that are receiving or interested to receive one or more specific MBMS services.

A limited amount of MBMS control information is provided on the BCCH. This primarily concerns the information needed to acquire the MCCH(s). This information is carried by means of a single MBMS specific \textit{SystemInformationBlock: SystemInformationBlockType13}. An MBSFN area is identified solely by the \textit{mbsfn-AreaId} in \textit{SystemInformationBlockType13}. At mobility, the UE considers that the MBSFN area is continuous when the source cell and the target cell broadcast the same value in the \textit{mbsfn-AreaId}.

5.8.1.2 Scheduling

The MCCH information is transmitted periodically, using a configurable repetition period. Scheduling information is not provided for MCCH i.e. both the time domain scheduling as well as the lower layer configuration are semi-statically configured, as defined within \textit{SystemInformationBlockType13}.

For MBMS user data, which is carried by the MTCH logical channel, E-UTRAN periodically provides MCH scheduling information (MSI) at lower layers (MAC). This MCH information only concerns the time domain scheduling i.e. the frequency domain scheduling and the lower layer configuration are semi-statically configured. The periodicity of the MSI is configurable and defined by the MCH scheduling period.

5.8.1.3 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). The modification period boundaries are defined by SFN values for which SFN mod n = 0, where \(m\) is the number of radio frames comprising the modification period. The modification period is configured by means of \textit{SystemInformationBlockType13}.

When the network changes (some of) the MCCH information, it notifies the UEs about the change during a first modification period. In the next modification period, the network transmits the updated MCCH information. These general principles are illustrated in figure 5.8.1.3-1, in which different colours indicate different MCCH information. Upon receiving a change notification, a UE interested to receive MBMS services acquires the new MCCH information immediately from the start of the next modification period. The UE applies the previously acquired MCCH information until the UE acquires the new MCCH information.

![Figure 5.8.1.3-1: Change of MCCH Information](image-url)
Indication of an MBMS specific RNTI, the M-RNTI (see TS 36.321 [6]), on PDCCH is used to inform UEs in RRC_IDLE and UEs in RRC_CONNECTED about an MCCH information change. When receiving an MCCH information change notification, the UE knows that the MCCH information will change at the next modification period boundary. The notification on PDCCH indicates which of the MCCHs will change, which is done by means of an 8-bit bitmap. Within this bitmap, the bit at the position indicated by the field notificationIndicator is used to indicate changes for that MBSFN area: if the bit is set to “1”, the corresponding MCCH will change. No further details are provided e.g. regarding which MCCH information will change. The MCCH information change notification is used to inform the UE about a change of MCCH information upon session start or about the start of MBMS counting.

The MCCH information change notifications on PDCCH are transmitted periodically and are carried on MBSFN subframes only. These MCCH information change notification occasions are common for all MCCHs that are configured, and configurable by parameters included in SystemInformationBlockType13: a repetition coefficient, a radio frame offset and a subframe index. These common notification occasions are based on the MCCH with the shortest modification period.

NOTE 1: E-UTRAN may modify the MBMS configuration information provided on MCCH at the same time as updating the MBMS configuration information carried on BCCH i.e. at a coinciding BCCH and MCCH modification period. Upon detecting that a new MCCH is configured on BCCH, a UE interested to receive one or more MBMS services should acquire the MCCH, unless it knows that the services it is interested in are not provided by the corresponding MBSFN area.

A UE that is receiving an MBMS service via MRB shall acquire the MCCH information from the start of each modification period. A UE interested to receive MBMS from a carrier on which dl-Bandwidth included in MasterInformationBlock is set to n6 shall acquire the MCCH information at least once every MBMS modification period. A UE that is not receiving an MBMS service via MRB but potentially interested to receive other services not started yet in another MBSFN area from a carrier on which dl-Bandwidth included in MasterInformationBlock is other than n6, shall verify that the stored MCCH information remains valid by attempting to find the MCCH information change notification at least notificationRepetitionCoeff times during the modification period of the applicable MCCH(s), if no MCCH information change notification is received.

NOTE 2: In case the UE is aware which MCCH(s) E-UTRAN uses for the service(s) it is interested to receive, the UE may only need to monitor change notifications for a subset of the MCCHs that are configured, referred to as the ‘applicable MCCH(s)’ in the above.

5.8.2 MCCH information acquisition

5.8.2.1 General

![Figure 5.8.2.1-1: MCCH information acquisition](image)

The UE applies the MCCH information acquisition procedure to acquire the MBMS control information that is broadcasted by the E-UTRAN. The procedure applies to MBMS capable UEs that are in RRC_IDLE or in RRC_CONNECTED.

5.8.2.2 Initiation

A UE interested to receive MBMS services shall apply the MCCH information acquisition procedure upon entering the corresponding MBSFN area (e.g. upon power on, following UE mobility) and upon receiving a notification that the MCCH information has changed. A UE that is receiving an MBMS service shall apply the MCCH information acquisition procedure to acquire the MCCH, that corresponds with the service that is being received, at the start of each modification period.
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 unless explicitly specified otherwise.

5.8.2.3 MCCH information acquisition by the UE

An MBMS capable UE shall:

1> if the procedure is triggered by an MCCH information change notification:

2> start acquiring the MBSFNAreaConfiguration message and the MBMSCountingRequest message if present, from the beginning of the modification period following the one in which the change notification was received;

NOTE 1: The UE continues using the previously received MCCH information until the new MCCH information has been acquired.

1> if the UE enters an MBSFN area:

2> acquire the MBSFNAreaConfiguration message and the MBMSCountingRequest message if present, at the next repetition period;

1> if the UE is receiving an MBMS service:

2> start acquiring the MBSFNAreaConfiguration message and the MBMSCountingRequest message if present, that both concern the MBSFN area of the service that is being received, from the beginning of each modification period;

5.8.2.4 Actions upon reception of the MBSFNAreaConfiguration message

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

5.8.2.5 Actions upon reception of the MBMSCountingRequest message

Upon receiving MBMSCountingRequest message, the UE shall perform the MBMS Counting procedure as specified in 5.8.4.

5.8.3 MBMS PTM radio bearer configuration

5.8.3.1 General

The MBMS PTM radio bearer configuration procedure is used by the UE to configure RLC, MAC and the physical layer upon starting and/or stopping to receive an MRB. The procedure applies to UEs interested to receive one or more MBMS services.

NOTE: In case the UE is unable to receive an MBMS service due to capability limitations, upper layers may take appropriate action e.g. terminate a lower priority unicast service.

5.8.3.2 Initiation

The UE applies the MRB establishment procedure to start receiving a session of a service it has an interest in. The procedure may be initiated e.g. upon start of the MBMS session, upon (re-)entry of the corresponding MBSFN service area, upon becoming interested in the MBMS service, upon removal of UE capability limitations inhibiting reception of the concerned service.

The UE applies the MRB release procedure to stop receiving a session. The procedure may be initiated e.g. upon stop of the MBMS session, upon leaving the corresponding MBSFN service area, upon losing interest in the MBMS service, when capability limitations start inhibiting reception of the concerned service.

5.8.3.3 MRB establishment

Upon MRB establishment, the UE shall:

1> establish an RLC entity in accordance with the configuration specified in 9.1.1.4;
> configure an MTCH logical channel in accordance with the received logicalChannelIdentity, applicable for the MRB, as included in the MBSFNAreaConfiguration message;

> configure the physical layer in accordance with the pmch-Config, applicable for the MRB, as included in the MBSFNAreaConfiguration message;

> inform upper layers about the establishment of the MRB by indicating the corresponding tmgi and sessionId;

### 5.8.3.4 MRB release

Upon MRB release, the UE shall:

> release the RLC entity as well as the related MAC and physical layer configuration;

> inform upper layers about the release of the MRB by indicating the corresponding tmgi and sessionId;

### 5.8.4 MBMS Counting Procedure

#### 5.8.4.1 General

![Diagram](image)

**Figure 5.8.4.1-1: MBMS Counting procedure**

The MBMS Counting procedure is used by the E-UTRAN to count the number of RRC_CONNECTED mode UEs which are receiving via an MRB or interested to receive via an MRB the specified MBMS services.

The UE determines interest in an MBMS service, that is identified by the TMGI, by interaction with upper layers.

#### 5.8.4.2 Initiation

E-UTRAN initiates the procedure by sending an MBMSCountingRequest message.

#### 5.8.4.3 Reception of the MBMSCountingRequest message by the UE

Upon receiving the MBMSCountingRequest message, the UE in RRC_CONNECTED mode shall:

1> if the SystemInformationBlockType1, that provided the scheduling information for the systemInformationBlockType13 that included the configuration of the MCCH via which the MBMSCountingRequest message was received, contained the identity of the Registered PLMN; and

1> if the UE is receiving via an MRB or interested to receive via an MRB at least one of the services in the received countingRequestList:

2> if more than one entry is included in the mbsfn-AreaInfoList received in the SystemInformationBlockType13 that included the configuration of the MCCH via which the MBMSCountingRequest message was received:

3> include the mbsfn-AreaIndex in the MBMSCountingResponse message and set it to the index of the entry in the mbsfn-AreaInfoList within the received SystemInformationBlockType13 that corresponds with the MBSFN area used to transfer the received MBMSCountingRequest message;

2> for each MBMS service included in the received countingRequestList:
3> if the UE is receiving via an MRB or interested to receive via an MRB this MBMS service:

4> include an entry in the countingResponseList within the MBMSCountingResponse message with countingResponseService set it to the index of the entry in the countingRequestList within the received MBMSCountingRequest that corresponds with the MBMS service the UE is receiving or interested to receive;

2> submit the MBMSCountingResponse message to lower layers for transmission upon which the procedure ends;

NOTE 1: UEs that are receiving an MBMS User Service [56] by means of a Unicast Bearer Service [57] (i.e. via a DRB), but are interested to receive the concerned MBMS User Service [56] via an MBMS Bearer Service (i.e. via an MRB), respond to the counting request.

NOTE 2: If ciphering is used at upper layers, the UE does not respond to the counting request if it can not decipher the MBMS service for which counting is performed (see TS 22.146 [62, 5.3]).

NOTE 3: The UE treats the MBMSCountingRequest messages received in each modification period independently. In the unlikely case E-UTRAN would repeat an MBMSCountingRequest (i.e. including the same services) in a subsequent modification period, the UE responds again. The UE provides at most one MBMSCountingResponse message to multiple transmission attempts of an MBMSCountingRequest messages in a given modification period.

5.8.5 MBMS interest indication

5.8.5.1 General

The purpose of this procedure is to inform E-UTRAN that the UE is receiving or is interested to receive MBMS service(s) via an MRB or SC-MRB, and if so, to inform E-UTRAN about the priority of MBMS versus unicast reception.

5.8.5.2 Initiation

An MBMS or SC-PTM capable UE in RRC_CONNECTED may initiate the procedure in several cases including upon successful connection establishment, upon entering or leaving the service area, upon session start or stop, upon change of interest, upon change of priority between MBMS reception and unicast reception or upon change to a PCell broadcasting SystemInformationBlockType15.

Upon initiating the procedure, the UE shall:

1> if SystemInformationBlockType15 is broadcast by the PCell:

2> ensure having a valid version of SystemInformationBlockType15 for the PCell;

2> if the UE did not transmit an MBMSInterestIndication message since last entering RRC_CONNECTED state; or

2> if since the last time the UE transmitted an MBMSInterestIndication message, the UE connected to a PCell not broadcasting SystemInformationBlockType15;

3> if the set of MBMS frequencies of interest, determined in accordance with 5.8.5.3, is not empty:
4> initiate transmission of the **MBMSInterestIndication** message in accordance with 5.8.5.4;

2> else:

3> if the set of MBMS frequencies of interest, determined in accordance with 5.8.5.3, has changed since the last transmission of the **MBMSInterestIndication** message; or

3> if the prioritisation of reception of all indicated MBMS frequencies compared to reception of any of the established unicast bearers has changed since the last transmission of the **MBMSInterestIndication** message:

4> initiate transmission of the **MBMSInterestIndication** message in accordance with 5.8.5.4;

NOTE: The UE may send a **MBMSInterestIndication** even when it is able to receive the MBMS services it is interested in i.e. to avoid that the network allocates a configuration inhibiting MBMS reception.

3> else if **SystemInformationBlockType20** is broadcast by the PCell:

4> if since the last time the UE transmitted an **MBMSInterestIndication** message, the UE connected to a PCell not broadcasting **SystemInformationBlockType20**; or

4> if the set of MBMS services of interest determined in accordance with 5.8.5.3a is different from **mbms-Services** included in the last transmission of the **MBMSInterestIndication** message;

5> initiate the transmission of the **MBMSInterestIndication** message in accordance with 5.8.5.4.

5.8.5.3 Determine MBMS frequencies of interest

The UE shall:

1> consider a frequency to be part of the MBMS frequencies of interest if the following conditions are met:

2> at least one MBMS session the UE is receiving or interested to receive via an MRB or SC-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 3GPP TS 36.300 [9] or 3GPP TS 26.346 [57].

2> for at least one of these MBMS sessions **SystemInformationBlockType15** acquired from the PCell includes for the concerned frequency one or more MBMS SAIs as indicated in the USD for this session; and

NOTE 2: The UE considers a frequency to be part of the MBMS frequencies of interest even though E-UTRAN may (temporarily) not employ an MRB or SC-MRB for the concerned session. I.e. the UE does not verify if the session is indicated on (SC-)MCCCH

NOTE 3: The UE considers the frequencies of interest independently of any synchronization state, e.g. [9, Annex J.1]

2> the UE is capable of simultaneously receiving MRBs and/or is capable of simultaneously receiving SC-MRBs on the set of MBMS frequencies of interest, regardless of whether a serving cell is configured on each of these frequencies or not; and

2> the **supportedBandCombination** the UE included in **UE-EUTRA-Capability** contains at least one band combination including the set of MBMS frequencies of interest;

NOTE 4: Indicating a frequency implies that the UE supports **SystemInformationBlockType13** or **SystemInformationBlockType20** acquisition for the concerned frequency i.e. the indication should be independent of whether a serving cell is configured on that frequency.

NOTE 5: When evaluating which frequencies it can receive simultaneously, the UE does not take into account the serving frequencies that are currently configured i.e. it only considers MBMS frequencies it is interested to receive.
NOTE 6: The set of MBMS frequencies of interest includes at most one frequency for a given physical frequency. The UE only considers a physical frequency to be part of the MBMS frequencies of interest if it supports at least one of the bands indicated for this physical frequency in SystemInformationBlockType1 (for serving frequency) or SystemInformationBlockType15 (for neighbouring frequencies). In this case, E-UTRAN may assume the UE supports MBMS reception on any of the bands supported by the UE (i.e. according to supportedBandCombination).

5.8.5.3a Determine MBMS services of interest

The UE shall:

1> consider a MBMS service to be part of the MBMS services of interest if the following conditions are met:

2> the UE is SC-PTM capable; and

2> the UE is receiving or interested to receive this service via an SC-MRB; and

2> one session of this service is ongoing or about to start; and

2> one or more MBMS SAIs in the USD for this service is included in SystemInformationBlockType15 acquired from the PCell for a frequency belonging to the set of MBMS frequencies of interest, determined according to 5.8.5.3.

5.8.5.4 Actions related to transmission of MBMSInterestIndication message

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

1> if the set of MBMS frequencies of interest, determined in accordance with 5.8.5.3, is not empty:

2> include mbms-FreqList and set it to include the MBMS frequencies of interest sorted by decreasing order of interest, using the EARFCN corresponding with freqBandIndicator included in SystemInformationBlockType1 (for serving frequency), if applicable, and the EARFCN(s) as included in SystemInformationBlockType15 (for neighbouring frequencies);

NOTE 1: The EARFCN included in mbms-FreqList is merely used to indicate a physical frequency the UE is interested to receive i.e. the UE may not support the band corresponding to the included EARFCN (but it does support at least one of the bands indicated in system information for the concerned physical frequency).

2> include mbms-Priority if the UE prioritises reception of all indicated MBMS frequencies above reception of any of the unicast bearers;

2> if SystemInformationBlockType20 is broadcast by the PCell:

3> include mbms-Services and set it to indicate the set of MBMS services of interest determined in accordance with 5.8.5.3a;

NOTE 2: If the UE prioritises MBMS reception and unicas t data cannot be supported because of congestion on the MBMS carrier(s), E-UTRAN may initiate release of unicast bearers. It is up to E-UTRAN implementation whether all bearers or only GBR bearers are released. E-UTRAN does not initiate re-establishment of the released unicast bearers upon alleviation of the congestion.

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

5.8a SC-PTM

5.8a.1 Introduction

5.8a.1.1 General

SC-PTM control information is provided on a specific logical channel: the SC-MCCH. The SC-MCCH carries the SCPTMConfiguration message which indicates the MBMS sessions that are ongoing as well as the (corresponding) information on when each session may be scheduled, i.e. scheduling period, scheduling window and start offset. The SCPTMConfiguration message also provides information about the neighbour cells transmitting the MBMS sessions which are ongoing on the current cell. In this release of the specification, an SC-PTM capable UE is only required to
support reception of a single MBMS service at a time, and reception of more than one MBMS service in parallel is left for UE implementation.

A limited amount of SC-PTM control information is provided on the BCCH. This primarily concerns the information needed to acquire the SC-MCCH.

### 5.8a.1.2 SC-MCCH scheduling

The SC-MCCH information (i.e. information transmitted in messages sent over SC-MCCH) is transmitted periodically, using a configurable repetition period. SC-MCCH transmissions (and the associated radio resources and MCS) are indicated on PDCCH.

### 5.8a.1.3 SC-MCCH information validity and notification of changes

Change of SC-MCCH information only occurs at specific radio frames, i.e. the concept of a modification period is used. Within a modification period, the same SC-MCCH information may be transmitted a number of times, as defined by its scheduling (which is based on a repetition period). 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 means of `SystemInformationBlockType20`.

When the network changes (some of) the SC-MCCH information, it notifies the UEs about the change in the first subframe which can be used for SC-MCCH transmission in a repetition period. LSB bit in 8-bit bitmap when set to ‘1’ indicates the change in SC-MCCH. Upon receiving a change notification, a UE interested to receive MBMS services transmitted using SC-PTM acquires the new SC-MCCH information starting from the same subframe. The UE applies the previously acquired SC-MCCH information until the UE acquires the new SC-MCCH information.

### 5.8a.1.4 Procedures

The SC-PTM capable UE receiving or interested to receive MBMS service(s) via SC-MRB applies SC-PTM procedures described in 5.8a and the MBMS interest indication procedure as specified in 5.8.5.

### 5.8a.2 SC-MCCH information acquisition

#### 5.8a.2.1 General

![Figure 5.8a.2.1-1: SC-MCCH information acquisition](image)

The UE applies the SC-MCCH information acquisition procedure to acquire the SC-PTM control information that is broadcast by the E-UTRAN. The procedure applies to SC-PTM capable UEs that are in RRC_IDLE or in RRC_CONNECTED.

#### 5.8a.2.2 Initiation

A UE interested to receive MBMS services via SC-MRB shall apply the SC-MCCH information acquisition procedure upon entering the cell broadcasting `SystemInformationBlockType20` (e.g. upon power on, following UE mobility) and upon receiving a notification that the SC-MCCH information has changed. A UE that is receiving an MBMS service via SC-MRB shall apply the SC-MCCH information acquisition procedure to acquire the SC-MCCH information that corresponds with the service that is being received, at the start of each modification period.

Unless explicitly stated otherwise in the procedural specification, the SC-MCCH information acquisition procedure overwrites any stored SC-MCCH information, i.e. delta configuration is not applicable for SC-MCCH information and the UE discontinues using a field if it is absent in SC-MCCH information unless explicitly specified otherwise.
5.8a.2.3 SC-MCCH information acquisition by the UE

A SC-PTM capable UE shall:

1> if the procedure is triggered by an SC-MCCH information change notification:
   2> start acquiring the SCPTMConfiguration message from the subframe where the change notification was received;

NOTE 1: The UE continues using the previously received SC-MCCH information until the new SC-MCCH information has been acquired.

1> if the UE enters a cell broadcasting SystemInformationBlockType20:
   2> acquire the SCPTMConfiguration message at the next repetition period;

1> if the UE is receiving an MBMS service via an SC-MRB:
   2> start acquiring the SCPTMConfiguration message from the beginning of each modification period.

5.8a.2.4 Actions upon reception of the SCPTMConfiguration message

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

5.8a.3 SC-PTM radio bearer configuration

5.8a.3.1 General

The SC-PTM radio bearer configuration procedure is used by the UE to configure RLC, MAC and the physical layer upon starting and/or stopping to receive an SC-MRB transmitted on SC-MTCH. The procedure applies to SC-PTM capable UEs that are in RRC_CONNECTED or in RRC_IDLE and are interested to receive one or more MBMS services via SC-MRB.

NOTE: In case the UE is unable to receive an MBMS service via an SC-MRB due to capability limitations, upper layers may take appropriate action e.g. terminate a lower priority unicast service.

5.8a.3.2 Initiation

The UE applies the SC-MRB establishment procedure to start receiving a session of a MBMS service it has an interest in. The procedure may be initiated e.g. upon start of the MBMS session, upon entering a cell providing via SC-MRB a MBMS service in which the UE has interest, upon becoming interested in the MBMS service, upon removal of UE capability limitations inhibiting reception of the concerned service.

The UE applies the SC-MRB release procedure to stop receiving a session. The procedure may be initiated e.g. upon stop of the MBMS session, upon leaving the cell where a SC-MRB is established, upon losing interest in the MBMS service, when capability limitations start inhibiting reception of the concerned service.

5.8a.3.3 SC-MRB establishment

Upon SC-MRB establishment, the UE shall:

1> establish an RLC entity in accordance with the configuration specified in 9.1.1.7;

1> configure a SC-MTCH logical channel applicable for the SC-MRB and instruct MAC to receive DL-SCH on the cell where the SCPTMConfiguration message was received for the MBMS service for which the SC-MRB is established and using g-RNTI and sc-mtch-SchedulingInfo (if included) in this message for this MBMS service:

1> configure the physical layer in accordance with the sc-mtch-InfoList, applicable for the SC-MRB, as included in the SCPTMConfiguration message;

1> inform upper layers about the establishment of the SC-MRB by indicating the corresponding tmgi and sessionId;
5.8a.3.4 SC-MRB release

Upon SC-MRB release, the UE shall:

1> release the RLC entity as well as the related MAC and physical layer configuration;

1> inform upper layers about the release of the SC-MRB by indicating the corresponding tmgi and sessionId;

5.9 RN procedures

5.9.1 RN reconfiguration

5.9.1.1 General

The purpose of this procedure is to configure/reconfigure the RN subframe configuration and/or to update the system information relevant for the RN in RRC_CONNECTED.

5.9.1.2 Initiation

E-UTRAN may initiate the RN reconfiguration procedure to an RN in RRC_CONNECTED when AS security has been activated.

5.9.1.3 Reception of the RNReconfiguration by the RN

The RN shall:

1> if the rn-SystemInfo is included:

2> if the systemInformationBlockType1 is included:

3> act upon the received SystemInformationBlockType1 as specified in 5.2.2.7;

2> if the SystemInformationBlockType2 is included:

3> act upon the received SystemInformationBlockType2 as specified in 5.2.2.9;

1> if the rn-SubframeConfig is included:

2> reconfigure lower layers in accordance with the received subframeConfigPatternFDD or subframeConfigPatternTDD;

2> if the rpdcch-Config is included:

3> reconfigure lower layers in accordance with the received rpdcch-Config;

1> submit the RNReconfigurationComplete message to lower layers for transmission, upon which the procedure ends;
5.10 Sidelink

5.10.1 Introduction

The sidelink communication and associated synchronisation resource configuration applies for the frequency at which it was received/acquired. Moreover, for a UE configured with one or more SCells, the sidelink communication and associated synchronisation resource configuration provided by dedicated signalling applies for the PCell/ the primary frequency. The sidelink discovery and associated synchronisation resource configuration applies for the frequency at which it was received/acquired or the indicated frequency in the configuration. For a UE configured with one or more SCells, the sidelink discovery and associated synchronisation resource configuration provided by dedicated signalling applies for the the PCell/ the primary frequency / any other indicated frequency.

NOTE 1: Upper layers configure the UE to receive or transmit sidelink communication on a specific frequency, to monitor or transmit non-PS related sidelink discovery announcements on one or more frequencies or to monitor or transmit PS related sidelink discovery announcements on a specific frequency, but only if the UE is authorised to perform these particular ProSe related sidelink activities.

NOTE 2: It is up to UE implementation which actions to take (e.g. termination of unicast services, detach) when it is unable to perform the desired sidelink activities, e.g. due to UE capability limitations.

Sidelink communication consists of one-to-many and one-to-one sidelink communication. One-to-many sidelink communication consists of relay related and non-relay related one-to-many sidelink communication. One-to-one sidelink communication consists of relay related and non-relay related one-to-one sidelink communication. In relay related one-to-one sidelink communication the communicating parties consist of one sidelink relay UE and one sidelink remote UE.

Sidelink discovery consists of public safety related (PS related) and non-PS related sidelink discovery. PS related sidelink discovery consists of relay related and non-relay related PS related sidelink discovery. Upper layers indicate to RRC whether a particular sidelink announcement is PS related or non-PS related.

The specification covers the use of UE to network sidelink relays by specifying the additional requirements that apply for a sidelink relay UE and a sidelink remote UE. I.e. for such UEs the regular sidelink UE requirements equally apply unless explicitly stated otherwise.

5.10.1a Conditions for sidelink communication operation

When it is specified that the UE shall perform sidelink communication operation only if the conditions defined in this section are met, the UE shall perform sidelink communication operation only if:

1> if the UE’s serving cell is suitable (RRC_IDLE or RRC_CONNECTED); and if either the selected cell on the frequency used for sidelink communication operation belongs to the registered or equivalent PLMN as specified in TS 24.334 [69] or the UE is out of coverage on the frequency used for sidelink communication operation as defined in TS 36.304 [4, 11.4]; or

1> if the UE is camped on a serving cell (RRC_IDLE) on which it fulfils the conditions to support sidelink communication in limited service state as specified in TS 23.303 [68, 4.5.6]; and if either the serving cell is on the frequency used for sidelink communication operation or the UE is out of coverage on the frequency used for sidelink communication operation as defined in TS 36.304 [4, 11.4]; or

1> if the UE has no serving cell (RRC_IDLE);

5.10.1b Conditions for PS related sidelink discovery operation

When it is specified that the UE shall perform PS related sidelink discovery operation only if the conditions defined in this section are met, the UE shall perform PS related sidelink discovery operation only if:

1> if the UE’s serving cell is suitable (RRC_IDLE or RRC_CONNECTED); and if either the selected cell on the frequency used for PS related sidelink discovery operation belongs to the registered or other PLMN as specified in TS 24.334 [69] or the UE is out of coverage on the frequency used for PS related sidelink discovery operation as defined in TS 36.304 [4, 11.4]; or

1> if the UE is camped on a serving cell (RRC_IDLE) on which it fulfils the conditions to support sidelink discovery in limited service state as specified in TS 23.303 [68, 4.5.6]; and if either the serving cell is on the
frequency used for PS related sidelink discovery operation or the UE is out of coverage on the frequency used for PS related sidelink discovery operation as defined in TS 36.304 [4, 11.4]; or

1> if the UE has no serving cell (RRC_IDLE);

5.10.1c Conditions for non-PS related sidelink discovery operation

When it is specified that the UE shall perform non-PS related sidelink discovery operation only if the conditions defined in this section are met, the UE shall perform non-PS related sidelink discovery operation only if:

1> if the UE's serving cell (RRC_IDLE) or PCell (RRC_CONNECTED) is suitable; and if the selected cell on the frequency used for non-PS related sidelink discovery operation belongs to the registered or other PLMN as specified in TS 24.334 [69].

5.10.2 Sidelink UE information

5.10.2.1 General

The purpose of this procedure is to inform E-UTRAN that the UE is interested or no longer interested to receive sidelink communication or discovery, as well as to request assignment or release of transmission resources for sidelink communication or discovery announcements or sidelink discovery gaps and to report parameters related to sidelink discovery from system information of inter-frequency/PLMN cells.
5.10.2.2 Initiation

A UE capable of sidelink communication or discovery that is in RRC_CONNECTED may initiate the procedure to indicate it is (interested in) receiving sidelink communication or discovery in several cases including upon successful connection establishment, upon change of interest, upon change to a PCell broadcasting SystemInformationBlockType18 or SystemInformationBlockType19. A UE capable of sidelink communication or discovery may initiate the procedure to request assignment of dedicated resources for the concerned sidelink communication transmission or discovery announcements or to request sidelink discovery gaps for sidelink discovery transmission or sidelink discovery reception and a UE capable of inter-frequency/PLMN sidelink discovery parameter reporting may initiate the procedure to report parameters related to sidelink discovery from system information of inter-frequency/PLMN cells.

NOTE 1: A UE in RRC_IDLE that is configured to transmit sidelink communication/ discovery announcements, while SystemInformationBlockType18/ SystemInformationBlockType19 does not include the resources for transmission (in normal conditions), initiates connection establishment in accordance with 5.3.3.1a.

Upon initiating the procedure, the UE shall:

1> if SystemInformationBlockType18 is broadcast by the PCell:

2> ensure having a valid version of SystemInformationBlockType18 for the PCell;

2> if configured by upper layers to receive sidelink communication:

3> if the UE did not transmit a SidelinkUEInformation message since last entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType18; or

NOTE 2: After handover/ re-establishment from a source PCell not broadcasting SystemInformationBlockType18 the UE repeats the same interest information that it provided previously as such a source PCell may not forward the interest information.

3> if the last transmission of the SidelinkUEInformation message did not include commRxInterestedFreq; or if the frequency configured by upper layers to receive sidelink communication on has changed since the last transmission of the SidelinkUEInformation message:

4> initiate transmission of the SidelinkUEInformation message to indicate the sidelink communication reception frequency of interest in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelinkUEInformation message included commRxInterestedFreq;

4> initiate transmission of the SidelinkUEInformation message to indicate it is no longer interested in sidelink communication reception in accordance with 5.10.2.3;

2> if configured by upper layers to transmit non-relay related one-to-many sidelink communication:

3> if the UE did not transmit a SidelinkUEInformation message since last entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType18; or

3> if the last transmission of the SidelinkUEInformation message did not include commTxResourceReq; or if the information carried by the commTxResourceReq has changed since the last transmission of the SidelinkUEInformation message:

4> initiate transmission of the SidelinkUEInformation message to indicate the non-relay related one-to many sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelinkUEInformation message included commTxResourceReq;
4> initiate transmission of the SidelnkUEInformation message to indicate it no longer requires non-relay related one-to-many sidelink communication transmission resources in accordance with 5.10.2.3;

2> if configured by upper layer to transmit relay related one-to-many sidelink communication:

3> if the UE did not transmit a SidelnkUEInformation message since entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a SidelnkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType18, connected to a PCell not broadcasting SystemInformationBlockType19 or broadcasting SystemInformationBlockType19 not including discConfigRelay; or

3> if the last transmission of SidelnkUEInformation message did not include commTxResourceReqRelay; or if the information carried by the commTxResourceReqRelay has changed since the last transmission of the SidelnkUEInformation message:

4> if the UE is acting as sidelink relay UE:

5> initiate transmission of the SidelnkUEInformation message to indicate the relay related one-to-many sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelnkUEInformation message included commTxResourceReqRelay:

4> initiate transmission of the SidelnkUEInformation message to indicate it no longer requires relay related one-to-many sidelink communication transmission resources in accordance with 5.10.2.3;

2> if configured by upper layers to transmit non-relay related one-to-one sidelink communication:

3> if the UE did not transmit a SidelnkUEInformation message since last entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a SidelnkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType18 or connected to a PCell broadcasting SystemInformationBlockType18 not including commTxResourceUC-ReqAllowed; or

3> if the last transmission of the SidelnkUEInformation message did not include commTxResourceReqUC; or if the information carried by the commTxResourceReqUC has changed since the last transmission of the SidelnkUEInformation message:

4> if commTxResourceUC-ReqAllowed is included in SystemInformationBlockType18:

5> initiate transmission of the SidelnkUEInformation message to indicate the non-relay related one-to-one sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelnkUEInformation message included commTxResourceReqUC:

4> initiate transmission of the SidelnkUEInformation message to indicate it no longer requires non-relay related one-to-one sidelink communication transmission resources in accordance with 5.10.2.3;

2> if configured by upper layers to transmit relay related one-to-one sidelink communication:

3> if the UE did not transmit a SidelnkUEInformation message since last entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a SidelnkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType18, connected to a PCell not broadcasting SystemInformationBlockType19 or broadcasting SystemInformationBlockType19 not including discConfigRelay; or
3> if the last transmission of the SidelinkUEInformation message did not include commTxResourceReqRelayUC; or if the information carried by the commTxResourceReqRelayUC has changed since the last transmission of the SidelinkUEInformation message:

4> if the UE is acting as sidelink relay UE; or:

4> if the UE has a selected sidelink relay UE; and if SystemInformationBlockType19 is broadcast by the PCell and includes discConfigRelay; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met;

5> initiate transmission of the SidelinkUEInformation message to indicate the relay related one-to-one sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelinkUEInformation message included commTxResourceReqRelayUC:

4> initiate transmission of the SidelinkUEInformation message to indicate it no longer requires relay related one-to-one sidelink communication transmission resources in accordance with 5.10.2.3;

1> if SystemInformationBlockType19 is broadcast by the PCell:

2> ensure having a valid version of SystemInformationBlockType19 for the PCell;

2> if configured by upper layers to receive sidelink discovery announcements on a serving frequency or on one or more frequencies included in discInterFreqList, if included in SystemInformationBlockType19 of the PCell:

3> if the UE did not transmit a SidelinkUEInformation message since last entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType19; or

3> if the last transmission of the SidelinkUEInformation message did not include discRxInterest:

4> initiate transmission of the SidelinkUEInformation message to indicate it is interested in sidelink discovery reception in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelinkUEInformation message included discRxInterest:

4> initiate transmission of the SidelinkUEInformation message to indicate it is no longer interested in sidelink discovery reception in accordance with 5.10.2.3;

2> if the UE is configured by upper layers to transmit non-PS related sidelink discovery announcements on the primary frequency or on one or more frequencies included in discInterFreqList, if included in SystemInformationBlockType19 of the PCell, with discTxResourcesInterFreq included within discResourcesNonPS and not set to noTxOnCarrier:

3> if the UE did not transmit a SidelinkUEInformation message since last entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType19 or connected to a PCell broadcasting SystemInformationBlockType19 not including discTxResourcesInterFreq within discResourcesNonPS or discTxResourcesInterFreq did not include all frequencies for which the UE will request resources; or

3> if the last transmission of the SidelinkUEInformation message did not include discTxResourceReq; or if the non-PS related sidelink discovery announcement resources required by the UE have changed (i.e. resulting in a change of discTxResourceReq) since the last transmission of the SidelinkUEInformation message:

4> initiate transmission of the SidelinkUEInformation message to indicate the non-PS related sidelink discovery announcement resources required by the UE in accordance with 5.10.2.3;
2> else:

3> if the last transmission of the **SidelinkUEInformation** message included `discTxResourceReq`:

4> initiate transmission of the **SidelinkUEInformation** message to indicate it no longer requires non-PS related sidelink discovery announcement resources in accordance with 5.10.2.3;

2> if configured by upper layers to transmit PS related sidelink discovery announcements on the primary frequency or, in case of non-relay PS related sidelink discovery announcements, on a frequency included in `discInterFreqList`, if included in `SystemInformationBlockType19`, with `discTxResourcesInterFreq` included within `discResourcesPS` and not set to `noTxOnCarrier`:

3> if the UE did not transmit a **SidelinkUEInformation** message since last entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a **SidelinkUEInformation** message the UE connected to a PCell not broadcasting `SystemInformationBlockType19`, connected to a PCell broadcasting `SystemInformationBlockType19` not including `discConfigPS`, or in case of non-relay PS related transmission: (connected to a PCell broadcasting `SystemInformationBlockType19` not including `discResourcesPS` or for which `discTxResourcesInterFreq` did not include all frequencies for which the UE will request resources), or in case of relay related PS sidelink discovery announcements: (connected to a PCell broadcasting `SystemInformationBlockType19` not including `discConfigRelay`) sidelink; or

3> if the last transmission of the **SidelinkUEInformation** message did not include `discTxResourceReqPS`; or if the PS related sidelink discovery announcement resources required by the UE have changed (i.e. resulting in a change of `discTxResourceReqPS`) since the last transmission of the **SidelinkUEInformation** message:

4> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements; or

4> if the UE is acting as sidelink relay UE; and if `SystemInformationBlockType19` includes `discConfigRelay`; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met; or

4> if the UE is selecting a sidelink relay UE / has a selected sidelink relay UE; and if `SystemInformationBlockType19` includes `discConfigRelay`; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:

5> initiate transmission of the **SidelinkUEInformation** message to indicate the PS related sidelink discovery announcement resources required by the UE in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the **SidelinkUEInformation** message included `discTxResourceReqPS`:

4> initiate transmission of the **SidelinkUEInformation** message to indicate it no longer requires PS related sidelink discovery announcement resources in accordance with 5.10.2.3;

2> if configured by upper layers to monitor or transmit sidelink discovery announcements; and if the UE requires sidelink discovery gaps, to perform such actions:

3> if the UE did not transmit a **SidelinkUEInformation** message since last entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a **SidelinkUEInformation** message the UE connected to a PCell not broadcasting `SystemInformationBlockType19` or connected to a PCell broadcasting `SystemInformationBlockType19` not including `gapRequestsAllowedCommon` while at the same time the UE was not configured with `gapRequestsAllowedDedicated`; or

3> if the last transmission of the **SidelinkUEInformation** message did not include the gaps required to monitor or transmit the sidelink discovery announcements (i.e. UE requiring gaps to monitor discovery announcements while `discRxGapReq` was not included or UE requiring gaps to transmit discovery announcements while `discTxGapReq` was not included); or if the sidelink discovery gaps required by the UE have changed (i.e. resulting in a change of `discRxGapReq` or `discTxGapReq`) since the last transmission of the **SidelinkUEInformation** message:

4> if the UE is configured with `gapRequestsAllowedDedicated` set to `true`; or
if the UE is not configured with gapRequestsAllowedDedicated and gapRequestsAllowedCommon is included in SystemInformationBlockType19:

initiate transmission of the SidelinkUEInformation message to indicate the sidelink discovery gaps required by the UE in accordance with 5.10.2.3;

else:

if the last transmission of the SidelinkUEInformation message included discTxGapReq or discRxGapReq:

initiate transmission of the SidelinkUEInformation message to indicate it no longer requires sidelink discovery gaps in accordance with 5.10.2.3;

if the UE acquired the relevant parameters from the system information of one or more cells on a carrier included in the discSysInfoToReportConfig and T370 is running:

if the UE has configured lower layers to transmit or monitor the sidelink discovery announcements on those cells:

initiate transmission of the SidelinkUEInformation message to report the acquired system information parameters and stop T370;

5.10.2.3 Actions related to transmission of SidelinkUEInformation message

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

if the UE initiates the procedure to indicate it is (no more) interested to receive sidelink communication or discovery or to request (configuration/ release) of sidelink communication or discovery transmission resources (i.e. UE includes all concerned information, irrespective of what triggered the procedure):

if SystemInformationBlockType18 is broadcast by the PCell:

if configured by upper layers to receive sidelink communication:

include commRxInterestedFreq and set it to the sidelink communication frequency;

if configured by upper layers to transmit non-relay related one-to-many sidelink communication:

include commTxResourceReq and set its fields as follows:

set carrierFreq to indicate the sidelink communication frequency i.e. the same value as indicated in commRxInterestedFreq if included;

set destinationInfoList to include the non-relay related one-to-many sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;

if configured by upper layers to transmit non-relay related one-to-one sidelink communication; and

if commTxResourceUC-ReqAllowed is included in SystemInformationBlockType18:

include commTxResourceReqUC and set its fields as follows:

set carrierFreq to indicate the one-to-one sidelink communication frequency i.e. the same value as indicated in commRxInterestedFreq if included;

set destinationInfoList to include the non-relay related one-to-one sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;

if configured by upper layers to transmit relay related one-to-one sidelink communication; and

if commTxResourceReqRelayUC is included in SystemInformationBlockType18:

include commTxResourceReqRelayUC and set its fields as follows:
5> set destinationInfoList to include the one-to-one sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;

4> include ue-Type and set it to relayUE if the UE is acting as sidelink relay UE and to remoteUE otherwise;

3> if configured by upper layers to transmit relay related one-to-many sidelink communication; and

3> if SystemInformationBlockType19 is broadcast by the PCell including discConfigRelay; and

3> if the UE is acting as sidelink relay UE:

4> include commTxResourceReqRelay and set its fields as follows:

5> set destinationInfoList to include the one-to-many sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;

4> include ue-Type and set it to relayUE;

2> if SystemInformationBlockType19 is broadcast by the PCell:

3> if configured by upper layers to receive sidelink discovery announcements on a serving frequency or one or more frequencies included in discInterFreqList, if included in SystemInformationBlockType19:

4> include discRxInterest;

3> if the UE is configured by upper layers to transmit non-PS related sidelink discovery announcements:

4> for each frequency on which the UE is configured to transmit non-PS related sidelink discovery announcements that concerns the primary frequency or that is included in discInterFreqList with discTxResourcesInterFreq included within discResourcesNonPS and not set to noTxOnCarrier:

5> for the first frequency, include discTxResourceReq and set it to indicate the number of discovery messages for sidelink discovery announcement(s) for which it requests E-UTRAN to assign dedicated resources as well as the concerned frequency, if different from the primary;

5> for any additional frequency, include discTxResourceReqAddFreq and set it to indicate the number of discovery messages for sidelink discovery announcement(s) for which it requests E-UTRAN to assign dedicated resources as well as the concerned frequency;

3> if configured by upper layers to transmit PS related sidelink discovery announcements; and

3> if the frequency on which the UE is configured to transmit PS related sidelink discovery announcements either concerns the primary frequency or, in case of non-relay PS related sidelink discovery announcements, is included in discInterFreqList with discTxResourcesInterFreq included within discResourcesPS and not set to noTxOnCarrier:

4> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements and SystemInformationBlockType19 includes discConfigPS; or

4> if the UE is acting as sidelink relay UE; and if SystemInformationBlockType19 includes discConfigRelay; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met; or

4> if the UE is selecting a sidelink relay UE / has a selected sidelink relay UE; and if SystemInformationBlockType19 includes discConfigRelay; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:

5> include discTxResourceReqPS and set it to indicate the number of discovery messages for PS related sidelink discovery announcement(s) for which it requests E-UTRAN to assign dedicated resources as well as the concerned frequency, if different from the primary;

1> else if the UE initiates the procedure to request sidelink discovery transmission and/or reception gaps:

2> if the UE is configured with gapRequestsAllowedDedicated set to true; or

2> if the UE is not configured with gapRequestsAllowedDedicated and gapRequestsAllowedCommon is included in SystemInformationBlockType19:
3> if the UE requires sidelink discovery gaps to monitor the sidelink discovery announcements the UE is configured to monitor by upper layers:

4> include discRxGapReq and set it to indicate, for each frequency that either concerns the primary frequency or is included in discInterFreqList on which the UE is configured to monitor sidelink discovery announcements and for which it requires sidelink discovery gaps to do so, the gap pattern(s) as well as the concerned frequency, if different from the primary;

3> if the UE requires sidelink discovery gaps to transmit the sidelink discovery announcements the UE is configured to transmit by upper layers:

4> include discTxGapReq and set it to indicate, for each frequency that either concerns the primary or is included in discInterFreqList on which the UE is configured to transmit sidelink discovery announcements and for which it requires sidelink discovery gaps to do so, the gap pattern(s) as well as the concerned frequency, if different from the primary;

1> else if the UE initiates the procedure to report the system information parameters related to sidelink discovery of carriers other than the primary:

2> include discSysInfoReportFreqList and set it to report the system information parameter acquired from the cells on those carriers;

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

5.10.3 Sidelink communication monitoring

A UE capable of sidelink communication that is configured by upper layers to receive sidelink communication shall:

1> if the conditions for sidelink communication operation as defined in 5.10.1a are met:

2> if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:

3> if the cell chosen for sidelink communication reception broadcasts SystemInformationBlockType18 including commRxPool:

4> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources indicated by commRxPool;

NOTE 1: If commRxPool includes one or more entries including rxParametersNCell, the UE may only monitor such entries if the associated PSS/SSS or SLSSID is detected. When monitoring such pool(s), the UE applies the timing of the concerned PSS/SSS or SLSS.

2> else (i.e. out of coverage on the sidelink carrier):

3> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources that were preconfigured (i.e. preconfigComm in SL-Preconfiguration defined in 9.3);

NOTE 2: The UE may monitor in accordance with the timing of the selected SyncRef UE, or if the UE does not have a selected SyncRef UE, based on the UE's own timing.
5.10.4 Sidelink communication transmission

A UE capable of sidelink communication that is configured by upper layers to transmit non-relay related sidelink communication and has related data to be transmitted or a UE capable of relay related sidelink communication that is configured by upper layers to transmit relay related sidelink communications and satisfies the conditions for relay related sidelink communication specified in this section shall:

1> if the conditions for sidelink communication operation as defined in 5.10.1a are met:

2> if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:

3> if the UE is in RRC_CONNECTED and uses the PCell for sidelink communication:

4> if the UE is configured, by the current PCell/ the PCell in which physical layer problems or radio link failure was detected, with commTxResources set to scheduled:

5> if T310 or T311 is running; and if the PCell at which the UE detected physical layer problems or radio link failure broadcasts SystemInformationBlockType18 including commTxPoolExceptional; or

5> if T301 is running and the cell on which the UE initiated connection re-establishment broadcasts SystemInformationBlockType18 including commTxPoolExceptional:

6> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in commTxPoolExceptional;

5> else:

6> configure lower layers to request E-UTRAN to assign transmission resources for sidelink communication;

4> else if the UE is configured with commTxPoolNormalDedicated or commTxPoolNormalDedicatedExt:

5> if priorityList is included for the entries of commTxPoolNormalDedicated or commTxPoolNormalDedicatedExt:

6> configure lower layers to transmit the sidelink control information and the corresponding data using the one or more pools of resources indicated by commTxPoolNormalDedicated or commTxPoolNormalDedicatedExt i.e. indicate all entries of this field to lower layers;

5> else:

6> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in commTxPoolNormalDedicated;

3> else (i.e. sidelink communication in RRC_IDLE or on cell other than PCell in RRC_CONNECTED):

4> if the cell chosen for sidelink communication transmission broadcast SystemInformationBlockType18:

5> if SystemInformationBlockType18 includes commTxPoolNormalCommon:

6> if priorityList is included for the entries of commTxPoolNormalCommon or commTxPoolNormalCommonExt:

7> configure lower layers to transmit the sidelink control information and the corresponding data using the one or more pools of resources indicated by commTxPoolNormalCommon and/or commTxPoolNormalCommonExt i.e. indicate all entries of these fields to lower layers;

6> else:

7> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in commTxPoolNormalCommon;
else if `SystemInformationBlockType18` includes `commTxPoolExceptional`:

- from the moment the UE initiates connection establishment until receiving an `RRCConnectionReconfiguration` including `sl-CommConfig` or until receiving an `RRCConnectionRelease` or an `RRCConnectionReject`;

- configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in `commTxPoolExceptional`;

else (i.e. out of coverage on sidelink carrier):

1. if `priorityList` is included for the entries of `preconfigComm` in `SL-Preconfiguration` defined in 9.3:

   - configure lower layers to transmit the sidelink control information and the corresponding data using the one or more pools of resources indicated `preconfigComm` i.e. indicate all entries of this field to lower layers and in accordance with the timing of the selected SyncRef UE, or if the UE does not have a selected SyncRef UE, based on the UE's own timing;

   else:

   - configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources that were preconfigured i.e. indicated by the first entry in `preconfigComm in SL-Preconfiguration` defined in 9.3 and in accordance with the timing of the selected SyncRef UE, or if the UE does not have a selected SyncRef UE, based on the UE's own timing;

The conditions for relay related sidelink communication are as follows:

1. if the transmission concerns sidelink relay communication; and the UE is capable of sidelink relay or sidelink remote operation:

   2. if the UE is in RRC_IDLE; and if the UE has a selected sidelink relay UE: configure lower layers to transmit the sidelink control information and the corresponding data using the resources, as specified previously in this section, only if the following condition is met:

   3. if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met; and if the UE configured lower layers with a pool of resources included in `SystemInformationBlockType18` (i.e. `commTxPoolNormalCommon`, `commTxPoolNormalCommonExt` or `commTxPoolExceptional`); and `commTxAllowRelayCommon` is included in `SystemInformationBlockType18`;

   2. if the UE is in RRC_CONNECTED: configure lower layers to transmit the sidelink control information and the corresponding data using the resources, as specified previously in this section, only if the following condition is met:

   3. if the UE configured lower layers with resources provided by dedicated signalling (i.e. `commTxResources`); and the UE is configured with `commTxAllowRelayDedicated` set to `true`;

### 5.10.5 Sidelink discovery monitoring

A UE capable of non-PS related sidelink discovery that is configured by upper layers to monitor non-PS related sidelink discovery announcements shall:

1. for each frequency the UE is configured to monitor non-PS related sidelink discovery announcements on, prioritising the frequencies included in `discInterFreqList`, if included in `SystemInformationBlockType19`:

2. if the PCell or the cell the UE is camping on indicates the pool of resources to monitor sidelink discovery announcements on by `discRxResourcesInterFreq` in `discResourcesNonPS` within `discInterFreqList` in `SystemInformationBlockType19`:

   3. configure lower layers to monitor sidelink discovery announcements using the pool of resources indicated by `discRxResourcesInterFreq` in `discResourcesNonPS` within `SystemInformationBlockType19`;

2. else if the cell used for sidelink discovery monitoring broadcasts `SystemInformationBlockType19`:

   3. configure lower layers to monitor sidelink discovery announcements using the pool of resources indicated by `discRxPool` in `SystemInformationBlockType19`;
if the UE is configured with \textit{discRxGapConfig} and requires sidelink discovery gaps to monitor sidelink discovery announcements on the concerned frequency;

3> configure lower layers to monitor the concerned frequency using the sidelink discovery gaps indicated by \textit{discRxGapConfig};

2> else:

3> configure lower layers to monitor the concerned frequency without affecting normal operation;

A UE capable of PS related sidelink discovery that is configured by upper layers to monitor PS related sidelink discovery announcements shall:

1> if out of coverage on the frequency, as defined in TS 36.304 [4, 11.4];

2> configure lower layers to monitor sidelink discovery announcements using the pool of resources that were preconfigured (i.e. indicated by \textit{discRxPoolList} within \textit{preconfigDisc} in SL-Preconfiguration defined in 9.3);

1> else if configured by upper layers to monitor non-relay PS related discovery announcements; and if the PCell or the cell the UE is camping on indicates a pool of resources to monitor sidelink discovery announcements on by \textit{discRxResourcesInterFreq} in \textit{discResourcesPS} within \textit{discInterFreqList} in SystemInformationBlockType19:

2> configure lower layers to monitor sidelink discovery announcements using the pool of resources indicated by \textit{discRxResourcesInterFreq} in \textit{discResourcesPS} in SystemInformationBlockType19;

1> else if configured by upper layers to monitor PS related sidelink discovery announcements; and if the cell used for sidelink discovery monitoring broadcasts SystemInformationBlockType19:

2> configure lower layers to monitor sidelink discovery announcements using the pool of resources indicated by \textit{discRxPoolPS} in SystemInformationBlockType19;

1> if the UE is configured with \textit{discRxGapConfig} and requires sidelink discovery gaps to monitor sidelink discovery announcements on the concerned frequency;

2> configure lower layers to monitor the concerned frequency using the sidelink discovery gaps indicated by \textit{discRxGapConfig};

1> else:

2> configure lower layers to monitor the concerned frequency without affecting normal operation;

\textbf{NOTE 1:} The requirement not to affect normal UE operation also applies for the acquisition of sidelink discovery related system and synchronisation information from inter-frequency cells.

\textbf{NOTE 2:} The UE is not required to monitor all pools simultaneously.

\textbf{NOTE 3:} It is up to UE implementation to decide whether a cell is sufficiently good to be used to monitor sidelink discovery announcements.

\textbf{NOTE 4:} If \textit{discRxPool}, \textit{discRxPoolPS} or \textit{discRxResourcesInterFreq} includes one or more entries including \textit{rxParameters}, the UE may only monitor such entries if the associated SLSSIDs are detected. When monitoring such pool(s) the UE applies the timing of the corresponding SLSS.

### 5.10.6 Sidelink discovery announcement

A UE capable of non-PS related sidelink discovery that is configured by upper layers to transmit non-PS related sidelink discovery announcements shall, for each frequency the UE is configured to transmit such announcements on:

\textbf{NOTE:} In case the configured resources are insufficient it is up to UE implementation to decide which sidelink discovery announcements to transmit.

1> if the frequency used to transmit sidelink discovery announcements concerns the serving frequency (RRC\_IDLE) or primary frequency (RRC\_CONNECTED):

2> if the UE's serving cell (RRC\_IDLE) or PCell (RRC\_CONNECTED) is suitable as defined in TS 36.304 [4]:
3> if the UE is in RRC_CONNECTED (i.e. PCell is used for sidelink discovery announcement):

4> if the UE is configured with discTxResources set to scheduled:

5> configure lower layers to transmit the sidelink discovery announcement using the assigned resources indicated by scheduled in discTxResources;

4> else if the UE is configured with discTxPoolDedicated (i.e. discTxResources set to ue-Selected):

5> select an entry of the list of resource pool entries in discTxPoolDedicated and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

3> else if T300 is not running (i.e. UE in RRC_IDLE, announcing via serving cell):

4> if SystemInformationBlockType19 of the serving cell includes discTxPoolCommon:

5> select an entry of the list of resource pool entries in discTxPoolCommon and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

1> else if, for the frequency used to transmit sidelink discovery announcements on, the UE is configured with dedicated resources (i.e. with discTxResources-r12, if discTxCarrierFreq is included in discTxInterFreqInfo, or with discTxResources within discTxInfoInterFreqListAdd in discTxInterFreqInfo); and the conditions for non-PS related sidelink discovery operation as defined in 5.10.1c are met:

2> if the UE is configured with discTxResources set to scheduled:

3> configure lower layers to transmit the sidelink discovery announcement using the assigned resources indicated by scheduled in discTxResources;

2> else if the UE is configured with discTxResources set to ue-Selected:

3> select an entry of the list of resource pool entries in ue-Selected and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

1> else if the frequency used to transmit sidelink discovery announcements on is included in discInterFreqList within SystemInformationBlockType19 of the serving cell/ PCell, and discTxResourcesInterFreq within discResourcesNonPS in the corresponding entry of discInterFreqList is set to discTxPoolCommon (i.e. serving cell/ PCell broadcasts pool of resources) and the conditions for non-PS related sidelink discovery operation as defined in 5.10.1c are met; or

1> else if discTxPoolCommon is included in SystemInformationBlockType19 acquired from cell selected on the sidelink discovery announcement frequency; and the conditions for non-PS related sidelink discovery operation as defined in 5.10.1c are met:

2> select an entry of the list of resource pool entries in discTxPoolCommon and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

1> if the UE is configured with discTxGapConfig and requires sidelink discovery gaps to transmit sidelink discovery announcements on the concerned frequency:

2> configure lower layers to transmit on the concerned frequency using the sidelink discovery gaps indicated by discTxGapConfig,

1> else:

2> configure lower layers to transmit on the concerned frequency without affecting normal operation;

A UE capable of PS related sidelink discovery that is configured by upper layers to transmit PS related sidelink discovery announcements shall:

1> if out of coverage on the frequency used to transmit PS related sidelink discovery announcements as defined in TS 36.304 [4, 11.4] and the conditions for PS -related sidelink discovery operation as defined in 5.10.1b are met:

2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements; or

2> if the UE is selecting a sidelink relay UE/ has a selected sidelink relay UE:
3> configure lower layers to transmit sidelink discovery announcements using the pool of resources that were preconfigured and in accordance with the following:

4> randomly select, using a uniform distribution, an entry of preconfigDisc in SL-Preconfiguration defined in 9.3;

4> using the timing of the selected SyncRef UE, or if the UE does not have a selected SyncRef UE, based on the UEs own timing;

1> else if the frequency used to transmit sidelink discovery announcements concerns the serving frequency (RRC_IDLE) or primary frequency (RRC_CONNECTED) and the conditions for PS related sidelink discovery operation as defined in 5.10.1b are met:

2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements; or

2> if the UE is acting as sidelink relay UE; and if the UE is in RRC_IDLE; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met; or

2> if the UE is acting as sidelink relay UE; and if the UE is in RRC_CONNECTED; or

2> if the UE is selecting a sidelink relay UE / has a selected sidelink relay UE; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:

3> if the UE is configured with discTxPoolPS-Dedicated; or

3> if the UE is in RRC_IDLE; and if discTxPoolPS-Common is included in SystemInformationBlockType19:

4> select an entry of the list of resource pool entries and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

3> else if the UE is configured with discTxResourcesPS set to scheduled:

4> configure lower layers to transmit the sidelink discovery announcement using the assigned resources indicated by scheduled in discTxResourcesPS;

1> else if, for the frequency used to transmit sidelink discovery announcements on, the UE is configured with dedicated resources (i.e. with discTxResourcesPS in discTxInterFreqInfo within sl-DiscConfig); and the conditions for PS related sidelink discovery operation as defined in 5.10.1b are met:

2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements:

3> if the UE is configured with discTxResourcesPS set to scheduled:

4> configure lower layers to transmit the sidelink discovery announcement using the assigned resources indicated by scheduled in discTxResourcesPS;

3> else if the UE is configured with discTxResourcesPS set to ue-Selected:

4> select an entry of the list of resource pool entries in ue-Selected and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

1> else if the frequency used to transmit sidelink discovery announcements on is included in discInterFreqList within SystemInformationBlockType19 of the serving cell/ PCell, while discTxResourcesInterFreq within discResourcesPS in the corresponding entry of discInterFreqList is set to discTxPoolCommon (i.e. serving cell/ PCell broadcasts pool of resources) and the conditions for PS related sidelink discovery operation as defined in 5.10.1b are met:

2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements:

3> select an entry of the list of resource pool entries in discTxPoolCommon and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

1> else if discTxPoolPS-Common is included in SystemInformationBlockType19 acquired from cell selected on the sidelink discovery announcement frequency; and the conditions for PS related sidelink discovery operation as defined in 5.10.1b are met:

2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements:
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5.10.6a Sidelink discovery announcement pool selection

A UE that is configured with a list of resource pool entries for sidelink discovery announcement transmission (i.e. by SL-DiscTxPoolList) shall:

1> if poolSelection is set to rsrpBased:
   2> select a pool from the list of pools the UE is configured with for which the RSRP measurement of the reference cell selected as defined in 5.10.6b, after applying the layer 3 filter defined by quantityConfig as specified in 5.5.3.2, is in-between threshLow and threshHigh;

1> else:
   2> randomly select, using a uniform distribution, a pool from the list of pools the UE is configured with;

1> configure lower layers to transmit the sidelink discovery announcement using the selected pool of resources;

NOTE 1: When performing resource pool selection based on RSRP, the UE uses the latest results of the available measurements used for cell reselection evaluation in RRC_IDLE/ for measurement report triggering evaluation in RRC_CONNECTED, which are performed in accordance with the performance requirements specified in TS 36.133 [16].

5.10.6b Sidelink discovery announcement reference carrier selection

A UE capable of sidelink discovery that is configured by upper layers to transmit sidelink discovery announcements shall:

1> for each frequency the UE is transmitting sidelink discovery announcements on, select a cell to be used as reference for synchronisation and DL measurements in accordance with the following:

2> if the frequency concerns the primary frequency:
   3> use the PCell as reference;

2> else if the frequency concerns a secondary frequency:
   3> use the concerned SCell as reference;

2> else if the UE is configured with discTxRefCarrierDedicated for the frequency:
   3> use the cell indicated by this field as reference;

2> else if the UE is configured with refCarrierCommon for the frequency:
   3> use the serving cell (RRC_IDLE)/ PCell (RRC_CONNECTED) as reference;

2> else:
   3> use the DL frequency paired with the one used to transmit sidelink discovery announcements on as reference;
5.10.7  Sidelink synchronisation information transmission

5.10.7.1  General

The purpose of this procedure is to provide synchronisation information to a UE. For sidelink discovery, the synchronisation information concerns a Sidelink Synchronisation Signal (SLSS) and, in case of PS related discovery, also timing information and some additional configuration parameters (i.e. the MasterInformationBlock-SL message), while for sidelink communication it concerns an SLSS and the MasterInformationBlock-SL message. A UE transmits synchronisation information either when E-UTRAN configures it to do so by dedicated signalling (i.e. network based), or when not configured by dedicated signalling (i.e. UE based) and E-UTRAN broadcasts (in coverage) or pre-configures a threshold (out of coverage).

The synchronisation information transmitted by the UE may be derived from information/ signals received from E-UTRAN (in coverage) or received from a UE acting as synchronisation reference for the transmitting UE. In the remainder, the UE acting as synchronisation reference is referred to as SyncRef UE.

5.10.7.2  Initiation

A UE capable of SLSS transmission shall, when transmitting sidelink discovery announcements in accordance with 5.10.6 and when the following conditions are met:
A UE capable of sidelink communication that is configured by upper layers to transmit sidelink communication shall, irrespective of whether or not it has data to transmit:

1> if the conditions for sidelink communication operation as defined in 5.10.1a are met:

2> in RRC_CONNECTED; and if networkControlledSyncTx is configured and set to on:

3> transmit SLSS in accordance with 5.10.7.3 and TS 36.211 [21];

3> transmit the MasterInformationBlock-SL message, in the same subframe as SLSS, and in accordance with 5.10.7.4;

A UE shall, when transmitting sidelink communication in accordance with 5.10.4 and when the following conditions are met:

1> if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:

2> if networkControlledSyncTx is not configured; and syncTxThreshIC is included in SystemInformationBlockType18; and the RSRP measurement of the cell chosen for sidelink communication transmission is below the value of syncTxThreshIC:

3> transmit SLSS in accordance with 5.10.7.3 and TS 36.211 [21];

3> transmit the MasterInformationBlock-SL message, in the same subframe as SLSS, and in accordance with 5.10.7.4;

1> else (i.e. out of coverage):
if \( \text{syncTxThreshOoC} \) is included in the preconfigured sidelink parameters (i.e. SL-Preconfiguration defined in 9.3); and the UE has no selected SyncRef UE or the S-RSRP measurement result of the selected SyncRef UE is below the value of \( \text{syncTxThreshOoC} \):

3. transmit SLSS in accordance with 5.10.7.3 and TS 36.211 [21];

3. transmit the \( \text{MasterInformationBlock-SL} \) message, in the same subframe as SLSS, and in accordance with 5.10.7.4;

### 5.10.7.3 Transmission of SLSS

The UE shall select the SLSSID and the subframe in which to transmit SLSS as follows:

1. if triggered by sidelink discovery announcement and in coverage on the frequency used for sidelink discovery, as defined in TS 36.304 [4, 11.4]:

2. select the SLSSID included in the entry of \( \text{discSyncConfig} \) included in the received \( \text{SystemInformationBlockType19} \), that includes \( \text{txParameters} \);

2. use \( \text{syncOffsetIndicator} \) corresponding to the selected SLSSID;

2. for each pool used for the transmission of discovery announcements (each corresponding to the selected SLSSID):

3. if a subframe indicated by \( \text{syncOffsetIndicator} \) corresponds to the first subframe of the discovery transmission pool:

4. if \( \text{discTxGapConfig} \) is configured and includes the concerned subframe; or the subframe is not used for regular uplink transmission:

5. select the concerned subframe;

3. else

4. if \( \text{discTxGapConfig} \) is configured and includes the concerned subframe; or the subframe is not used for regular uplink transmission:

5. select the subframe indicated by \( \text{syncOffsetIndicator} \) that precedes and which, in time domain, is nearest to the first subframe of the discovery transmission pool;

3. if the sidelink discovery announcements concern PS; and if \( \text{syncTxPeriodic} \) is included:

4. additionally select each subframe that periodically occurs 40 subframes after the selected subframe;

1. if triggered by sidelink communication and in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:

2. select the SLSSID included in the entry of \( \text{commSyncConfig} \) that is included in the received \( \text{SystemInformationBlockType18} \) and includes \( \text{txParameters} \);

2. use \( \text{syncOffsetIndicator} \) corresponding to the selected SLSSID;

2. if in RRC_CONNECTED; and if \( \text{networkControlledSyncTx} \) is configured and set to \textit{on}:

3. select the subframe(s) indicated by \( \text{syncOffsetIndicator} \);

2. else (when transmitting communication):

3. select the subframe(s) indicated by \( \text{syncOffsetIndicator} \) within the SC period in which the UE intends to transmit sidelink control information or data;

1. else (i.e. out of coverage on sidelink carrier):

2. select the synchronisation reference UE (i.e. SyncRef UE) as defined in 5.10.8;

2. if the UE has a selected SyncRef UE and \( \text{inCoverage} \) in the \( \text{MasterInformationBlock-SL} \) message received from this UE is set to \textit{TRUE}; or
2> if the UE has a selected SyncRef UE and inCoverage in the MasterInformationBlock-SL 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 36.211 [21]:

3> select the same SLSSID as the SLSSID of the selected SyncRef UE;

3> select the subframe in which to transmit the SLSS according to the syncOffsetIndicator1 or syncOffsetIndicator2 included in the preconfigured sidelink parameters (i.e. preconfigSync in SL-Preconfiguration defined in 9.3), such that the subframe timing is different from the SLSS of the selected SyncRef UE;

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 168 more than the index of the SLSSID of the selected SyncRef UE, see TS 36.211 [21];

3> select the subframe in which to transmit the SLSS according to syncOffsetIndicator1 or syncOffsetIndicator2 included in the preconfigured sidelink parameters (i.e. preconfigSync in SL-Preconfiguration defined in 9.3), such that the subframe timing is different from the SLSS of the selected SyncRef UE;

2> else (i.e. no SyncRef UE selected):

3> randomly select, using a uniform distribution, an SLSSID from the set of sequences defined for out of coverage, see TS 36.211 [21];

3> select the subframe in which to transmit the SLSS according to the syncOffsetIndicator1 or syncOffsetIndicator2 (arbitrary selection between these) included in the preconfigured sidelink parameters (i.e. preconfigSync in SL-Preconfiguration defined in 9.3);

5.10.7.4 Transmission of MasterInformationBlock-SL message

The UE shall set the contents of the MasterInformationBlock-SL message as follows:

1> if in coverage on the frequency used for the sidelink operation (communication or discovery) that triggered this procedure as defined in TS 36.304 [4, 11.4]:

2> set inCoverage to TRUE;

2> set sl-Bandwidth to the value of ul-Bandwidth as included in the received SystemInformationBlockType2 of the cell chosen for the concerned sidelink operation;

2> if tdd-Config is included in the received SystemInformationBlockType1:

3> set subframeAssignmentSL to the value representing the same meaning as of subframeAssignment that is included in tdd-Config in the received SystemInformationBlockType1;

2> else:

3> set subframeAssignmentSL to none;

2> if triggered by sidelink communication; and if syncInfoReserved is included in an entry of commSyncConfig from the received SystemInformationBlockType18:

3> set reserved to the value of syncInfoReserved in the received SystemInformationBlockType18;

2> if triggered by sidelink discovery; and if syncInfoReserved is included in an entry of discSyncConfig from the received SystemInformationBlockType19:

3> set reserved to the value of syncInfoReserved in the received SystemInformationBlockType19;

2> else:

3> set all bits in reserved to 0;

1> else if the UE has a selected SyncRef UE (as defined in 5.10.8):
2> set $\text{inCoverage}$ to $\text{FALSE}$;

2> set $sl$-$\text{Bandwidth}$, $\text{subframeAssignmentSL}$ and $\text{reserved}$ to the value of the corresponding field included in the received $\text{MasterInformationBlock-SL}$;

1> else (i.e. no SyncRef UE selected):

2> set $\text{inCoverage}$ to $\text{FALSE}$;

2> set $sl$-$\text{Bandwidth}$, $\text{subframeAssignmentSL}$ and $\text{reserved}$ to the value of the corresponding field included in the preconfigured sidelink parameters (i.e. $\text{preconfigGeneral}$ in $\text{SL-Preconfiguration}$ defined in 9.3);

1> set $\text{directFrameNumber}$ and $\text{directSubframeNumber}$ according to the subframe used to transmit the SLSS, as specified in 5.10.7.3;

1> submit the $\text{MasterInformationBlock-SL}$ message to lower layers for transmission upon which the procedure ends;

5.10.7.5 Void

5.10.8 Sidelink synchronisation reference

5.10.8.1 General

The purpose of this procedure is to select a synchronisation reference and used a.o. when transmitting sidelink communication, sidelink discovery or synchronisation information.

5.10.8.2 Selection and reselection of synchronisation reference UE (SyncRef UE)

The UE shall:

1> for the frequency used for sidelink communication or discovery, if out of coverage on that frequency as defined in TS 36.304 [4, 11.4]:

2> perform a full search (i.e. covering all subframes and all possible SLSSID) to detect candidate SLSS, in accordance with TS 36.133 [16]

2> when evaluating the one or more detected SLSSID, apply layer 3 filtering as specified in 5.5.3.2 using the preconfigured $\text{filterCoefficient}$ as defined in 9.3, before using the S-RSRP measurement results;

2> if the UE has selected a SyncRef UE:

3> if the S-RSRP of the strongest candidate SyncRef UE exceeds the minimum requirement TS 36.133 [16] by $\text{syncRefMinHyst}$ and the strongest candidate SyncRef UE belongs to the same priority group as the current SyncRef UE and the S-RSRP of the strongest candidate SyncRef UE exceeds the S-RSRP of the current SyncRef UE by $\text{syncRefDiffHyst}$; or

3> if the S-RSRP of the candidate SyncRef UE exceeds the minimum requirement TS 36.133 [16] by $\text{syncRefMinHyst}$ and the candidate SyncRef UE belongs to a higher priority group than the current SyncRef UE; or

3> if the S-RSRP of the current SyncRef UE is less than the minimum requirement TS 36.133 [16]:

4> consider no SyncRef UE to be selected;

2> if the UE has not selected a SyncRef UE,

3> if the UE detects one or more SLSSID for which the S-RSRP exceeds the minimum requirement defined in TS 36.133 [16] by $\text{syncRefMinHyst}$ and for which the UE received the corresponding $\text{MasterInformationBlock-SL}$ message (candidate SyncRef UEs), select a SyncRef UE according to the following priority order:

4> UEs of which $\text{inCoverage}$, included in the $\text{MasterInformationBlock-SL}$ message received from this UE, is set to $\text{TRUE}$, starting with the UE with the highest S-RSRP result (priority group 1);

4> UE which SLSSID is part of the set defined for in coverage, starting with the UE with the highest S-RSRP result (priority group 2);
4> Other UEs, starting with the UE with the highest S-RSRP result (priority group 3);

5.10.9 Sidelink common control information

5.10.9.1 General

The sidelink common control information is carried by a single message, the MasterInformationBlock-SL (MIB-SL) message. The MIB-SL includes timing information as well as some configuration parameters and is transmitted via SL-BCH.

The MIB-SL uses a fixed schedule with a periodicity of 40 ms without repetitions. In particular, the MIB-SL is scheduled in subframes indicated by syncOffsetIndicator i.e. for which (10*DFN + subframe number) mod 40 = syncOffsetIndicator.

The sidelink common control information may change at any transmission i.e. neither a modification period nor a change notification mechanism is used.

A UE configured to receive or transmit sidelink communication or PS related sidelink discovery shall:

1> if the UE has a selected SyncRef UE, as specified in 5.10.8.2:

2> ensure having a valid version of the MasterInformationBlock-SL message of that SyncRefUE:

5.10.9.2 Actions related to reception of MasterInformationBlock-SL message

Upon receiving MasterInformationBlock-SL, the UE shall:

1> apply the values of sl-Bandwidth, subframeAssignmentSL, directFrameNumber and directSubframeNumber included in the received MasterInformationBlock-SL message;

5.10.10 Sidelink relay UE operation

5.10.10.1 General

This procedure is used by a UE supporting sidelink relay UE operation and involves evaluation of the AS-layer conditions that need to be met in order for upper layers to configure a sidelink relay UE to receive/ transmit relay related PS sidelink discovery/ relay related sidelink communication. The AS-layer conditions merely comprise of being configured with radio resources that can be used for transmission.

A UE that fulfils the criteria specified in 5.10.10.2 and 5.10.10.3 and that is configured by higher layers accordingly is acting as a sidelink relay UE.

5.10.10.2 AS-conditions for relay related sidelink communication transmission by sidelink relay UE

A UE capable of sidelink relay UE operation shall inform upper layers that it is configured with radio resources that can be used for relay related sidelink communication transmission if the following conditions are met:

1> if in RRC_CONNECTED; and if the UE is configured with commTxResources; and the UE is configured with commTxAllowRelayDedicated set to true;

5.10.10.3 AS-conditions for relay PS related sidelink discovery transmission by sidelink relay UE

A UE capable of sidelink relay UE operation shall inform upper layers that it is configured with radio resources that can be used for relay PS related sidelink discovery transmission if the following conditions are met:

1> if in RRC_IDLE; and if the UE's serving cell is suitable as defined in TS 36.304 [4]; and if SystemInformationBlockType19 includes discConfigPS including discTxPoolPS-Common and discConfigRelay; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met;

1> else if in RRC_CONNECTED; and if discTxResourcesPS is configured;
5.10.10.4 Sidelink relay UE threshold conditions

A UE capable of sidelink relay UE operation shall:

1> if the threshold conditions specified in this section were not met:
   2> if neither \texttt{threshHigh} nor \texttt{threshLow} is included in \texttt{relayUE-Config} within \texttt{SystemInformationBlockType19}:
      3> consider the threshold conditions to be met (entry);
   2> else if \texttt{threshHigh} is not included in \texttt{relayUE-Config} within \texttt{SystemInformationBlockType19}; or the RSRP measurement of the PCell, or the cell on which the UE camps, is below \texttt{threshHigh} by \texttt{hystMax} (also included within \texttt{relayUE-Config}); and
   2> if \texttt{threshLow} is not included in \texttt{relayUE-Config} within \texttt{SystemInformationBlockType19}; or the RSRP measurement of the PCell, or the cell on which the UE camps, is above \texttt{threshLow} by \texttt{hystMin} (also included within \texttt{relayUE-Config}):
      3> consider the threshold conditions to be met (entry);
   1> else:
      2> if \texttt{threshHigh} is included in \texttt{relayUE-Config} within \texttt{SystemInformationBlockType19}; and the RSRP measurement of the PCell, or the cell on which the UE camps, is above \texttt{threshHigh} (also included within \texttt{relayUE-Config}); or
      2> if \texttt{threshLow} is included in \texttt{relayUE-Config} within \texttt{SystemInformationBlockType19}; and the RSRP measurement of the PCell, or the cell on which the UE camps, is below \texttt{threshLow} (also included within \texttt{relayUE-Config});
      3> consider the threshold conditions not to be met (leave);

5.10.11 Sidelink remote UE operation

5.10.11.1 General

This procedure is used by a UE supporting sidelink remote UE operation and involves evaluation of the AS-layer conditions that need to be met in order for upper layers to configure a sidelink remote UE to receive/ transmit relay related sidelink PS discovery/ relay related sidelink communication. The AS-layer conditions merely comprise of being configured with radio resources that can be used for transmission, as well as whether or not having a selected sidelink relay UE.

5.10.11.2 AS-conditions for relay related sidelink communication transmission by sidelink remote UE

A UE capable of sidelink remote UE operation shall inform upper layers whether it is configured with radio resources that can be used for relay related sidelink communication transmission if the following conditions are met:

1> if the UE is out of coverage; and is preconfigured with \texttt{SL-Preconfiguration} including \texttt{discTxPoolList} and \texttt{preconfigRelay};

1> else if in RRC\_IDLE; and if the UE’s serving cell is suitable as defined in TS 36.304 [4]; and if \texttt{SystemInformationBlockType18} includes \texttt{commTxPoolNormalCommon} and \texttt{commTxAllowRelayCommon}; and if \texttt{SystemInformationBlockType19} includes \texttt{discConfigRelay}; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met;

1> else if in RRC\_CONNECTED; and if the UE is configured with \texttt{commTxResources}; and the UE is configured with \texttt{commTxAllowRelayDedicated} set to \texttt{true};

5.10.11.3 AS-conditions for relay PS related sidelink discovery transmission by sidelink remote UE

A UE capable of sidelink remote UE operation shall inform upper layers whether it is configured with radio resources that can be used for relay PS related sidelink discovery transmission if the following conditions are met:
5.10.11.4 Selection and reselection of sidelink relay UE

A UE capable of sidelink remote UE operation that is configured by upper layers to search for a sidelink relay UE shall:

1> if out of coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]; or

1> if the serving frequency is used for sidelink communication and the RSRP measurement of the cell on which the UE camps (RRC_IDLE)/ the PCell (RRC_CONNECTED) is below $\text{threshHigh}$ within $\text{remoteUE-Config}$:

2> search for candidate sidelink relay UEs, in accordance with TS 36.133 [16]

2> when evaluating the one or more detected sidelink relay UEs, apply layer 3 filtering as specified in 5.5.3.2 across measurements that concern the same ProSe Relay UE ID and using the $\text{filterCoefficient}$ in $\text{SystemInformationBlockType19}$ (in coverage) or the preconfigured $\text{filterCoefficient}$ as defined in 9.3(out of coverage), before using the SD-RSRP measurement results;

NOTE 1: The details of the interaction with upper layers are up to UE implementation.

2> if the UE does not have a selected sidelink relay UE:

3> select a candidate sidelink relay UE which SD-RSRP exceeds $q-\text{RxLevMin}$ included in either $\text{reselectionInfoIC}$ (in coverage) or $\text{reselectionInfoOoC}$ (out of coverage) by $\text{minHyst}$;

2> else if SD-RSRP of the currently selected sidelink relay UE is below $q-\text{RxLevMin}$ included in either $\text{reselectionInfoIC}$ (in coverage) or $\text{reselectionInfoOoC}$ (out of coverage); or if upper layers indicate not to use the currently selected sidelink relay: (i.e. sidelink relay UE reselection):

3> select a candidate sidelink relay UE which SD-RSRP exceeds $q-\text{RxLevMin}$ included in either $\text{reselectionInfoIC}$ (in coverage) or $\text{reselectionInfoOoC}$ (out of coverage) by $\text{minHyst}$;

2> else if the UE did not detect any candidate sidelink relay UE which SD-RSRP exceeds $q-\text{RxLevMin}$ included in either $\text{reselectionInfoIC}$ (in coverage) or $\text{reselectionInfoOoC}$ (out of coverage) by $\text{minHyst}$:

3> consider no sidelink relay UE to be selected;

NOTE 2: The UE may perform sidelink relay UE reselection in a manner resulting in selection of the sidelink relay UE, amongst all candidate sidelink relay UEs meeting higher layer criteria, that has the best radio link quality. Further details, including interaction with upper layers, are up to UE implementation.

5.10.11.5 Sidelink remote UE threshold conditions

A UE capable of sidelink remote UE operation shall:

1> if the threshold conditions specified in this section were not met:

2> if $\text{threshHigh}$ is not included in $\text{remoteUE-Config}$ within $\text{SystemInformationBlockType19}$; or

2> if $\text{threshHigh}$ is included in $\text{remoteUE-Config}$ within $\text{SystemInformationBlockType19}$, and the RSRP measurement of the PCell, or the cell on which the UE camps, is below $\text{threshHigh}$ by $\text{hystMax}$ (also included within $\text{remoteUE-Config}$):

3> consider the threshold conditions to be met (entry);

1> else:
if \textit{threshHigh} is included in \textit{remoteUE-Config} within \textit{SystemInformationBlockType19}; and the RSRP measurement of the PCell, or the cell on which the UE camps, is above \textit{threshHigh} (also included within \textit{remoteUE-Config});

consider the threshold conditions not to be met (leave);

\section{Protocol data units, formats and parameters (tabular \& ASN.1)}

\subsection{General}

The contents of each RRC message is specified in sub-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 sub-clause 6.3.

The need for fields to be present in a message or an abstract type, i.e., the ASN.1 fields that are specified as \texttt{OPTIONAL} in the abstract notation (ASN.1), is specified by means of comment text tags attached to the \texttt{OPTIONAL} statement in the abstract syntax. All comment text tags are available for use in the downlink direction only. The meaning of each tag is specified in table 6.1-1.

\begin{table}[ht]
\begin{tabular}{|c|l|}
\hline
\textbf{Abbreviation} & \textbf{Meaning} \\
\hline
\textit{Cond} conditionTag & \textit{Conditionally present} \\
(Used in downlink only) & A field for which the need is specified by means of conditions. For each \textit{conditionTag}, the need is specified in a tabular form following the ASN.1 segment. In case, according to the conditions, a field is not present, the UE takes no action and where applicable shall continue to use the existing value (and/or the associated functionality) unless explicitly stated otherwise (e.g. in the conditional presence table or in the description of the field itself). \\
\hline
Need OP & \textit{Optionally present} \\
(Used in downlink only) & A field that is optional to signal. For downlink messages, the UE is not required to take any special action on absence of the field beyond what is specified in the procedural text or the field description table following the ASN.1 segment. The UE behaviour on absence should be captured either in the procedural text or in the field description. \\
\hline
Need ON & \textit{Optionally present, No action} \\
(Used in downlink only) & A field that is optional to signal. If the message is received by the UE, and in case the field is absent, the UE takes no action and where applicable shall continue to use the existing value (and/or the associated functionality). \\
\hline
Need OR & \textit{Optionally present, Release} \\
(Used in downlink only) & A field that is optional to signal. If the message is received by the UE, and in case the field is absent, the UE shall discontinue/ stop using/ delete any existing value (and/or the associated functionality). \\
\hline
\end{tabular}
\caption{Meaning of abbreviations used to specify the need for fields to be present}
\end{table}

Any field with Need ON in system information shall be interpreted as Need OR.

Need codes may not be specified for a parent extension field/ extension group, used in downlink, which includes one or more child extension fields. Upon absence of such a parent extension field/ extension group, the UE shall:

- For each individual child extension field, including extensions that are mandatory to include in the optional group, act in accordance with the need code that is defined for the extension;

- Apply this behaviour not only for child extension fields included directly within the optional parent extension field/ extension group, but also for extension fields defined at further nesting levels as long as for none of the fields in-between the concerned extension field and the parent extension field a need code is specified;

ETSİ
NOTE 1: The above applies for groups of non critical extensions using double brackets (referred to as extension groups), as well as 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).

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. This rule does not apply for optional parent extension fields/ extension groups without need codes.

NOTE 2: The previous rule implies that E-UTRAN has to include such a parent extension field to release a child field that is either:
- Optional with need OR, or
- Conditional while the UE releases the child field when absent.

The handling of need codes as specified in the previous is illustrated by means of an example, as shown in the following ASN.1.

```asn1
-- /example/ ASN1START
RRCMessage-r8-IEs ::= SEQUENCE {
  field1         InformationElement1, OPTIONAL, -- Need ON
  field2         InformationElement2 OPTIONAL, -- Need ON
  nonCriticalExtension     RRCMessage-v8a0-IEs OPTIONAL
}
RRCMessage-v8a0-IEs ::= SEQUENCE {
  field3         InformationElement3 OPTIONAL, -- Need ON
  nonCriticalExtension     RRCMessage-v940-IEs OPTIONAL
}
RRCMessage-v940-IEs ::= SEQUENCE {
  field4         InformationElement4 OPTIONAL, -- Need OR
  nonCriticalExtension     SEQUENCE {} OPTIONAL
}
InformationElement1 ::= SEQUENCE {
  field11        InformationElement11 OPTIONAL, -- Need ON
  field12        InformationElement12 OPTIONAL, -- Need OR
  ...,
  [[ field13        InformationElement13 OPTIONAL, -- Need OR
    field14        InformationElement14 OPTIONAL -- Need ON
  ]]
}
InformationElement2 ::= SEQUENCE {
  field21        InformationElement11 OPTIONAL, -- Need ON
  ...
}
-- ASN1STOP
```

The handling of need codes as specified in the previous implies that:
- if `field2` in `RRCMessage-r8-IEs` is absent, the UE does not modify `field21`;
- if `field2` in `RRCMessage-r8-IEs` is present but does not include `field21`, the UE releases `field21`;
- if the extension group containing `field13` is absent, the UE releases `field13` and does not modify `field14`;
- if `nonCriticalExtension` defined by IE `RRCMessage-v8a0-IEs` is absent, the UE does not modify `field3` and releases `field4`.

In the ASN.1 of this specification, the first bit of a bit string refers to the leftmost bit, unless stated otherwise.

### 6.2 RRC messages

NOTE: The messages included in this section reflect the current status of the discussions. Additional messages may be included at a later stage.
6.2.1 General message structure

---

**EUTRA-RRC-Definitions**

This ASN.1 segment is the start of the E-UTRA RRC PDU definitions.

```
-- ASN1START
EUTRA-RRC-Definitions DEFINITIONS AUTOMATIC TAGS ::= BEGIN
-- ASN1STOP
```

---

**BCCH-BCH-Message**

The **BCCH-BCH-Message** class is the set of RRC messages that may be sent from the E-UTRAN to the UE via BCH on the BCCH logical channel.

```
-- ASN1START
BCCH-BCH-Message ::= SEQUENCE {
  message     BCCH-BCH-MessageType
}
BCCH-BCH-MessageType ::= MasterInformationBlock
-- ASN1STOP
```

---

**BCCH-DL-SCH-Message**

The **BCCH-DL-SCH-Message** class is the set of RRC messages that may be sent from the E-UTRAN to the UE via DL-SCH on the BCCH logical channel.

```
-- ASN1START
BCCH-DL-SCH-Message ::= SEQUENCE {
  message     BCCH-DL-SCH-MessageType
}
BCCH-DL-SCH-MessageType ::= CHOICE {
  c1      CHOICE {
    systemInformation      SystemInformation,
    systemInformationBlockType1    SystemInformationBlockType1
  },
  messageClassExtension SEQUENCE {}
}
-- ASN1STOP
```

---

**BCCH-DL-SCH-Message-BR**

The **BCCH-DL-SCH-Message-BR** class is the set of RRC messages that may be sent from the E-UTRAN to the UE via DL-SCH on the BR-BCCH logical channel.

```
-- ASN1START
BCCH-DL-SCH-Message-BR ::= SEQUENCE {
  message     BCCH-DL-SCH-MessageType-BR-r13
}
BCCH-DL-SCH-MessageType-BR-r13 ::= CHOICE {
  c1      CHOICE {
    systemInformation-BR-r13    SystemInformation-BR-r13,
    systemInformationBlockType1-BR-r13  SystemInformationBlockType1-BR-r13
  },
  messageClassExtension SEQUENCE {}
}
-- ASN1STOP
```
-- **MCCH-Message**

The **MCCH-Message** class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the MCCH logical channel.

```asn1
MCCH-Message ::= SEQUENCE {
  message     MCCH-MessageType
}
MCCH-MessageType ::= CHOICE {
  c1       CHOICE {
    mbsfnAreaConfiguration-r9  MBSFNAreaConfiguration-r9,
  },
  later      CHOICE {
    c2        CHOICE{
      mbmsCountingRequest-r10   MBMSCountingRequest-r10,
    },
    messageClassExtension SEQUENCE {}
  }
}
```

-- **PCCH-Message**

The **PCCH-Message** class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the PCCH logical channel.

```asn1
PCCH-Message ::= SEQUENCE {
  message     PCCH-MessageType
}
PCCH-MessageType ::= CHOICE {
  c1      CHOICE {
    paging         Paging,
  },
  messageClassExtension SEQUENCE {}
}
```

-- **DL-CCCH-Message**

The **DL-CCCH-Message** class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the downlink CCCH logical channel.

```asn1
DL-CCCH-Message ::= SEQUENCE {
  message     DL-CCCH-MessageType
}
DL-CCCH-MessageType ::= CHOICE {
  c1      CHOICE {
    rrcConnectionReestablishment   RRCConnectionReestablishment,
    rrcConnectionReestablishmentReject  RRCConnectionReestablishmentReject,
    rrcConnectionReject      RRCConnectionReject,
    rrcConnectionSetup      RRCConnectionSetup,
  },
  messageClassExtension SEQUENCE {}
}
```
---

**DL-DCCH-Message**

The *DL-DCCH-Message* class is the set of RRC messages that may be sent from the E-UTRAN to the UE or from the E-UTRAN to the RN on the downlink DCCH logical channel.

```asn1
DL-DCCH-Message ::= SEQUENCE {
    message     DL-DCCH-MessageType
}

DL-DCCH-MessageType ::= CHOICE {
    c1 CHOICE {
        csfbParametersResponseCDMA2000 CSFBParametersResponseCDMA2000,
        dlInformationTransfer DLInformationTransfer,
        handoverFromEUTRAPreparationRequest HandoverFromEUTRAPreparationRequest,
        mobilityFromEUTRACommand MobilityFromEUTRACommand,
        rrcConnectionReconfiguration RRCConnectionReconfiguration,
        rrcConnectionRelease RRCConnectionRelease,
        securityModeCommand SecurityModeCommand,
        ueCapabilityEnquiry UECapabilityEnquiry,
        counterCheck CounterCheck,
        ueInformationRequest-r9 UEInformationRequest-r9,
        loggedMeasurementConfiguration-r10 LoggedMeasurementConfiguration-r10,
        rnReconfiguration-r10 RNReconfiguration-r10,
        rrcConnectionResume-r13 RRCConnectionResume-r13,
        spare3 NULL, spare2 NULL, spare1 NULL
    },
    messageClassExtension SEQUENCE {} }
```

---

**UL-CCCH-Message**

The *UL-CCCH-Message* class is the set of RRC messages that may be sent from the UE to the E-UTRAN on the uplink CCCH logical channel.

```asn1
UL-CCCH-Message ::= SEQUENCE {
    message     UL-CCCH-MessageType
}

UL-CCCH-MessageType ::= CHOICE {
    c1 CHOICE {
        rrcConnectionReestablishmentRequest RRCConnectionReestablishmentRequest,
        rrcConnectionRequest RRCConnectionRequest
    },
    messageClassExtension CHOICE {
        c2 CHOICE {
            rrcConnectionResumeRequest-r13 RRCConnectionResumeRequest-r13
        },
        messageClassExtensionFuture-r13 SEQUENCE {}
    }
}
```

---

**UL-DCCH-Message**

The *UL-DCCH-Message* class is the set of RRC messages that may be sent from the UE to the E-UTRAN or from the RN to the E-UTRAN on the uplink DCCH logical channel.

```asn1
UL-DCCH-Message ::= SEQUENCE {
    message     UL-DCCH-MessageType
}

UL-DCCH-MessageType ::= CHOICE {
    c1 CHOICE {
        csfbParametersRequestCDMA2000 CSFBParametersRequestCDMA2000,
    }
}
```
The **SC-MCCH-Message** class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the SC-MCCH logical channel.

```asn1
-- ASN1START
SC-MCCH-Message-r13 ::= SEQUENCE {
  message SC-MCCH-MessageType-r13
}

SC-MCCH-MessageType-r13 ::= CHOICE {
  c1 CHOICE {
    scptmConfiguration-r13 SCPTMConfiguration-r13
  },
  messageClassExtensionFuture-r11 SEQUENCE {}  
}
-- ASN1STOP
```
6.2.2 Message definitions

-- CounterCheck

The CounterCheck message is used by the E-UTRAN 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 E-UTRAN.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: E-UTRAN to UE

CounterCheck

\[\text{CounterCheck} ::= \text{SEQUENCE} \{\]
  \[\quad \text{rrc-TransactionIdentifier} \quad \text{RRC-TransactionIdentifier,}\]
  \[\quad \text{criticalExtensions} \quad \text{CHOICE} \{\]
  \[\quad \text{c1} \quad \text{CHOICE} \{\]
    \[\quad \text{counterCheck-r8} \quad \text{CounterCheck-r8-IEs,}\]
    \[\quad \text{spare3 NULL, spare2 NULL, spare1 NULL}\]
  \[\}
  \[\quad \text{criticalExtensionsFuture} \quad \text{SEQUENCE} ()\]
\[\}\]

CounterCheck-r8-IEs ::= SEQUENCE {
  drb-CountMSB-InfoList DRB-CountMSB-InfoList,
  nonCriticalExtension CounterCheck-v8a0-IEs OPTIONAL
}

CounterCheck-v8a0-IEs ::= SEQUENCE {
  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)
}

-- ASN1STOP

CounterCheck field descriptions

\text{count-MSB-Downlink} Indicates the value of 25 MSBs from downlink COUNT associated to this DRB.

\text{count-MSB-Uplink} Indicates the value of 25 MSBs from uplink COUNT associated to this DRB.

\text{drb-CountMSB-InfoList} Indicates the MSBs of the COUNT values of the DRBs.
---

**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 E-UTRAN

`CounterCheckResponse` message

---

**CSFBParametersRequestCDMA2000**

The *CSFBParametersRequestCDMA2000* message is used by the UE to obtain the CDMA2000 1xRTT Parameters from the network. The UE needs these parameters to generate the CDMA2000 1xRTT Registration message used to register with the CDMA2000 1xRTT Network which is required to support CSFB to CDMA2000 1xRTT.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

---
CSFBParametersRequestCDMA2000 ::= SEQUENCE {
criticalExtensions     CHOICE {
csfbParametersRequestCDMA2000-r8     CSFBParametersRequestCDMA2000-r8-IEs,
criticalExtensionsFuture   SEQUENCE {}
}
}

CSFBParametersRequestCDMA2000-r8-IEs ::= SEQUENCE {
nonCriticalExtension    CSFBParametersRequestCDMA2000-v8a0-IEs OPTIONAL
}

CSFBParametersRequestCDMA2000-v8a0-IEs ::= SEQUENCE {
lateNonCriticalExtension   OCTET STRING OPTIONAL,
nonCriticalExtension    SEQUENCE {} OPTIONAL
}

-- ASN1STOP

CSFBParametersResponseCDMA2000

The CSFBParametersResponseCDMA2000 message is used to provide the CDMA2000 1xRTT Parameters to the UE so the UE can register with the CDMA2000 1xRTT Network to support CSFB to CDMA2000 1xRTT.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

CSFBParametersResponseCDMA2000 ::= SEQUENCE {
rrc-TransactionIdentifier   RRC-TransactionIdentifier,
criticalExtensions      CHOICE {
csfbParametersResponseCDMA2000-r8  CSFBParametersResponseCDMA2000-r8-IEs,
criticalExtensionsFuture    SEQUENCE {}
}
}

CSFBParametersResponseCDMA2000-r8-IEs ::= SEQUENCE {
rand        RAND-CDMA2000,
mobilityParameters     MobilityParametersCDMA2000,
nonCriticalExtension    CSFBParametersResponseCDMA2000-v8a0-IEs OPTIONAL
}

CSFBParametersResponseCDMA2000-v8a0-IEs ::= SEQUENCE {
lateNonCriticalExtension   OCTET STRING OPTIONAL,
nonCriticalExtension    SEQUENCE {} OPTIONAL
}

-- ASN1STOP

DLInformationTransfer

The DLInformationTransfer message is used for the downlink transfer of NAS or non-3GPP dedicated information.

Signalling radio bearer: SRB2 or SRB1 (only if SRB2 not established yet. If SRB2 is suspended, E-UTRAN does not send this message until SRB2 is resumed.)

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

DLInformationTransfer message

-- ASN1START
The HandoverFromEUTRAPreparationRequest message is used to trigger the handover preparation procedure with a CDMA2000 RAT. This message is also used to trigger a tunneled preparation procedure with a CDMA2000 1xRTT RAT to obtain traffic channel resources for the enhanced CS fallback to CDMA2000 1xRTT, which may also involve a concurrent preparation for handover to CDMA2000 HRPD. Also, this message is used to trigger the dual Rx/Tx redirection procedure with a CDMA2000 1xRTT RAT.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

HandoverFromEUTRAPreparationRequest message
**HandoverFromEUTRAPreparationRequest field descriptions**

**concurrPrepCDMA2000-HRPD**
Value TRUE indicates that upper layers should initiate concurrent preparation for handover to CDMA2000 HRPD in addition to preparation for enhanced CS fallback to CDMA2000 1xRTT.

**dualRxTxRedirectIndicator**
Value TRUE indicates that the second radio of the dual Rx/Tx UE is being redirected to CDMA2000 1xRTT [51].

**redirectCarrierCDMA2000-1XRTT**
Used to indicate the CDMA2000 1xRTT carrier frequency where the UE is being redirected to.

---

### Conditional presence | Explanation
--- | ---
**cdma2000-1XRTT** | The field is optionally present, need ON, if the cdma2000-Type = type1XRTT; otherwise it is not present.
**cdma2000-Type** | The field is mandatory present if the cdma2000-Type = type1XRTT; otherwise it is not present.
**dualRxTxRedirect** | The field is optionally present, need ON, if dualRxTxRedirectIndicator is present; otherwise it is not present.

---

**InDeviceCoexIndication**

The *InDeviceCoexIndication* message is used to inform E-UTRAN about IDC problems which cannot be solved by the UE itself, as well as to provide information that may assist E-UTRAN when resolving these problems.

**Signalling radio bearer:** SRB1

**RLC-SAP:** AM

**Logical channel:** DCCH

**Direction:** UE to E-UTRAN

---

### InDeviceCoexIndication message

---

**ASN1START**

\[
\text{InDeviceCoexIndication-r11 ::= SEQUENCE }
\begin{cases}
\text{criticalExtensions cl1 CHOICE (}
\begin{cases}
\text{InDeviceCoexIndication-r11-IEs, spare3 NULL, spare2 NULL, spare1 NULL}
\end{cases}
\text{), criticalExtensionsFuture SEQUENCE ()}
\end{cases}
\]

\[
\text{InDeviceCoexIndication-r11-IEs ::= SEQUENCE }
\begin{cases}
\text{AffectedCarrierFreqList-r11 AffectedCarrierFreqList-r11-IEs, TDM-AssistanceInfo-r11 TDM-AssistanceInfo-r11-IEs, OCTET STRING lateNonCriticalExtension, InDeviceCoexIndication-v1ld0-IEs }
\end{cases}
\]

\[
\text{InDeviceCoexIndication-v1ld0-IEs ::= SEQUENCE }
\begin{cases}
\text{AffectedCarrierFreqCombList-r11 AffectedCarrierFreqCombList-r11-IEs, VictimSystemType-r11 VictimSystemType-r11-IEs, InDeviceCoexIndication-v13l0-IEs }
\end{cases}
\]

---

**ASN1STOP**
InDeviceCoexIndication-v1310-IEs ::= SEQUENCE {
  affectedCarrierFreqList-v1310 AffectedCarrierFreqList-v1310   OPTIONAL,
  affectedCarrierFreqCombList-r13 AffectedCarrierFreqCombList-r13  OPTIONAL,
  nonCriticalExtension InDeviceCoexIndication-v1360-IEs
                OPTIONAL
}

InDeviceCoexIndication-v1360-IEs ::= SEQUENCE {
  hardwareSharingProblem-r13 ENUMERATED {true}    OPTIONAL,
  nonCriticalExtension    SEQUENCE {}      OPTIONAL
}

AffectedCarrierFreqList-r11 ::= SEQUENCE (SIZE (1..maxFreqIDC-r11)) OF AffectedCarrierFreq-r11

AffectedCarrierFreqList-v1310 ::= SEQUENCE (SIZE (1..maxFreqIDC-r11)) OF AffectedCarrierFreq-v1310

AffectedCarrierFreq-r11 ::= SEQUENCE {
  carrierFreq-r11    MeasObjectId,
  interferenceDirection-r11 ENUMERATED {eutra, other, both, spare}
}

AffectedCarrierFreq-v1310 ::= SEQUENCE {
  carrierFreq-v1310    MeasObjectId-v1310        OPTIONAL
}

AffectedCarrierFreqCombList-r11 ::= SEQUENCE (SIZE (1..maxCombIDC-r11)) OF AffectedCarrierFreqComb-r11

AffectedCarrierFreqCombList-r13 ::= SEQUENCE (SIZE (1..maxCombIDC-r11)) OF AffectedCarrierFreqComb-r13

AffectedCarrierFreqComb-r11 ::= SEQUENCE (SIZE (2..maxServCell-r10)) OF MeasObjectId

AffectedCarrierFreqComb-r13 ::= SEQUENCE (SIZE (2..maxServCell-r13)) OF MeasObjectId-r13

TDM-AssistanceInfo-r11 ::= CHOICE {
  drx-AssistanceInfo-r11    SEQUENCE {
    drx-CycleLength-r11     ENUMERATED {sf40, sf64, sf80, sf128, sf160,
                                  sf256, spare2, spare1},
    drx-Offset-r11      INTEGER (0..255) OPTIONAL,
    drx-ActiveTime-r11     ENUMERATED {sf20, sf30, sf40, sf60, sf80,
                                       sf100, spare2, spare1}
  },
  idc-SubframePatternList-r11 IDC-SubframePatternList-r11,
  ...
}

IDC-SubframePatternList-r11 ::= SEQUENCE (SIZE (1..maxSubframePatternIDC-r11)) OF IDC-SubframePattern-r11

IDC-SubframePattern-r11 ::= CHOICE {
  subframePatternFDD-r11    BIT STRING (SIZE (4)),
  subframePatternTDD-r11    CHOICE {
    subframeConfig0-r11     BIT STRING (SIZE (70)),
    subframeConfig1-5-r11    BIT STRING (SIZE (10)),
    subframeConfig6-r11     BIT STRING (SIZE (60))
  },
  ...
}

VictimSystemType-r11 ::= SEQUENCE {
  gps-r11       ENUMERATED {true}    OPTIONAL,
  glonass-r11       ENUMERATED {true}    OPTIONAL,
  bds-r11        ENUMERATED {true}    OPTIONAL,
  galileo-r11     ENUMERATED {true}    OPTIONAL,
  wlan-r11       ENUMERATED {true}    OPTIONAL,
  bluetooth-r11  ENUMERATED {true}    OPTIONAL
}

-- ASN1STOP
**InDeviceCoexIndication field descriptions**

**AffectedCarrierFreq**
If carrierFreq-v1310 is included, carrierFreq-r11 is ignored by eNB.

**affectedCarrierFreqCombList**
Indicates a list of E-UTRA carrier frequencies that are affected by IDC problems due to Inter-Modulation Distortion and harmonics from E-UTRA when configured with UL CA. affectedCarrierFreqCombList-r13 is used when more than 5 serving cells are configured or affected combinations contain MeasObjectId larger than 32. If affectedCarrierFreqCombList-r13 is included, affectedCarrierFreqCombList-r11 shall not be included.

**affectedCarrierFreqList**
List of E-UTRA carrier frequencies affected by IDC problems. If E-UTRAN includes affectedCarrierFreqList-v1310 it includes the same number of entries, and listed in the same order, as in affectedCarrierFreqList-r11.

**drx-ActiveTime**
Indicates the desired active time that the E-UTRAN is recommended to configure. Value in number of subframes. Value sf20 corresponds to 20 subframes, sf30 corresponds to 30 subframes and so on.

**drx-CycleLength**
Indicates the desired DRX cycle length that the E-UTRAN is recommended to configure. Value in number of subframes. Value sf40 corresponds to 40 subframes, sf64 corresponds to 64 subframes and so on.

**drx-Offset**
Indicates the desired DRX starting offset that the E-UTRAN is recommended to configure. The UE shall set the value of drx-Offset smaller than the value of drx-CycleLength. The starting frame and subframe satisfy the relation: [(SFN * 10) + subframe number mod (drx-CycleLength) = drx-Offset.

**hardwareSharingProblem**
Indicates whether the UE has hardware sharing problems that the UE cannot solve by itself. The field is present (i.e. value true), if the UE has such hardware sharing problems. Otherwise the field is absent.

**idc-SubframePatternList**
A list of one or more subframe patterns indicating which HARQ process E-UTRAN is requested to abstain from using. Value 0 indicates that E-UTRAN is requested to abstain from using the subframe. For FDD, the radio frame in which the pattern starts (i.e. the radio frame in which the first/leftmost bit of the subframePatternFDD corresponds to subframe #0) occurs when SFN mod 2 = 0. For TDD, the first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string divided by 10. The UE shall indicate a subframe pattern that follows HARQ time line, as specified in TS 36.213 [23], if a subframe is set to 1 in the subframe pattern, also the corresponding subframes carrying the potential UL grant [23, 8.0], the UL HARQ retransmission [23, 8.0] and the DL/UL HARQ feedback [23, 7.3, 8.3 and 9.1.2] shall be set to 1.

**interferenceDirection**
Indicates the direction of IDC interference. Value eutra indicates that only E-UTRA is victim of IDC interference, value other indicates that only another radio is victim of IDC interference and value both indicates that both E-UTRA and another radio are victims of IDC interference. The other radio refers to either the ISM radio or GNSS (see 3GPP TR 36.816 [63]).

**victimSystemType**
Indicate the list of victim system types to which IDC interference is caused from E-UTRA when configured with UL CA. Value gps, glonass, bds and galileo indicates the type of GNSS. Value wlan indicates WLAN and value bluetooth indicates Bluetooth.

---

**InterFreqRSTDMeasurementIndication**

The InterFreqRSTDMeasurementIndication message is used to indicate that the UE is going to either start or stop OTDOA inter-frequency RSTD measurement which requires measurement gaps as specified in TS 36.133 [16, 8.1.2.6].

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

**InterFreqRSTDMeasurementIndication message**

```asn1
InterFreqRSTDMeasurementIndication-r10 ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE {
      interFreqRSTDMeasurementIndication-r10 InterFreqRSTDMeasurementIndication-r10-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE { }
  }
}
```

ETSI
InterFreqRSTDMeasurementIndication field descriptions

carrierFreq
The EARFCN value of the carrier received from upper layers for which the UE needs to perform the inter-frequency RSTD measurements. If the UE includes carrierFreq-v1090, it shall set carrierFreq-r10 to maxEARFCN.

measPRS-Offset
Indicates the requested gap offset for performing inter-frequency RSTD measurements. 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-frequency 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 measPRS-Offset. NOTE: Figure 6.2.2-1 illustrates the measPRS-Offset field.

rstd-InterFreqIndication
Indicates the inter-frequency RSTD measurement action, i.e. the UE is going to start or stop inter-frequency RSTD measurement.

Figure 6.2.2-1 (informative): Exemplary calculation of measPRS-Offset field.
LoggedMeasurementConfiguration

The LoggedMeasurementConfiguration message is used by E-UTRAN to configure the UE to perform logging of measurement results while in RRC_IDLE or to perform logging of measurement results for MBSFN while in both RRC_IDLE and RRC_CONNECTED. It is used to transfer the logged measurement configuration for network performance optimisation, see TS 37.320 [60].

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

---

LoggedMeasurementConfiguration message

--- 

LoggedMeasurementConfiguration-r10 ::= SEQUENCE {
    criticalExtensions     CHOICE {
        c1         CHOICE {
            loggedMeasurementConfiguration-r10  LoggedMeasurementConfiguration-r10-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture    SEQUENCE {}
    }
}

LoggedMeasurementConfiguration-r10-IEs ::= SEQUENCE {
    traceReference-r10    TraceReference-r10,
    traceRecordingSessionRef-r10 OCTET STRING (SIZE (2)),
    tce-Id-r10      OCTET STRING (SIZE (1)),
    absoluteTimeInfo-r10 AbsoluteTimeInfo-r10,
    areaConfiguration-r10   AreaConfiguration-r10  OPTIONAL, -- Need OR
    loggingDuration-r10    LoggingDuration-r10,
    loggingInterval-r10    LoggingInterval-r10,
    nonCriticalExtension   LoggedMeasurementConfiguration-v1080-IEs OPTIONAL
}

LoggedMeasurementConfiguration-v1080-IEs ::= SEQUENCE {
    lateNonCriticalExtension-r10 OCTET STRING      OPTIONAL,
    nonCriticalExtension   LoggedMeasurementConfiguration-v1130-IEs OPTIONAL
}

LoggedMeasurementConfiguration-v1130-IEs ::= SEQUENCE {
    plmn-IdentityList-r11   PLMN-IdentityList3-r11  OPTIONAL, -- Need OR
    areaConfiguration-v1130   AreaConfiguration-v1130  OPTIONAL, -- Need OR
    nonCriticalExtension   LoggedMeasurementConfiguration-v1250-IEs OPTIONAL
}

LoggedMeasurementConfiguration-v1250-IEs ::= SEQUENCE {
    targetMBSFN-AreaList-r12 TargetMBSFN-AreaList-r12  OPTIONAL, -- Need OP
    nonCriticalExtension   SEQUENCE ()     OPTIONAL
}

TargetMBSFN-AreaList-r12 ::= SEQUENCE (SIZE (0..maxMBSFN-Area)) OF TargetMBSFN-Area-r12

TargetMBSFN-Area-r12 ::= SEQUENCE {
    mbsfn-AreaId-r12      MBSFN-AreaId-r12,
    carrierFreq-r12      ARFCN-ValueEUTRA-r9,
    ...
}

---
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/identities.

**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.

**targetMBSFN-AreaList**
Used to indicate logging of MBSFN measurements and further restrict the area and frequencies for which the UE performs measurement logging for MBSFN. If both MBSFN area id and carrier frequency are present, a specific MBSFN area is indicated. If only carrier frequency is present, all MBSFN areas on that carrier frequency are indicated. If there is no entry in the list, any MBSFN area is indicated.

**tce-Id**
Parameter Trace Collection Entity Id: See TS 32.422 [58].

**traceRecordingSessionRef**
Parameter Trace Recording Session Reference: See TS 32.422 [58].

---

**MasterInformationBlock**

The **MasterInformationBlock** includes the system information transmitted on BCH.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: BCCH

Direction: E-UTRAN to UE

---

MasterInformationBlock

-- ASN.1START

MasterInformationBlock ::= SEQUENCE {
  dl-Bandwidth      ENUMERATED {
    n6, n15, n25, n50, n75, n100},
  phich-Config      PHICH-Config,
  systemFrameNumber     BIT STRING (SIZE (8)),
  schedulingInfoSIB1-BR-r13   INTEGER (0..31),
  spare        BIT STRING (SIZE (5))
}

-- ASN.1STOP

---

MasterInformationBlock field descriptions

**dl-Bandwidth**
Parameter: transmission bandwidth configuration, NRB in downlink, see TS 36.101 [42, table 5.6-1]. n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on.

**phich-Config**
Specifies the PHICH configuration. If the UE is a BL UE or UE in CE, it shall ignore this field.

**schedulingInfoSIB1-BR**
This field contains an index to a table that defines SystemInformationBlockType1-BR scheduling information. The table is specified in TS 36.213 [23, Table 7.1.6-1 and Table 7.1.7.2.7-1]. Value 0 means that SystemInformationBlockType1-BR is not scheduled.

**systemFrameNumber**
Defines the 8 most significant bits of the SFN. As indicated in TS 36.211 [21, 6.6.1], the 2 least significant bits of the SFN are acquired implicitly in the P-BCH decoding, i.e. timing of 40ms P-BCH TTI indicates 2 least significant bits (within 40ms P-BCH TTI, the first radio frame: 00, the second radio frame: 01, the third radio frame: 10, the last radio frame: 11). One value applies for all serving cells of a Cell Group (i.e. MCG or SCG). The associated functionality is common (i.e. not performed independently for each cell).
**MBMSCountingRequest**

The **MBMSCountingRequest** message is used by E-UTRAN to count the UEs that are receiving or interested to receive specific MBMS services.

- Signalling radio bearer: N/A
- RLC-SAP: UM
- Logical channel: MCCH
- Direction: E-UTRAN to UE

**MBMSCountingRequest message**

```asn1
-- ASN1START
MBMSCountingRequest-r10 ::= SEQUENCE {
  countingRequestList-r10            COUNTINGRequestList-r10,
  lateNonCriticalExtension  OCTET STRING OPTIONAL,
  nonCriticalExtension   SEQUENCE() OPTIONAL
}

COUNTINGRequestList-r10 ::= SEQUENCE (SIZE (1..maxServiceCount)) OF COUNTINGRequestInfo-r10

COUNTINGRequestInfo-r10 ::= SEQUENCE {
  tmgi-r10       TMGI-r9,
  ...
}
-- ASN1STOP
```

**MBMSCountingResponse**

The **MBMSCountingResponse** message is used by the UE to respond to an **MBMSCountingRequest** message.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

**MBMSCountingResponse message**

```asn1
-- ASN1START
MBMSCountingResponse-r10 ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1         CHOICE {
      countingResponse-r10    MBMSCountingResponse-r10-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE()
  },
  mbsfn-AreaIndex-r10    INTEGER (0..maxMBSFN-Area-1) OPTIONAL,
  lateNonCriticalExtension  OCTET STRING OPTIONAL,
  nonCriticalExtension   SEQUENCE() OPTIONAL
}

MBMSCountingResponse-r10-IEs ::= SEQUENCE {
  mbsfn-AreaIndex-r10    INTEGER (0..maxMBSFN-Area-1) OPTIONAL,
  countingResponseList-r10   COUNTINGResponseList-r10 STOP,  OPTIONAL,
  lateNonCriticalExtension  OCTET STRING OPTIONAL,
  nonCriticalExtension   SEQUENCE() OPTIONAL
}

COUNTINGResponseList-r10 ::= SEQUENCE (SIZE (1..maxServiceCount)) OF COUNTINGResponseInfo-r10

COUNTINGResponseInfo-r10 ::= SEQUENCE {
  countingResponseService-r10  INTEGER (0..maxServiceCount-1),
  ...
}
-- ASN1STOP
```
MBMSCountingResponse field descriptions

- **countingResponseList**
  List of MBMS services which the UE is receiving or interested to receive. Value 0 for field `countingResponseService` corresponds to the first entry in `countingRequestList` within MBMSCountingRequest, value 1 corresponds to the second entry in this list and so on.

- **mbmsn-AreaIndex**
  Index of the entry in field `mbfn-AreaInfoList` within SystemInformationBlockType13. Value 0 corresponds to the first entry in `mbfn-AreaInfoList` within SystemInformationBlockType13, value 1 corresponds to the second entry in this list and so on.

---

MBMSInterestIndication

The MBMSInterestIndication message is used to inform E-UTRAN that the UE is receiving/interested to receive or no longer receiving/interested to receive MBMS via an MRB or SC-MRB.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

**MBMSInterestIndication message**

```asn1
-- ASN1START
MBMSInterestIndication-r11 ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1         CHOICE {
      interestIndication-r11    MBMSInterestIndication-r11-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {} 
  }
}
MBMSInterestIndication-r11-IEs ::= SEQUENCE {
  mbms-FreqList-r11     CarrierFreqListMBMS-r11   OPTIONAL,
  mbms-Priority-r11     ENUMERATED {true}    OPTIONAL,
  lateNonCriticalExtension   OCTET STRING     OPTIONAL,
  nonCriticalExtension    MBMSInterestIndication-v1310-IEs OPTIONAL
}
MBMSInterestIndication-v1310-IEs ::= SEQUENCE {
  mbms-Services-r13     MBMS-ServiceList-r13    OPTIONAL,
  nonCriticalExtension    SEQUENCE {}      OPTIONAL
}
-- ASN1STOP
```

MBMSInterestIndication field descriptions

- **mbms-FreqList**
  List of MBMS frequencies on which the UE is receiving or interested to receive MBMS via an MRB or SC-MRB.

- **mbms-Priority**
  Indicates whether the UE prioritises MBMS reception above unicast reception. The field is present (i.e. value true), if the UE prioritises reception of all listed MBMS frequencies above reception of any of the unicast bearers. Otherwise the field is absent.

---

MBSFNAreaConfiguration

The MBSFNAreaConfiguration message contains the MBMS control information applicable for an MBSFN area. For each MBSFN area included in SystemInformationBlockType13 E-UTRAN configures an MCCH (i.e. the MCCH identifies the MBSFN area) and signals the MBSFNAreaConfiguration message.

Signalling radio bearer: N/A
MBSFNAreaConfiguration message

```
MBSFNAreaConfiguration-r9 ::= SEQUENCE {
    commonSF-Alloc-r9    CommonSF-AllocPatternList-r9,
    commonSF-AllocPeriod-r9    ENUMERATED {
        rf4, rf8, rf16, rf32, rf64, rf128, rf256},
    pmch-InfoList-r9    PMCH-InfoList-r9,
    nonCriticalExtension    MBSFNAreaConfiguration-v930-IEs OPTIONAL
}
```

```
MBSFNAreaConfiguration-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension   OCTET STRING      OPTIONAL,
    nonCriticalExtension    MBSFNAreaConfiguration-v1250-IEs  OPTIONAL
}
```

```
MBSFNAreaConfiguration-v1250-IEs ::= SEQUENCE {
    pmch-InfoListExt-r12    PMCH-InfoListExt-r12    OPTIONAL, -- Need OR
    nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
```

```
CommonSF-AllocPatternList-r9 ::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig
```

**MBSFNAreaConfiguration field descriptions**

- **commonSF-Alloc**
  Indicates the subframes allocated to the MBSFN area. E-UTRAN always sets this field to cover at least the subframes configured by `SystemInformationBlockType13` for this MCCH, regardless of whether any MBMS sessions are ongoing.

- **commonSF-AllocPeriod**
  Indicates the period during which resources corresponding with field `commonSF-Alloc` are divided between the (P)MCH that are configured for this MBSFN area. The subframe allocation patterns, as defined by `commonSF-Alloc`, repeat continuously during this period. Value `rf4` corresponds to 4 radio frames, `rf8` corresponds to 8 radio frames and so on. Value `rf4` starts in the radio frames for which: SFN mod `commonSF-AllocPeriod` = 0.

- **pmch-InfoList**
  EUTRAN may include `pmch-InfoListExt` even if `pmch-InfoList` does not include `maxPMCH-PerMBSFN` entries. EUTRAN configures at most `maxPMCH-PerMBSFN` entries i.e. across `pmch-InfoList` and `pmch-InfoListExt`.

---

**MeasurementReport**

The `MeasurementReport` message is used for the indication of measurement results.

- **Signalling radio bearer:** SRB1
- **RLC-SAP:** UM
- **Logical channel:** MCCH
- **Direction:** E-UTRAN to UE

```
MeasurementReport ::=    SEQUENCE {
    criticalExtensions     CHOICE {
        c1         CHOICE{
            measurementReport-r8    MeasurementReport-r8-IEs,
            spare7 NULL, spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
    criticalExtensionsFuture    SEQUENCE {}
```
MeasurementReport-r8-IEs ::= SEQUENCE {
  measResults       MeasResults,
  nonCriticalExtension    MeasurementReport-v8a0-IEs OPTIONAL
}
MeasurementReport-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension    SEQUENCE {} OPTIONAL
}

MobilityFromEUTRACCommand

The MobilityFromEUTRACCommand message is used to command handover or a cell change from E-UTRA to another RAT (3GPP or non-3GPP), or enhanced CS fallback to CDMA2000 1xRTT.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

MobilityFromEUTRACCommand message

MobilityFromEUTRACCommand ::=  SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1          CHOICE{
      mobilityFromEUTRACCommand-r8  MobilityFromEUTRACCommand-r8-IEs,
      mobilityFromEUTRACCommand-r9  MobilityFromEUTRACCommand-r9-IEs,
      spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {} -- ASN1START
    criticalExtensionsFuture   SEQUENCE {} -- ASN1START
  },
  criticalExtensionsFuture   SEQUENCE {} -- ASN1START
}

MobilityFromEUTRACCommand-r8-IEs ::= SEQUENCE {
  cs-FallbackIndicator    BOOLEAN,
  purpose        CHOICE{
    handover       Handover,
    cellChangeOrder      CellChangeOrder
  },
  nonCriticalExtension    MobilityFromEUTRACCommand-v8a0-IEs OPTIONAL
}

MobilityFromEUTRACCommand-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension    SEQUENCE {} OPTIONAL
}

MobilityFromEUTRACCommand-r9-IEs ::= SEQUENCE {
  cs-FallbackIndicator    BOOLEAN,
  purpose        CHOICE{
    handover       Handover,
    cellChangeOrder      CellChangeOrder,
    e-CSFB-r9       E-CSFB-r9,
    ... 
  },
  nonCriticalExtension    MobilityFromEUTRACCommand-v930-IEs OPTIONAL
}

MobilityFromEUTRACCommand-v930-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension    SEQUENCE {} OPTIONAL
}
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension MobilityFromEUTRACommand-v960-IEs OPTIONAL
}

MobilityFromEUTRACommand-v960-IEs ::= SEQUENCE {
  bandIndicator BandIndicatorGERAN OPTIONAL, -- Cond GERAN
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

Handover ::= SEQUENCE {
  targetRAT-Type ENUMERATED {
    utra, geran, cdma2000-1xrtt, cdma2000-hrp, spare4, spare3, spare2, spare1, ...},
  targetRAT-MessageContainer OCTET STRING, nase-SecurityParamFromEUTRA OCTET STRING (SIZE (1)) OPTIONAL, -- Cond UTRA-GERAN
  systemInformation SI-OrPSI-GERAN OPTIONAL -- Cond PSHO
}

CellChangeOrder ::= SEQUENCE {
  t304 ENUMERATED {
    ms100, ms200, ms500, ms1000, ms2000, ms4000, ms8000, ms10000-v1310},
  targetRAT-Type CHOICE {
    geran SEQUENCE {
      physCellId PhysCellIdGERAN,
      carrierFreq CarrierFreqGERAN,
      networkControlOrder BIT STRING (SIZE (2)) OPTIONAL, -- Need OP
      systemInformation SI-OrPSI-GERAN OPTIONAL -- Need OP
    },
    ...
  }
}

SI-OrPSI-GERAN ::= CHOICE {
  si SystemInfoListGERAN,
  psi SystemInfoListGERAN
}

E-CSFB-r9 ::= SEQUENCE {
  messageContCDMA2000-1XRTT-r9 OCTET STRING OPTIONAL, -- Need ON
  mobilityCDMA2000-HRP-r9 ENUMERATED {
    handover, redirection
  } OPTIONAL, -- Need OP
  redirectCarrierCDMA2000-HRP-r9 CarrierFreqCDMA2000 OPTIONAL -- Cond concRedir
}

-- ASN1STOP
**MobilityFromEUTRACommand field descriptions**

- **bandIndicator**: Indicates how to interpret the ARFCN of the BCCH carrier.
- **carrierFreq**: contains the carrier frequency of the target GERAN cell.
- **cs-FallbackIndicator**: Value true indicates that the CS fallback procedure to UTRAN or GERAN is triggered.
- **messageContCDMA2000-1XRTT**: This field contains a message specified in CDMA2000 1xRTT standard that either tells the UE to move to specific 1xRTT target cell(s) or indicates a failure to allocate resources for the enhanced CS fallback to CDMA2000 1xRTT.
- **messageContCDMA2000-HRPD**: This field contains a message specified in CDMA2000 HRPD standard that either tells the UE to move to specific HRPD target cell(s) or indicates a failure to allocate resources for the handover to CDMA2000 HRPD.
- **mobilityCDMA2000-HRPD**: This field indicates whether or not mobility to CDMA2000 HRPD is to be performed by the UE and it also indicates the type of mobility to CDMA2000 HRPD that is to be performed; If this field is not present the UE shall perform only the enhanced CS fallback to CDMA2000 1xRTT.
- **nas-SecurityParamFromEUTRA**: Used to deliver the key synchronisation and Key freshness for the E-UTRAN to UTRAN handovers as specified in TS 33.401. The content of the parameter is defined in TS24.301.
- **networkControlOrder**: Parameter NETWORK_CONTROL_ORDER in TS 44.060 [36].
- **purpose**: Indicates which type of mobility procedure the UE is requested to perform. EUTRAN always applies value e-CSFB in case of enhanced CS fallback to CDMA2000 (e.g. also when that procedure results in handover to CDMA2000 1XRTT only, in handover to CDMA2000 HRPD only or in redirection to CDMA2000 HRPD only).
- **redirectCarrierCDMA2000-HPD**: The redirectCarrierCDMA2000-HPD indicates a CDMA2000 carrier frequency and is used to redirect the UE to a HRPD carrier frequency.
- **SystemInfoListGERAN**: If purpose = CellChangeOrder and if the field is not present, the UE has to acquire SI/PSI from the GERAN cell.
- **t304**: Timer T304 as described in section 7.3. Value ms100 corresponds with 100 ms, ms200 corresponds with 200 ms and so on. EUTRAN includes extended value ms10000-v1310 only when UE supports CE.
- **targetRAT-Type**: Indicates the target RAT type.
- **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. NOTE 1. A complete message is included, as specified in the other standard.

### Conditional presence

<table>
<thead>
<tr>
<th>ConcHO</th>
<th>The field is mandatory present if the mobilityCDMA2000-HPD is set to “handover”; otherwise the field is optional present, need ON.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConcRedir</td>
<td>The field is mandatory present if the mobilityCDMA2000-HPD is set to “redirection”; otherwise the field is not present.</td>
</tr>
<tr>
<td>GERAN</td>
<td>The field should be present if the purpose is set to “handover” and the targetRAT-Type is set to “geran”; otherwise the field is not present</td>
</tr>
<tr>
<td>PSHO</td>
<td>The field is mandatory present in case of PS handover toward GERAN; otherwise the field is optionally present, but not used by the UE</td>
</tr>
<tr>
<td>UTRAGERAN</td>
<td>The field is mandatory present if the targetRAT-Type is set to “utra” or “geran”; otherwise the field is not present</td>
</tr>
</tbody>
</table>

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
---|---|---
cdma2000-1XRTT | C.S0001 or later, C.S0007 or later, C.S0008 or later | HANOVER COMMAND

<table>
<thead>
<tr>
<th>targetRAT-Type</th>
<th>Standard to apply</th>
<th>targetRAT-MessageContainer</th>
</tr>
</thead>
</table>
cdma2000-HRPD | C.S0024 or later | HANOVER COMMAND

<table>
<thead>
<tr>
<th>targetRAT-Type</th>
<th>Standard to apply</th>
<th>targetRAT-MessageContainer</th>
</tr>
</thead>
</table>
geran | GSM TS 04.18, version 8.5.0 or later, or 3GPP TS 44.018 (clause 9.1.15) | PS HANOVER COMMAND
| | 3GPP TS 44.060, version 6.13.0 or later (clause 11.2.43) | DTM HANOVER COMMAND
| | 3GPP TS 44.060, version 7.6.0 or later (clause 11.2.46) | |
| utra | 3GPP TS 25.331 (clause 10.2.16a) | HANOVER TO UTRAN COMMAND

-- 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: E-UTRAN to UE

Paging message

```
-- ASN1START
Paging ::= SEQUENCE {
pagingRecordList       PagingRecordList     OPTIONAL, -- Need ON
systemInfoModification ENUMERATED (true) OPTIONAL, -- Need ON
etws-Indication       ENUMERATED (true) OPTIONAL, -- Need ON
nonCriticalExtension   Paging-v890-IEs      OPTIONAL
}
Paging-v890-IEs ::= SEQUENCE {
lateNonCriticalExtension OCTET STRING       OPTIONAL,
nonCriticalExtension   Paging-v890-IEs      OPTIONAL
}
Paging-v920-IEs ::= SEQUENCE {
cmas-Indication-r9     ENUMERATED (true) OPTIONAL, -- Need ON
nonCriticalExtension    Paging-v920-IEs    OPTIONAL
}
Paging-v1130-IEs ::= SEQUENCE {
eab-ParamModification-r11 ENUMERATED (true) OPTIONAL, -- Need ON
nonCriticalExtension   Paging-v1130-IEs     OPTIONAL
}
Paging-v1310-IEs ::= SEQUENCE {
redistributionIndication-r13 ENUMERATED (true) OPTIONAL, --Need ON
systemInfoModification-eDRX-r13 ENUMERATED (true) OPTIONAL, -- Need ON
nonCriticalExtension   SEQUENCE {}       OPTIONAL
}
PagingRecordList ::= SEQUENCE (SIZE (1..maxPageRec)) OF PagingRecord
PagingRecord ::= SEQUENCE {
ue-Identity       PagingUE-Identity,  
cn-Domain       ENUMERATED {ps, cs}, ...
}
PagingUE-Identity ::= CHOICE {
s-TMSI        S-TMSI, 
imsi         IMSI,  ...
}
IMSI ::= SEQUENCE (SIZE (6..21)) OF IMSI-Digit
```

```
### Paging field descriptions

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmas-Indication</td>
<td>If present: indication of a CMAS notification.</td>
</tr>
<tr>
<td>cn-Domain</td>
<td>Indicates the origin of paging.</td>
</tr>
<tr>
<td>eab-ParamModification</td>
<td>If present: indication of an EAB parameters (SIB14) modification.</td>
</tr>
<tr>
<td>etws-Indication</td>
<td>If present: indication of an ETWS primary notification and/or ETWS secondary notification.</td>
</tr>
<tr>
<td>imsi</td>
<td>The International Mobile Subscriber Identity, a globally unique permanent subscriber identity, see TS 23.003 [27]. The first element contains the first IMSI digit, the second element contains the second IMSI digit and so on.</td>
</tr>
<tr>
<td>redistributionIndication</td>
<td>If present: indication to trigger E-UTRAN inter-frequency redistribution procedure as specified in TS 36.304 [4, 5.2.4.10].</td>
</tr>
<tr>
<td>systemInfoModification</td>
<td>If present: indication of a BCCH modification other than SIB10, SIB11, SIB12 and SIB14. This indication does not apply to UEs using eDRX cycle longer than the BCCH modification period.</td>
</tr>
<tr>
<td>systemInfoModification-eDRX</td>
<td>If present: indication of a BCCH modification other than SIB10, SIB11, SIB12 and SIB14. This indication applies only to UEs using eDRX cycle longer than the BCCH modification period.</td>
</tr>
<tr>
<td>ue-Identity</td>
<td>Provides the NAS identity of the UE that is being paged.</td>
</tr>
</tbody>
</table>

---

### ProximityIndication

The ProximityIndication message is used to indicate that the UE is entering or leaving the proximity of one or more CSG member cell(s).

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

---

### ProximityIndication message

```asn1
ProximityIndication-r9 ::= SEQUENCE {
    criticalExtensions     CHOICE {
        c1         CHOICE {
            proximityIndication-r9    ProximityIndication-r9-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        }
    }
}

ProximityIndication-r9-IEs ::= SEQUENCE {
    type-r9        ENUMERATED {entering, leaving},
    carrierFreq-r9  CHOICE {
        eutra-r9       ARFCN-ValueEUTRA,
        utra-r9        ARFCN-ValueUTRA,
        ...,
        eutra2-v9e0    ARFCN-ValueEUTRA-v9e0
    },
    nonCriticalExtension    ProximityIndication-v930-IEs
    OPTIONAL
}

ProximityIndication-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING     OPTIONAL,
}```
carrierFreq
Indicates the RAT and frequency of the CSG member cell(s), for which the proximity indication is sent. For E-UTRA
and UTRA frequencies, the UE shall set the ARFCN according to a band it previously considered suitable for
accessing (one of) the CSG member cell(s), for which the proximity indication is sent.

**ProximityIndication field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>carrierFreq</td>
<td>Indicates the RAT and frequency of the CSG member cell(s), for which the proximity indication is sent. For E-UTRA and UTRA frequencies, the UE shall set the ARFCN according to a band it previously considered suitable for accessing (one of) the CSG member cell(s), for which the proximity indication is sent.</td>
</tr>
<tr>
<td>type</td>
<td>Used to indicate whether the UE is entering or leaving the proximity of CSG member cell(s).</td>
</tr>
</tbody>
</table>

---

**RNReconfiguration**

The **RNReconfiguration** is a command to modify the RN subframe configuration and/or to convey changed system information.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to RN

**RNReconfiguration message**

```asn1
RNReconfiguration-r10 ::= SEQUENCE {
  rrc-TransactionIdentifier  RRC-TransactionIdentifier,
  criticalExtensions    CHOICE {
    c1        CHOICE {
      rnReconfiguration-r10  RNReconfiguration-r10-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture  SEQUENCE {}
  }
}

RNReconfiguration-r10-IEs ::= SEQUENCE {
  rn-SystemInfo-r10     RN-SystemInfo-r10   OPTIONAL, -- Need ON
  rn-SubframeConfig-r10    RN-SubframeConfig-r10   OPTIONAL, -- Need ON
  lateNonCriticalExtension   OCTET STRING     OPTIONAL,
  nonCriticalExtension    SEQUENCE {}      OPTIONAL
}

RN-SystemInfo-r10 ::=   SEQUENCE {
  systemInformationBlockType1-r10  OCTET STRING (CONTAINING SystemInformationBlockType1)
  OPTIONAL, -- Need ON
  systemInformationBlockType2-r10  SystemInformationBlockType2 OPTIONAL, -- Need ON
  ...}
```

---

**RNReconfigurationComplete**

The **RNReconfigurationComplete** message is used to confirm the successful completion of an RN reconfiguration.
Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: RN to E-UTRAN

**RNReconfigurationComplete message**

```asn1
RNReconfigurationComplete-r10 ::= SEQUENCE {
  rrc-TransactionIdentifier    RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1          CHOICE{
      rnReconfigurationComplete-r10   RNReconfigurationComplete-r10-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture    SEQUENCE {} }
}
RNReconfigurationComplete-r10-IEs ::= SEQUENCE {
  lateNonCriticalExtension    OCTET STRING    OPTIONAL,
  nonCriticalExtension     SEQUENCE {}     OPTIONAL
}
```

**RRCConnectionReconfiguration**

The **RRCConnectionReconfiguration** 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) including any associated dedicated NAS information and security configuration.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: E-UTRAN to UE

**RRCConnectionReconfiguration message**

```asn1
RRCConnectionReconfiguration ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1         CHOICE{
      rrcConnectionReconfiguration-r8  RRCConnectionReconfiguration-r8-IEs,
      spare7 NULL,
      spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}
RRCConnectionReconfiguration-r8-IEs ::= SEQUENCE {
  measConfig       MeasConfig      OPTIONAL, -- Need ON
  mobilityControlInfo     MobilityControlInfo    OPTIONAL, -- Cond HO
  dedicatedInfoNASList    SEQUENCE (SIZE(1..maxDRB)) OF
                           DedicatedInfoNAS   OPTIONAL, -- Cond nonHO
  radioResourceConfigDedicated  RadioResourceConfigDedicated OPTIONAL, -- Cond HO-toEUTRA
  securityConfigHO     SecurityConfigHO   OPTIONAL, -- Cond HO
  nonCriticalExtension    RRCConnectionReconfiguration-v890-IEs OPTIONAL
}
RRCConnectionReconfiguration-v890-IEs ::= SEQUENCE {
...
```
lateNonCriticalExtension OCTET STRING (CONTAINING RRCConnectionReconfiguration-v8m0-IEs) OPTIONAL,
nonCriticalExtension RRCConnectionReconfiguration-v920-IEs OPTIONAL
}

-- Late non-critical extensions:
RRCConnectionReconfiguration-v8m0-IEs ::= SEQUENCE {
  -- Following field is only for pre REL-10 late non-critical extensions
  lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension RRCConnectionReconfiguration-v10l0-IEs OPTIONAL
}

RRCConnectionReconfiguration-v10l0-IEs ::= SEQUENCE {
  antennaInfoDedicatedPCell-v10l0 AntennaInfoDedicated-v10l0 OPTIONAL, -- Need ON
  nonCriticalExtension RRCConnectionReconfiguration-v10l0-IEs OPTIONAL
}

RRCConnectionReconfiguration-v10l0-IEs ::= SEQUENCE {
  mobilityControlInfo-v10l0 MobilityControlInfo-v10l0 OPTIONAL,
sCellToAddModList-v10l0 SCellToAddModList-v10l0 OPTIONAL, -- Need ON
  -- Following field is only for late non-critical extensions from REL-10 to REL-11
  lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension RRCConnectionReconfiguration-v12f0-IEs OPTIONAL
}

RRCConnectionReconfiguration-v12f0-IEs ::= SEQUENCE {
  scg-Configuration-v12f0 SCG-Configuration-v12f0 OPTIONAL, -- Cond nonFullConfig
  -- Following field is only for late non-critical extensions from REL-12
  lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension RRCConnectionReconfiguration-v1370-IEs OPTIONAL
}

RRCConnectionReconfiguration-v1370-IEs ::= SEQUENCE {
  radioResourceConfigDedicated-v1370 RadioResourceConfigDedicated-v1370 OPTIONAL, -- Cond nonFullConfig
  nonCriticalExtension RRCConnectionReconfiguration-v13c0-IEs OPTIONAL
}

RRCConnectionReconfiguration-v13c0-IEs ::= SEQUENCE {
  radioResourceConfigDedicated-v13c0 RadioResourceConfigDedicated-v13c0 OPTIONAL, -- Cond nonFullConfig
  sCellToAddModList-v13c0 SCellToAddModList-v13c0 OPTIONAL, -- Need ON
  scg-Configuration-v13c0 SCG-Configuration-v13c0 OPTIONAL, -- Need ON
  -- Following field is only for late non-critical extensions from REL-13 onwards
  nonCriticalExtension OCTET STRING (CONTAINING RRCConnectionReconfiguration-v1250-IEs) OPTIONAL
}

-- Regular non-critical extensions:
RRCConnectionReconfiguration-v920-IEs ::= SEQUENCE {
  otherConfig-r9 OtherConfig-r9 OPTIONAL, -- Need ON
  fullConfig-r9 ENUMERATED {true} OPTIONAL, -- Cond HO-Reestab
  nonCriticalExtension RRCConnectionReconfiguration-v1020-IEs OPTIONAL
}

RRCConnectionReconfiguration-v1020-IEs ::= SEQUENCE {
  sCellToReleaseList-r10 SCellToReleaseList-r10 OPTIONAL, -- Need ON
  sCellToAddModList-r10 SCellToAddModList-r10 OPTIONAL, -- Need ON
  nonCriticalExtension RRCConnectionReconfiguration-v1130-IEs OPTIONAL
}

RRCConnectionReconfiguration-v1130-IEs ::= SEQUENCE {
  systemInformationBlockType1Dedicated-r11 OCTET STRING (CONTAINING SystemInformationBlockType1) OPTIONAL, -- Need ON
  nonCriticalExtension RRCConnectionReconfiguration-v1250-IEs OPTIONAL
}

RRCConnectionReconfiguration-v1250-IEs ::= SEQUENCE {
  wlan-OffloadInfo-r12 WLAN-OffloadInfo-r12 OPTIONAL, -- Need ON

  setup wlan-OffloadConfigDedicated-r12 WLAN-OffloadConfig-r12,
t350-r12 ENUMERATED {min5, min10, min20, min30, min60, 
min120, min180, spare1} OPTIONAL, -- Need OR
}

-- Following field is only for late non-critical extensions from REL-13 onwards
nonCriticalExtension OCTET STRING (CONTAINING RRCConnectionReconfiguration-v1250-IEs) OPTIONAL

RRCConnectionReconfiguration-v1250-IEs ::= SEQUENCE {
  wlan-OffloadInfo-r12 WLAN-OffloadInfo-r12 OPTIONAL, -- Need ON
  scg-Configuration-r12 SCG-Configuration-r12 OPTIONAL, -- Cond nonFullConfig

| sl-SyncTxControl-r12  | sl-SyncTxControl-r12  | OPTIONAL, -- Need ON |
| sl-DiscConfig-r12    | sl-DiscConfig-r12    | OPTIONAL, -- Need ON |
| sl-CommConfig-r12    | sl-CommConfig-r12    | OPTIONAL, -- Need ON |
| nonCriticalExtension | RRCConnectionReconfiguration-v1310-IEs | OPTIONAL |

RRCConnectionReconfiguration-v1310-IEs ::= SEQUENCE {
  sCelltoListToReleaseExt-r13  SCelltoListToReleaseExt-r13  OPTIONAL, -- Need ON |
  lwa-Configuration-r13 LWA-Configuration-r13  OPTIONAL, -- Need ON |
  lwip-Configuration-r13 LWIP-Configuration-r13  OPTIONAL, -- Need ON |
  rclwi-Configuration-r13 RCLWI-Configuration-r13  OPTIONAL, -- Need ON |
  nonCriticalExtension       SEQUENCE {}      OPTIONAL |
}

SL-SyncTxControl-r12 ::=   SEQUENCE {
  networkControlledSyncTx-r12    ENUMERATED {on, off}  OPTIONAL  -- Need OP |
}

PSCellToAddMod-r12 ::=    SEQUENCE {
  sCellIndex-r12      SCellIndex-r10, |
  cellIdentification-r12    SEQUENCE {
    physCellId-r12      PhysCellId, |
    dl-CarrierFreq-r12     ARFCN-ValueEUTRA-r9 |
  } |
  radioResourceConfigCommonPSCell-r12 RadioResourceConfigCommonPSCell-r12 OPTIONAL, -- Cond SCellAdd |
  radioResourceConfigDedicatedPSCell-r12 RadioResourceConfigDedicatedPSCell-r12 OPTIONAL, -- Cond SCellAdd2 |
... |
  [ [ antennaInfoDedicatedPSCell-v1280 AntennaInfoDedicated-v1010 OPTIONAL -- Need ON ] ], |
  [ [ sCellIndex-r13 SCellIndex-r13 OPTIONAL -- Need ON ] ], |
  [ [ radioResourceConfigDedicatedPSCell-v1370 RadioResourceConfigDedicatedPSCell-v1370 OPTIONAL -- Need ON ] ], |
  [ [ radioResourceConfigDedicatedPSCell-v13c0 RadioResourceConfigDedicatedPSCell-v13c0 OPTIONAL -- Need ON ] ] |
}

PSCellToAddMod-v12f0 ::=    SEQUENCE {
  radioResourceConfigCommonPSCell-r12 RadioResourceConfigCommonPSCell-v12f0 OPTIONAL |
}

PowerCoordinationInfo-r12 ::= SEQUENCE {
  p-MeNB-r12       INTEGER (1..16), |
  p-SeNB-r12       INTEGER (1..16), |
  powerControlMode-r12    INTEGER (1..2) |
}

SCellToAddModList-r10 ::= SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellToAddMod-r10 |
SCellToAddModList-v1010 ::= SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellToAddMod-v1010 |
SCellToAddModList-v13c0 ::= SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellToAddMod-v13c0 |
SCellToAddModListExt-r13 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellToAddModExt-r13 |
SCellToAddModListExt-v1370 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellToAddModExt-v1370 |
SCellToAddModListExt-v13c0 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellToAddModExt-v13c0 |
SCellToAddMod-r10 ::=    SEQUENCE {
  sCellIndex-r10      SCellIndex-r10, |
  cellIdentification-r10    SEQUENCE {
    physCellId-r10      PhysCellId, |
    dl-CarrierFreq-r10     ARFCN-ValueEUTRA |
  } |
  radioResourceConfigDedicatedSCell-r10 RadioResourceConfigDedicatedSCell-r10 OPTIONAL, -- Cond SCellAdd2 |
... |
  [ [ dl-CarrierFreq-v1090 ARFCN-ValueEUTRA-v9e0 OPTIONAL -- Cond EARFCN-max ] ] |
  [ [ antennaInfoDedicatedSCell-v10i0 AntennaInfoDedicated-v10i0 OPTIONAL -- Need ON ] ] |

SCellToAddMod-v1010 ::= SEQUENCE {
    radioResourceConfigCommonSCell-v1010 RadioResourceConfigCommonSCell-v1010 OPTIONAL
}

SCellToAddMod-v13c0 ::= SEQUENCE {
    radioResourceConfigDedicatedSCell-v13c0 RadioResourceConfigDedicatedSCell-v13c0 OPTIONAL
}

SCellToAddModExt-r13 ::= SEQUENCE {
    sCellIndex-r13 SCellIndex-r13,
    cellIdentification-r13 SEQUENCE {
        physCellId-r13 PhysCellId,
        dl-CarrierFreq-r13 ARFCN-ValueEUTRA-r9
    } OPTIONAL, -- Cond SCellAdd
    antennaInfoDedicatedSCell-r13 AntennaInfoDedicated-v1010 OPTIONAL -- Need ON
}

SCellToAddModExt-v1370 ::= SEQUENCE {
    radioResourceConfigCommonSCell-v1370 RadioResourceConfigCommonSCell-v1010 OPTIONAL
}

SCellToReleaseList-r10 ::= SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellIndex-r10

SCellToReleaseListExt-r13 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellIndex-r13

SCG-Configuration-r12 ::= CHOICE {
    release NULL,
    setup SEQUENCE {
        scg-ConfigPartMCG-r12 SEQUENCE {
            scg-Counter-r12 INTEGER (0..65535) OPTIONAL, -- Need ON
            powerCoordinationInfo-r12 PowerCoordinationInfo-r12 OPTIONAL, -- Need ON
        } OPTIONAL, -- Need ON
        scg-ConfigPartSCG-r12 SCG-ConfigPartSCG-r12 OPTIONAL -- Need ON
    } OPTIONAL, -- Need ON
}

SCG-Configuration-v12f0 ::= CHOICE {
    release NULL,
    setup SEQUENCE {
        scg-ConfigPartSCG-v12f0 SCG-ConfigPartSCG-v12f0 OPTIONAL -- Need ON
    } OPTIONAL
}

SCG-Configuration-v13c0 ::= CHOICE {
    release NULL,
    setup SEQUENCE {
        scg-ConfigPartSCG-v13c0 SCG-ConfigPartSCG-v13c0 OPTIONAL -- Need ON
    } OPTIONAL
}

SCG-ConfigPartSCG-r12 ::= SEQUENCE {
    radioResourceConfigDedicatedSCG-r12 RadioResourceConfigDedicatedSCG-r12 OPTIONAL, -- Need ON
    sCellToReleaseListSCG-r12 SCellToReleaseList-r10 OPTIONAL, -- Need ON
    pSCellToAddMod-r12 PCellToAddMod-r12 OPTIONAL, -- Need ON
    sCellToAddModListSCG-r12 SCellToAddModList-r10 OPTIONAL, -- Need ON
    mobilityControlInfoSCG-r12 MobilityControlInfoSCG-r12 OPTIONAL, -- Need ON
    ...
}

SCG-ConfigPartSCG-v12f0 ::= SEQUENCE {
    pSCellToAddMod-v12f0 PCellToAddMod-v12f0 OPTIONAL, -- Need ON
    sCellToAddModListSCG-v12f0 SCellToAddModList-v1010 OPTIONAL -- Need ON
}
SCG-ConfigPartSCG-v13c0 ::= SEQUENCE {
    sCellToAddModListSCG-v13c0    SCellToAddModList-v13c0  OPTIONAL, -- Need ON
    sCellToAddModListSCG-Ext-v13c0 SCellToAddModListExt-v13c0  OPTIONAL -- Need ON
}

SecurityConfigHO ::= SEQUENCE {
    handoverType  CHOICE {
        intraLTE SEQUENCE {
            securityAlgorithmConfig    SecurityAlgorithmConfig  OPTIONAL, -- Cond
            keyChangeIndicator     BOOLEAN,
            nextHopChainingCount    NextHopChainingCount
        },
        interRAT SEQUENCE {
            securityAlgorithmConfig    SecurityAlgorithmConfig,
            nas-SecurityParamToEUTRA   OCTET STRING (SIZE(6))
        }
    },
    ...}

-- ASN1STOP
### RRCConnectionReconfiguration field descriptions

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dedicatedInfoNASList</td>
<td>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.</td>
</tr>
<tr>
<td>fullConfig</td>
<td>Indicates the full configuration option is applicable for the RRC Connection Reconfiguration message.</td>
</tr>
<tr>
<td>keyChangeIndicator</td>
<td>true is used only in an intra-cell handover when a K_{ANB} key is derived from a K_{ASME} key taken into use through the latest successful NAS SMC procedure, as described in TS 33.401 [32] for K_{ANB} re-keying. false is used in an intra-LTE handover when the new K_{ANB} key is obtained from the current K_{ANB} key or from the NH as described in TS 33.401 [32].</td>
</tr>
<tr>
<td>lwa-Configuration</td>
<td>This field is used to provide parameters for LWA configuration. E-UTRAN does not simultaneously configure LWA with DC, LWIP or RCLWI for a UE.</td>
</tr>
<tr>
<td>lwip-Configuration</td>
<td>This field is used to provide parameters for LWIP configuration. E-UTRAN does not simultaneously configure LWIP with DC, LWA or RCLWI for a UE.</td>
</tr>
<tr>
<td>nas-securityParamToEUTRA</td>
<td>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-RAT handover to E-UTRA. The content is defined in TS 24.301.</td>
</tr>
<tr>
<td>networkControlledSyncTx</td>
<td>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.</td>
</tr>
</tbody>
</table>

- **nextHopChainingCount**
  - Parameter NCC: See TS 33.401 [32]

- **p-MeNB**
  - Indicates the guaranteed power for the MeNB, as specified in TS 36.213 [23]. The value N corresponds to N-1 in TS 36.213 [23].

- **powerControlMode**
  - Indicates the power control mode used in DC. Value 1 corresponds to DC power control mode 1 and value 2 indicates DC power control mode 2, as specified in TS 36.213 [23].

- **p-SeNB**
  - Indicates the guaranteed power for the SeNB as specified in TS 36.213 [23, Table 5.1.4.2-1]. The value N corresponds to N-1 in TS 36.213 [23].

- **rclwi-Configuration**
  - WLAN traffic steering command as specified in 5.6.16.2. E-UTRAN does not simultaneously configure RCLWI with DC, LWA or LWIP for a UE.

- **sCellIndex**
  - In case of DC, the SCellIndex is unique within the scope of the UE i.e. an SCG cell can not use the same value as used for an MCG cell. For pSCellToAddMod, if sCellIndex-r13 is present the UE shall ignore sCellIndex-r12. sCellIndex-r13 in sCellToAddModListExt-r13 shall not have same values as sCellIndex-r10 in sCellToAddModList-r10.

- **sCellToAddModList, sCellToAddModListExt**
  - Indicates the SCell to be added or modified. Field sCellToAddModList is used to add the first 4 SCells for a UE with sCellIndex-r10 while sCellToAddModListExt is used to add the rest. If E-UTRAN includes sCellToAddModList-v10 it includes the same number of entries, and listed in the same order, as in sCellToAddModList-r10. If E-UTRAN includes sCellToAddModListExt-v10 it includes the same number of entries, and listed in the same order, as in sCellToAddModListExt-r10. If E-UTRAN includes sCellToAddModListExt-v13c0 it includes the same number of entries, and listed in the same order, as in sCellToAddModListExt-r13.

- **sCellToReleaseListSCG, sCellToReleaseListSCG-Ext**
  - Indicates the SCG cell to be released. The field is also used to release the PSCell e.g. upon change of PSCell, upon system information change for the PSCell.

- **scg-Counter**
  - A counter used upon initial configuration of SCG security as well as upon refresh of S-K_{ANB}. E-UTRAN includes the field upon SCG change when one or more SCG DRBs are configured. Otherwise E-UTRAN does not include the field.

- **systemInformationBlockType1Dedicated**
  - This field is used to transfer SystemInformationBlockType1 or SystemInformationBlockType1-BR to the UE.

- **t350**
  - Timer T350 as described in section 7.3. Value minN corresponds to N minutes.
### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARFCN-max</td>
<td>The field is mandatory present if dl-CarrierFreq-r10 is included and set to maxEARFCN. Otherwise the field is not present.</td>
</tr>
<tr>
<td>fullConfig</td>
<td>This field is mandatory present for handover within E-UTRA when the fullConfig is included; otherwise it is optionally present, Need OP.</td>
</tr>
<tr>
<td>HO</td>
<td>The field is mandatory present in case of handover within E-UTRA or to E-UTRA; otherwise the field is not present.</td>
</tr>
<tr>
<td>HO-Reestab</td>
<td>This field is optionally present, need ON, in case of handover within E-UTRA or upon the first reconfiguration after RRC connection re-establishment; otherwise the field is not present.</td>
</tr>
<tr>
<td>HO-toEUTRA</td>
<td>The field is mandatory present in case of handover to E-UTRA or for reconfigurations when fullConfig is included; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td>nonFullConfig</td>
<td>The field is not present when the fullConfig is included or in case of handover to E-UTRA; otherwise it is optional present, need ON.</td>
</tr>
<tr>
<td>nonHO</td>
<td>The field is not present in case of handover within E-UTRA or to E-UTRA; otherwise it is optional present, need ON.</td>
</tr>
<tr>
<td>SCellAdd</td>
<td>The field is mandatory present upon SCell addition; otherwise it is not present.</td>
</tr>
<tr>
<td>SCellAdd2</td>
<td>The field is mandatory present upon SCell addition; otherwise it is optionally present, need ON.</td>
</tr>
</tbody>
</table>

--

**RRCConnectionReconfigurationComplete**

The `RRCConnectionReconfigurationComplete` message is used to confirm the successful completion of an RRC connection reconfiguration.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

**RRCConnectionReconfigurationComplete message**

```asn1
-- ASN1START
RRCConnectionReconfigurationComplete ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,  
  criticalExtensions     CHOICE {
    rrcConnectionReconfigurationComplete-r8 
      RRCConnectionReconfigurationComplete-r8-IEs,  
    criticalExtensionsFuture   SEQUENCE {} 
  }
}
RRCConnectionReconfigurationComplete-r8-IEs ::= SEQUENCE {
  nonCriticalExtension    RRCConnectionReconfigurationComplete-v8a0-IEs OPTIONAL 
}
RRCConnectionReconfigurationComplete-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING OPTIONAL,  
  nonCriticalExtension    RRCConnectionReconfigurationComplete-v1020-IEs OPTIONAL 
}
RRCConnectionReconfigurationComplete-v1020-IEs ::= SEQUENCE {
  rlf-InfoAvailable-r10    ENUMERATED {true} OPTIONAL,  
  logMeasAvailable-r10     ENUMERATED {true} OPTIONAL,  
  nonCriticalExtension    RRCConnectionReconfigurationComplete-v1130-IEs OPTIONAL 
}
RRCConnectionReconfigurationComplete-v1130-IEs ::= SEQUENCE {
  connEstFailInfoAvailable-r11 ENUMERATED {true} OPTIONAL,  
  nonCriticalExtension    RRCConnectionReconfigurationComplete-v1250-IEs OPTIONAL 
}
RRCConnectionReconfigurationComplete-v1250-IEs ::= SEQUENCE {
  logMeasAvailableMBSFN-r12 ENUMERATED {true} OPTIONAL,  
  nonCriticalExtension    SEQUENCE {} OPTIONAL
-- ASN1END
```
The **RRCConnectionReestablishment** message is used to re-establish SRB1.

- Signalling radio bearer: SRB0
- RLC-SAP: TM
- Logical channel: CCCH
- Direction: E-UTRAN to UE

**RRCConnectionReestablishment message**

---

```asn1
RRCConnectionReestablishment ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1    CHOICE{
      rrcConnectionReestablishment-r8  RRCConnectionReestablishment-r8-IEs,
      spare7 NULL,
      spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {} } }
```

```asn1
RRCConnectionReestablishment-r8-IEs ::= SEQUENCE {
  radioResourceConfigDedicated  RadioResourceConfigDedicated,
  nextHopChainingCount    NextHopChainingCount,
  nonCriticalExtension    RRCConnectionReestablishment-v8a0-IEs OPTIONAL }
```

```asn1
RRCConnectionReestablishment-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL }
```

---

**RRCConnectionReestablishmentComplete**

The **RRCConnectionReestablishmentComplete** 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 E-UTRAN

**RRCConnectionReestablishmentComplete message**

---

```asn1
RRCConnectionReestablishmentComplete ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    rrcConnectionReestablishmentComplete-r8  RRCConnectionReestablishmentComplete-r8-IEs,
    criticalExtensionsFuture   SEQUENCE {} } }
```
**RRConnectionReestabishmentComplete-r8-IEs ::= SEQUENCE {**
  nonCriticalExtension RRConnectionReestabishmentComplete-v920-IEs OPTIONAL }

**RRConnectionReestabishmentComplete-v920-IEs ::= SEQUENCE {**
  rlf-InfoAvailable-r9 ENUMERATED {true} OPTIONAL,
  nonCriticalExtension RRConnectionReestabishmentComplete-v8a0-IEs OPTIONAL }

**RRConnectionReestabishmentComplete-v8a0-IEs ::= SEQUENCE {**
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension RRConnectionReestabishmentComplete-v1020-IEs OPTIONAL }

**RRConnectionReestabishmentComplete-v1020-IEs ::= SEQUENCE {**
  logMeasAvailable-r10 ENUMERATED {true} OPTIONAL,
  nonCriticalExtension RRConnectionReestabishmentComplete-v1130-IEs OPTIONAL }

**RRConnectionReestabishmentComplete-v1130-IEs ::= SEQUENCE {**
  connEstFailInfoAvailable-r11 ENUMERATED {true} OPTIONAL,
  nonCriticalExtension RRConnectionReestabishmentComplete-v1250-IEs OPTIONAL }

**RRConnectionReestabishmentComplete-v1250-IEs ::= SEQUENCE {**
  logMeasAvailableMBSFN-r12 ENUMERATED {true} OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL }

-- ASN1STOP

---

**RRConnectionReestabishmentComplete field descriptions**

rlf-InfoAvailable
This field is used to indicate the availability of radio link failure or handover failure related measurements

---

**RRConnectionReestabishmentReject**

The **RRConnectionReestabishmentReject** message is used to indicate the rejection of an RRC connection reestablishment request.

- **Signalling radio bearer:** SRB0
- **RLC-SAP:** TM
- **Logical channel:** CCCH
- **Direction:** E-UTRAN to UE

**RRConnectionReestabishmentReject message**

-- ASN1START

**RRConnectionReestabishmentReject ::= SEQUENCE {**
  criticalExtensions CHOICE {**
    rrcConnectionReestabishmentReject-r8 RRConnectionReestabishmentReject-r8-IEs,
    criticalExtensionsFuture SEQUENCE {**
  }

**RRConnectionReestabishmentReject-r8-IEs ::= SEQUENCE {**
  nonCriticalExtension RRConnectionReestabishmentReject-v8a0-IEs OPTIONAL }

**RRConnectionReestabishmentReject-v8a0-IEs ::= SEQUENCE {**
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL }

-- ASN1STOP
The **RRCConnectionReestablishmentRequest** message is used to request the reestablishment of an RRC connection.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to E-UTRAN

**RRCConnectionReestablishmentRequest message**

```asn1
RRCConnectionReestablishmentRequest ::= SEQUENCE {
    criticalExtensions     CHOICE {
        rrcConnectionReestablishmentRequest-r8
            RRCConnectionReestablishmentRequest-r8-IEs,
        criticalExtensionsFuture   SEQUENCE {}}
}
RRCConnectionReestablishmentRequest-r8-IEs ::= SEQUENCE {
    ue-Identity       ReestabUE-Identity,
    reestablishmentCause    ReestablishmentCause,
    spare        BIT STRING (SIZE (2))}
ReestabUE-Identity ::=    SEQUENCE {
    c-RNTI        C-RNTI,
    physCellId       PhysCellId,
    shortMAC-I       ShortMAC-I}
ReestablishmentCause ::=   ENUMERATED {
    reconfigurationFailure, handoverFailure,
    otherFailure, spare1}
```

**RRCConnectionReestablishmentRequest field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>physCellId</td>
<td>The Physical Cell Identity of the PCell the UE was connected to prior to the failure.</td>
</tr>
<tr>
<td>reestablishmentCause</td>
<td>Indicates the failure cause that triggered the re-establishment procedure. eNB is not expected to reject a RRCConnectionReestablishmentRequest due to unknown cause value being used by the UE.</td>
</tr>
<tr>
<td>ue-Identity</td>
<td>UE identity included to retrieve UE context and to facilitate contention resolution by lower layers.</td>
</tr>
</tbody>
</table>

The **RRCConnectionReject** message is used to reject the RRC connection establishment.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: E-UTRAN to UE

**RRCConnectionReject message**

```asn1
RRCConnectionReject ::= SEQUENCE {
    criticalExtensions     CHOICE {
        c1         CHOICE {
            c-RNTI, C-RNTI,
            physCellId, PhysCellId,
            shortMAC-I, ShortMAC-I}
    }
}
```
RRCConnectionReject field descriptions

deprioritisationReq
Indicates whether the current frequency or RAT is to be de-prioritised. The UE shall be able to store a de-prioritisation request for up to 8 frequencies (applicable when receiving another frequency specific de-prioritisation request before T325 expiry).

deprioritisationTimer
Indicates the period for which either the current carrier frequency or E-UTRA is de-prioritised. Value minN corresponds to N minutes.

extendedWaitTime
Value in seconds for the wait time for Delay Tolerant access requests.

rrc-SuspendIndication
If present, this field indicates that the UE should remain suspended and not release its stored context.

waitTime
Wait time value in seconds.

The RRCConnectionRelease message is used to command the release of an RRC connection.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

RRCConnectionRelease message

-- ASN1START

RRCConnectionRelease ::= SEQUENCE {
    rrc-TransactionIdentifier     RRC-TransactionIdentifier,
} -- ASN1STOP
criticalExtensions  
   CHOICE {  
      c1  
         CHOICE {  
            rrcConnectionRelease-r8  
            RRCConnectionRelease-v890-IEs,  
            spare3 NULL, spare2 NULL, spare1 NULL  
         },  
      criticalExtensionsFuture  
         SEQUENCE ()  
   }  

RRCConnectionRelease-r8-IEs ::=  
   SEQUENCE {  
      releaseCause  
         ReleaseCause,  
      redirectedCarrierInfo  
         RedirectedCarrierInfo OPTIONAL, -- Need ON  
      idleModeMobilityControlInfo  
         IdleModeMobilityControlInfo OPTIONAL, -- Need OP  
      nonCriticalExtension  
         RRCConnectionRelease-v890-IEs OPTIONAL  
   }  

RRCConnectionRelease-v890-IEs ::=  
   SEQUENCE {  
      lateNonCriticalExtension  
         OCTET STRING (CONTAINING RRCConnectionRelease-v9e0-IEs)  
         OPTIONAL,  
      nonCriticalExtension  
         RRCConnectionRelease-v920-IEs OPTIONAL  
   }  

   -- Late non critical extensions  
RRCConnectionRelease-v9e0-IEs ::=  
   SEQUENCE {  
      redirectedCarrierInfo-v9e0  
         RedirectedCarrierInfo-v9e0 OPTIONAL, -- Cond  
      NoRedirect-r8  
      IdleInfoEUTRA  
      nonCriticalExtension  
         SEQUENCE () OPTIONAL  
   }  

   -- Regular non critical extensions  
RRCConnectionRelease-v920-IEs ::=  
   SEQUENCE {  
      cellInfoList-r9  
         CHOICE {  
            geran-r9  
               CellInfoListGERAN-r9,  
            utra-FDD-r9  
               CellInfoListUTRA-FDD-r9,  
            utra-TDD-r9  
               CellInfoListUTRA-TDD-r9,  
            ...  
            utra-TDD-r10  
               CellInfoListUTRA-TDD-r10  
               OPTIONAL, -- Cond Redirection  
         },  
      nonCriticalExtension  
         RRCConnectionRelease-v1020-IEs OPTIONAL  
   }  

RRCConnectionRelease-v1020-IEs ::=  
   SEQUENCE {  
      extendedWaitTime-r10  
         INTEGER (1..1800) OPTIONAL, -- Need ON  
      nonCriticalExtension  
         RRCConnectionRelease-v1320-IEs OPTIONAL  
   }  

RRCConnectionRelease-v1320-IEs ::=  
   SEQUENCE {  
      resumeIdentity-r13  
         ResumeIdentity-r13 OPTIONAL, -- Need OR  
      nonCriticalExtension  
         SEQUENCE () OPTIONAL  
   }  

ReleaseCause ::=  
   ENUMERATED {loadBalancingTAUrequired,  
                other, cs-FallbackHighPriority-v1020, rrc-Suspend-v1320}  

RedirectedCarrierInfo ::=  
   CHOICE {  
      eutra  
         ARFCN-ValueEUTRA,  
      geran  
         CarrierFreqsGERAN,  
      utra-FDD  
         ARFCN-ValueUTRA,  
      utra-TDD  
         ARFCN-ValueUTRA,  
      cdma2000-HRPD  
         CarrierFreqCDMA2000,  
      cdma2000-1xRTT  
         CarrierFreqCDMA2000,  
      ...  
      utra-TDD-r10  
         CarrierFreqListUTRA-TDD-r10  
   }  

RedirectedCarrierInfo-v9e0 ::=  
   SEQUENCE {  
      eutra-v9e0  
         ARFCN-ValueEUTRA-v9e0  
   }  

CarrierFreqListUTRA-TDD-r10 ::=  
   SEQUENCE (SIZE (1..maxFreqUTRA-TDD-r10)) OF ARFCN-ValueUTRA  

IdleModeMobilityControlInfo ::=  
   SEQUENCE {  
      freqPriorityListEUTRA  
         FreqPriorityListEUTRA OPTIONAL, -- Need ON  
      freqPriorityListGERAN  
         FreqPriorityListGERAN OPTIONAL, -- Need ON  
      freqPriorityListUTRA-FDD  
         FreqPriorityListUTRA-FDD OPTIONAL, -- Need ON  
      freqPriorityListUTRA-TDD  
         FreqPriorityListUTRA-TDD OPTIONAL, -- Need ON  
   }
IdleModeMobilityControlInfo-v9e0 ::= SEQUENCE {
  freqPriorityListEUTRA-v9e0  SEQUENCE  OF FreqPriorityEUTRA-v9e0
}

FreqPriorityListEUTRA ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA

FreqPriorityEUTRA ::= SEQUENCE {
  carrierFreq       ARFCN-ValueEUTRA,
  cellReselectionPriority    CellReselectionPriority
}

FreqPriorityListEUTRA-v9e0 ::= SEQUENCE {
  carrierFreq-v9e0     ARFCN-ValueEUTRA-v9e0  OPTIONAL -- Cond EARFCN-max
}

FreqPriorityListEUTRA-v1310 ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-v1310

FreqPriorityListEUTRA-v1310 ::= SEQUENCE {
  carrierFreq-r12       ARFCN-ValueEUTRA-r9,
  cellReselectionPriority-r12 CellReselectionPriority
}

FreqPriorityListUTRA-FDD ::= SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF FreqPriorityUTRA-FDD

FreqPriorityListUTRA-FDD ::= SEQUENCE {
  carrierFreq       ARFCN-ValueUTRA,
  cellReselectionPriority    CellReselectionPriority
}

FreqPriorityListUTRA-TDD ::= SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF FreqPriorityUTRA-TDD

FreqPriorityListUTRA-TDD ::= SEQUENCE {
  carrierFreq       ARFCN-ValueUTRA,
  cellReselectionPriority    CellReselectionPriority
}

BandClassPriorityListHRPD ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandClassPriorityHRPD

BandClassPriorityList1XRTT ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandClassPriority1XRTT

BandClassPriorityHRPD ::= SEQUENCE {
  bandClass       BandclassCDMA2000,
  cellReselectionPriority    CellReselectionPriority
}

BandClassPriority1XRTT ::= SEQUENCE {
  bandClass       BandclassCDMA1XRTT,
  cellReselectionPriority    CellReselectionPriority
}
bandClass BandclassCDMA2000, 
cellReselectionPriority CellReselectionPriority 
}

CellInfoListGERAN-r9 ::= SEQUENCE (SIZE (1..maxCellInfoGERAN-r9)) OF CellInfoGERAN-r9

CellInfoGERAN-r9 ::= SEQUENCE {
  physCellId-r9 PhysCellIdGERAN,
  carrierFreq-r9 CarrierFreqGERAN,
  systemInformation-r9 SystemInfoListGERAN
}

CellInfoListUTRA-FDD-r9 ::= SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-FDD-r9

CellInfoUTRA-FDD-r9 ::= SEQUENCE {
  physCellId-r9 PhysCellIdUTRA-FDD,
  utra-BCCH-Container-r9 OCTET STRING
}

CellInfoListUTRA-TDD-r9 ::= SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-TDD-r9

CellInfoUTRA-TDD-r9 ::= SEQUENCE {
  physCellId-r9 PhysCellIdUTRA-TDD,
  utra-BCCH-Container-r9 OCTET STRING
}

CellInfoListUTRA-TDD-r10 ::= SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-TDD-r10

CellInfoUTRA-TDD-r10 ::= SEQUENCE {
  physCellId-r10 PhysCellIdUTRA-TDD,
  carrierFreq-r10 ARFCN-ValueUTRA,
  utra-BCCH-Container-r10 OCTET STRING
}

-- ASN1STOP
**RRConnectionRelease field descriptions**

<table>
<thead>
<tr>
<th>carrierFreq or bandClass</th>
<th>The carrier frequency (UTRA and E-UTRA) and band class (HRPD and 1xRTT) for which the associated cellReselectionPriority is applied.</th>
</tr>
</thead>
<tbody>
<tr>
<td>carrierFreqs</td>
<td>The list of GERAN carrier frequencies organised into one group of GERAN carrier frequencies.</td>
</tr>
<tr>
<td>cellInfoList</td>
<td>Used to provide system information of one or more cells on the redirected inter-RAT carrier frequency. The system information can be used if, upon redirection, the UE selects an inter-RAT cell indicated by the physCellId and carrierFreq (GERAN and UTRA TDD) or by the physCellId (other RATs). The choice shall match the redirectedCarrierInfo. In particular, E-UTRAN only applies value utra-TDD-r10 in case redirectedCarrierInfo is set to utra-TDD-r10.</td>
</tr>
<tr>
<td>extendedWaitTime</td>
<td>Value in seconds for the wait time for Delay Tolerant access requests.</td>
</tr>
<tr>
<td>freqPriorityListX</td>
<td>Provides a cell reselection priority for each frequency, by means of separate lists for each RAT (including E-UTRA). The UE shall be able to store at least 3 occurrences of freqPriorityGERAN. If E-UTRAN includes freqPriorityListEUTRA-v9e0 and/or freqPriorityListEUTRA-v1310 it includes the same number of entries, and listed in the same order, as in freqPriorityListEUTRA (i.e. without suffix). Field freqPriorityListExt includes additional neighbouring inter-frequencies, i.e. extending the size of the inter-frequency carrier list using the general principles specified in 5.1.2. EUTRAN only includes freqPriorityListExtEUTRA if freqPriorityListEUTRA (i.e without suffix) includes maxFreq entries. If E-UTRAN includes freqPriorityListExtEUTRA-v1310 it includes the same number of entries, and listed in the same order, as in freqPriorityListExtEUTRA-r12.</td>
</tr>
<tr>
<td>idleModeMobilityControlInfo</td>
<td>Provides dedicated cell reselection priorities. Used for cell reselection as specified in TS 36.304 [4]. For E-UTRA and UTRA frequencies, a UE that supports multi-band cells for the concerned RAT considers the dedicated priorities to be common for all overlapping bands (i.e. regardless of the ARFCN that is used).</td>
</tr>
<tr>
<td>redirectedCarrierInfo</td>
<td>The redirectedCarrierInfo indicates a carrier frequency (downlink for FDD) and is used to redirect the UE to an E-UTRA or an inter-RAT carrier frequency, by means of the cell selection upon leaving RRC_CONNECTED as specified in TS 36.304 [4].</td>
</tr>
<tr>
<td>releaseCause</td>
<td>The releaseCause is used to indicate the reason for releasing the RRC Connection. The cause value cs-FallbackHighPriority is only applicable when redirectedCarrierInfo is present with the value set to utra-FDD, utra-TDD or utra-TDD-r10. E-UTRAN should not set the releaseCause to loadBalancingTAURequired or to cs-FallbackHighPriority if the extendedWaitTime is present.</td>
</tr>
<tr>
<td>systemInformation</td>
<td>Container for system information of the GERAN cell i.e. one or more System Information (SI) messages as defined in TS 44.018 [45, table 9.1.1].</td>
</tr>
<tr>
<td>t320</td>
<td>Timer T320 as described in section 7.3. Value minN corresponds to N minutes.</td>
</tr>
<tr>
<td>utra-BCCCH-Container</td>
<td>Contains System Information Container message as defined in TS 25.331 [19].</td>
</tr>
</tbody>
</table>

**Conditional presence**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARFCN-max</td>
<td>The field is mandatory present if the corresponding carrierFreq (i.e. without suffix) is set to maxEARFCN. Otherwise the field is not present.</td>
</tr>
<tr>
<td>IdleInfoEUTRA</td>
<td>The field is optionally present, need OP, if the IdleModeMobilityControlInfo (i.e. without suffix) is included and includes freqPriorityListEUTRA; otherwise the field is not present.</td>
</tr>
<tr>
<td>NoRedirect-r8</td>
<td>The field is optionally present, need OP, if the redirectedCarrierInfo (i.e. without suffix) is not included; otherwise the field is not present.</td>
</tr>
<tr>
<td>Redirection</td>
<td>The field is optionally present, need ON, if the redirectedCarrierInfo is included and set to geran, utra-FDD, utra-TDD or utra-TDD-r10; otherwise the field is not present.</td>
</tr>
</tbody>
</table>

**RRConnectionRequest**

The **RRConnectionRequest** message is used to request the establishment of an RRC connection.
Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: UE to E-UTRAN

**RRCConnectionRequest message**

```asn1
RRCConnectionRequest ::= SEQUENCE {
  criticalExtensions     CHOICE {
    rrcConnectionRequest-r8    RRCConnectionRequest-r8-IEs,
    criticalExtensionsFuture   SEQUENCE {} }
}

RRCConnectionRequest-r8-IEs ::=  SEQUENCE {
  ue-Identity       InitialUE-Identity,
  establishmentCause     EstablishmentCause,
  spare        BIT STRING (SIZE (1))
}

InitialUE-Identity ::=    CHOICE {
  s-TMSI        S-TMSI,
  randomValue       BIT STRING (SIZE (40))
}

EstablishmentCause ::=    ENUMERATED {
  emergency, highPriorityAccess, mt-Access, mo-Signalling,
  mo-Data, delayTolerantAccess-v1020, mo-VoiceCall-v1280,
  spare1}
```

**RRCConnectionRequest field descriptions**

- **establishmentCause**
  Provides the establishment cause for the RRC connection request as provided by the upper layers. W.r.t. the cause value names: highPriorityAccess concerns AC11..AC15, 'mt' stands for 'Mobile Terminating' and 'mo' for 'Mobile Originating. eNB is not expected to reject a **RRCConnectionRequest** due to unknown cause value being used by the UE.

- **randomValue**
  Integer value in the range 0 to $2^{40} - 1$.

- **ue-Identity**
  UE identity included to facilitate contention resolution by lower layers.

**-- RRCConnectionResume**

The **RRCConnectionResume** message is used to resume the suspended RRC connection.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: E-UTRAN to UE

**RRCConnectionResume message**

```asn1
RRCConnectionResume ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1         CHOICE {
      rrcConnectionResume-r13    RRCConnectionResume-r13-IEs,
      spare3        NULL,
      spare2        NULL,
    }}
}
```

**-- ASN1STOP**
sparel NULL
,
criticalExtensionsFuture SEQUENCE {}
}
}

RRCConnectionResume-r13-IEs ::= SEQUENCE {
radioResourceConfigDedicated-r13  RadioResourceConfigDedicated OPTIONAL, -- Need ON
nextHopChainingCount-r13    NextHopChainingCount,
measConfig-r13    MeasConfig OPTIONAL, -- Need ON
antennaInfoDedicatedPCell-r13   AntennaInfoDedicated-v10i0 OPTIONAL, -- Need ON
drb-ContinueROHC-r13     ENUMERATED {true} OPTIONAL, -- Need OP
lateNonCriticalExtension    OCTET STRING OPTIONAL,
nonCriticalExtension    SEQUENCE {} OPTIONAL
}
-- ASN1STOP

**RRCConnectionResume field descriptions**

**drb-ContinueROHC**

This field indicates whether to continue or reset the header compression protocol context for the DRBs configured with the header compression protocol. Presence of the field indicates that the header compression protocol context continues while absence indicates that the header compression protocol context is reset.

--

**RRCConnectionResumeComplete**

The **RRCConnectionResumeComplete** 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 E-UTRAN

**RRCConnectionResumeComplete message**

-- ASN1START

RRCConnectionResumeComplete-r13 ::= SEQUENCE {
  rrc-TransactionIdentifier    RRC-TransactionIdentifier,
criticalExtensions       CHOICE {
    rrcConnectionResumeComplete-r13    RRCConnectionResumeComplete-r13-IEs,
criticalExtensionsFuture     SEQUENCE {}
  }
}
RRCConnectionResumeComplete-r13-IEs ::= SEQUENCE {
  selectedPLMN-Identity-r13   INTEGER (1..maxPLMN-r11) OPTIONAL,
dedicatedInfoNAS-r13    DedicatedInfoNAS OPTIONAL,
rlf-InfoAvailable-r13    ENUMERATED {true} OPTIONAL,
logMeasAvailable-r13    ENUMERATED {true} OPTIONAL,
connEstFailInfoAvailable-r13 ENUMERATED {true} OPTIONAL,
mobilityState-r13     ENUMERATED {normal, medium, high, spare} OPTIONAL,
logMeasAvailableMBSFN-r13 ENUMERATED {true} OPTIONAL,
lateNonCriticalExtension   OCTET STRING OPTIONAL,
nonCriticalExtension    SEQUENCE {} OPTIONAL
}
-- ASN1STOP

--

**RRCConnectionResumeRequest**

The **RRCConnectionResumeRequest** message is used to request the resumption of a suspended RRC connection.
Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: UE to E-UTRAN

**RRCConnectionResumeRequest message**

```asn1
RRCConnectionResumeRequest-r13 ::= SEQUENCE {
  criticalExtensions CHOICE {
    rrcConnectionResumeRequest-r13 RRCConnectionResumeRequest-r13-IEs,
    criticalExtensionsFuture SEQUENCE {}
  }
}

RRCConnectionResumeRequest-r13-IEs ::= SEQUENCE {
  resumeIdentity-r13 CHOICE {
    resumeID-r13 ResumeIdentity-r13,
    truncatedResumeID-r13 BIT STRING (SIZE (24))
  },
  shortResumeMAC-I-r13 BIT STRING (SIZE (16)),
  resumeCause-r13 ResumeCause,
  spare BIT STRING (SIZE (1))
}

ResumeCause ::= ENUMERATED {
  emergency, highPriorityAccess, mt-Access, mo-Signalling,
  mo-Data, delayTolerantAccess-v1020, mo-VoiceCall-v1280,
  spare1}
```

**RRCConnectionResumeRequest field descriptions**

- **resumeCause**
  Provides the resume cause for the RRC connection resume request as provided by the upper layers.

- **resumeidentity**
  UE identity to facilitate UE context retrieval at eNB

- **shortResumeMAC-I**
  Authentication token to facilitate UE authentication at eNB

---

**RRCConnectionSetup**

The **RRCConnectionSetup** message is used to establish SRB1.

Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: E-UTRAN to UE

**RRCConnectionSetup message**

```asn1
RRCConnectionSetup ::= SEQUENCE {
  rrc-TransactionIdentifier    RRC-TransactionIdentifier,
  criticalExtensions CHOICE {
    c1 CHOICE {
      rrcConnectionSetup-r8 RRCConnectionSetup-r8-IEs,
      spare7 NULL,
      spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {}
  }
}
```
The **RRCConnectionSetupComplete** 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 E-UTRAN

--- ASN1START

```
RRCConnectionSetupComplete ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1         CHOICE{
      rrcConnectionSetupComplete-r8  RRCConnectionSetupComplete-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {} 
  }
}
```

```
RRCConnectionSetupComplete-r8-IEs ::= SEQUENCE {
  selectedPLMN-Identity    INTEGER (1..maxPLMN-r11),
  registeredMME      RegisteredMME      OPTIONAL,
  dedicatedInfoNAS     DedicatedInfoNAS,
  nonCriticalExtension    RRCConnectionSetupComplete-v8a0-IEs OPTIONAL
}
```

```
RRCConnectionSetupComplete-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    RRCConnectionSetupComplete-v1020-IEs OPTIONAL
}
```

```
RRCConnectionSetupComplete-v1020-IEs ::= SEQUENCE {
  gummei-Type-r10      ENUMERATED {native, mapped}   OPTIONAL,
  rlf-InfoAvailable-r10    ENUMERATED {true}     OPTIONAL,
  logMeasAvailable-r10    ENUMERATED {true}     OPTIONAL,
  rn-SubframeConfigReq-r10   ENUMERATED {required, notRequired} OPTIONAL,
  nonCriticalExtension    RRCConnectionSetupComplete-v1130-IEs OPTIONAL
}
```

```
RRCConnectionSetupComplete-v1130-IEs ::= SEQUENCE {
  connEstFailInfoAvailable-r11  ENUMERATED {true}    OPTIONAL,
  nonCriticalExtension    RRCConnectionSetupComplete-v1250-IEs  OPTIONAL
}
```

```
RRCConnectionSetupComplete-v1250-IEs ::= SEQUENCE {
  mobilityState-r12     ENUMERATED {normal, medium, high, spare} OPTIONAL,
  mobilityHistoryAvail-r12      ENUMERATED {true}     OPTIONAL,
  logMeasAvailableMBSFN-r12   ENUMERATED {true}     OPTIONAL,
  nonCriticalExtension    RRCConnectionSetupComplete-v1320-IEs
}
```

--- ASN1STOP
RRCConnectionSetupComplete-v1320-IEs ::= SEQUENCE {
  ce-ModeB-r13     ENUMERATED {supported} OPTIONAL,
  s-TMSI-r13       S-TMSI OPTIONAL,
  attachWithoutPDN-Connectivity-r13
    ENUMERATED {true} OPTIONAL,
  up-CIoT-EPS-Optimisation-r13
    ENUMERATED {true} OPTIONAL,
  cp-CIoT-EPS-Optimisation-r13
    ENUMERATED {true} OPTIONAL,
  nonCriticalExtension
    RRCConnectionSetupComplete-v1330-IEs OPTIONAL
}

RRCConnectionSetupComplete-v1330-IEs ::= SEQUENCE {
  ue-CE-NeedULGaps-r13
    ENUMERATED {true} OPTIONAL,
  nonCriticalExtension
    SEQUENCE {} OPTIONAL
}

RegisteredMME ::= SEQUENCE {
  plmn-Identity     PLMN-Identity OPTIONAL,
  mmegi        BIT STRING (SIZE (16)),
  mmec        MMEC
}

-- ASN1STOP

RRCConnectionSetupComplete field descriptions

attachWithoutPDN-Connectivity
This field is used to indicate that the UE performs an Attach without PDN connectivity procedure, as indicated by the upper layers and specified in TS 24.301 [35].

cp-CIoT-EPS-Optimisation
This field is included when the UE supports the Control plane CIoT EPS Optimisation, as indicated by the upper layers, see TS 24.301 [35].

ce-ModeB
Indicates whether the UE supports operation in CE mode B, as specified in TS 36.306 [5].
gummei-Type
This field is used to indicate whether the GUMMEI included is native (assigned by EPC) or mapped (from 2G/3G identifiers).

mmegi
Provides the Group Identity of the registered MME within the PLMN, as provided by upper layers, see TS 23.003 [27].

mobilityState
This field indicates the UE mobility state (as defined in TS 36.304 [4, 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.

registeredMME
This field is used to transfer the GUMMEI of the MME where the UE is registered, as provided by upper layers.

rn-SubframeConfigReq
If present, this field indicates that the connection establishment is for an RN and whether a subframe configuration is requested or not.

selectedPLMN-Identity
Index of the PLMN selected by the UE from the plmn-IdentityList included in SIB1. 1 if the 1st PLMN is selected from the plmn-IdentityList included in SIB1, 2 if the 2nd PLMN is selected from the plmn-IdentityList included in SIB1 and so on.

up-CIoT-EPS-Optimisation
This field is included when the UE supports the User plane CIoT EPS Optimisation, as indicated by the upper layers, see TS 24.301 [35].

ue-CE-NeedULGaps
Indicates whether the UE needs uplink gaps during continuous uplink transmission in FDD as specified in TS 36.211 [21] and TS 36.306 [5].

-- SCGFailureInformation

The SCGFailureInformation message is used to provide information regarding failures detected by the UE.
Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: UE to E-UTRAN

**SCGFailureInformation message**

--- ASN1START

```asn1
SCGFailureInformation-r12 ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE {
      scgFailureInformation-r12 SCGFailureInformation-r12-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {}
  },
  failureReportSCG-r12 FailureReportSCG-r12 OPTIONAL,
  nonCriticalExtension SCGFailureInformation-v1310-IEs OPTIONAL
}

SCGFailureInformation-r12-IEs ::= SEQUENCE {
  failureReportSCG-r12 FailureReportSCG-r12-IEs OPTIONAL,
  nonCriticalExtension SCGFailureInformation-v1310-IEs OPTIONAL
}

SCGFailureInformation-v1310-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING (CONTAINING SCGFailureInformation-v12d0-IEs) OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- Late non-critical extensions:

SCGFailureInformation-v12d0-IEs ::= SEQUENCE {
  failureReportSCG-v12d0 FailureReportSCG-v12d0-IEs OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- Regular non-critical extensions:

FailureReportSCG-r12 ::= SEQUENCE {
  failureType-r12 ENUMERATED {t313-Expiry, randomAccessProblem,
    rlc-MaxNumRetx, scg-ChangeFailure },
  measResultServFreqList-r12 MeasResultServFreqList-r10 OPTIONAL,
  measResultServFreqListExt-r13 MeasResultServFreqListExt-r13 OPTIONAL
}

FailureReportSCG-v12d0 ::= SEQUENCE {
  measResultServFreqListExt-r13 MeasResultServFreqListExt-r13 OPTIONAL
}

-- ASN1STOP
```

---

**SCPTMConfiguration message**

The **SCPTMConfiguration** message contains the control information applicable for MBMS services transmitted via SC-MRB.

Signalling radio bearer: N/A
RLC-SAP: UM
Logical channel: SC-MCCH
Direction: E-UTRAN to UE

**SCPTMConfiguration message**
**SCPTMConfiguration** field descriptions

**sc-mtch-InfoList**
Provides the configuration of each SC-MTCH in the current cell.

**scptm-NeighbourCellList**
List of neighbour cells providing MBMS services via SC-MRB. When absent, the UE shall assume that MBMS services listed in the **SCPTMConfiguration** message are not provided via SC-MRB in any neighbour cell.

**p-b**
Parameter: $P_b$ for the PDSCH scrambled by G-RNTI, see TS 36.213 [23, Table 5.2-1].

---

**SecurityModeCommand**

The **SecurityModeCommand** message is used to command the activation of AS security.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: E-UTRAN to UE

**SecurityModeCommand message**

---

```asn1
SCPTMConfiguration-r13 ::= SEQUENCE {
  sc-mtch-InfoList-r13  SC-MTCH-InfoList-r13,
  scptm-NeighbourCellList-r13  SCPTM-NeighbourCellList-r13  OPTIONAL, -- Need OP
  lateNonCriticalExtension                    OCTET STRING      OPTIONAL,
  nonCriticalExtension                        SCPTMConfiguration-v1340       OPTIONAL
}

SCPTMConfiguration-v1340 ::= SEQUENCE {
  p-b-r13        INTEGER (0..3)   OPTIONAL, -- Need ON
  nonCriticalExtension    SEQUENCE {}    OPTIONAL
}

-- ASN1STOP
```

```asn1
-- ASN1START
SCPTMConfiguration ::= SEQUENCE {
  sc-mtch-InfoList-r13  SC-MTCH-InfoList-r13,
  scptm-NeighbourCellList-r13  SCPTM-NeighbourCellList-r13  OPTIONAL, -- Need OP
  lateNonCriticalExtension                    OCTET STRING      OPTIONAL,
  nonCriticalExtension                        SCPTMConfiguration-v1340       OPTIONAL
}

-- ASN1STOP
```
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 E-UTRAN

SecurityModeComplete message

```asnc
SecurityModeComplete ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    securityModeComplete-r8    SecurityModeComplete-r8-IEs,
    criticalExtensionsFuture   SEQUENCE {}
  }
}
```

SecurityModeComplete-r8-IEs ::= SEQUENCE {
  nonCriticalExtension    SecurityModeComplete-v8a0-IEs
  OPTIONAL
}

SecurityModeComplete-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

-- ASN1STOP

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 E-UTRAN

SecurityModeFailure message

```asnc
SecurityModeFailure ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    securityModeFailure-r8    SecurityModeFailure-r8-IEs,
    criticalExtensionsFuture   SEQUENCE {}
  }
}
```

SecurityModeFailure-r8-IEs ::= SEQUENCE {
  nonCriticalExtension    SecurityModeFailure-v8a0-IEs
  OPTIONAL
}

SecurityModeFailure-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

-- ASN1STOP
The *SidelinkUEInformation* message is used for the indication of sidelink information to the eNB.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

---

### SidelinkUEInformation message

```asn1
SidelinkUEInformation-r12 ::= SEQUENCE {
criticalExtensions    CHOICE {
c1        CHOICE {
sidelinkUEInformation-r12  SidelinkUEInformation-r12-IEs,
spare3 NULL, spare2 NULL, spare1 NULL
},
criticalExtensionsFuture   SEQUENCE {}
}
}
SidelinkUEInformation-r12-IEs ::= SEQUENCE {
commRxInterestedFreq-r12  ARFCN-ValueEUTRA-r9   OPTIONAL,
commTxResourceReq-r12   SL-CommTxResourceReq-r12 OPTIONAL,
discRxInterest-r12    ENUMERATED (true)   OPTIONAL,
discTxResourceReq-r12   INTEGER (1..63)    OPTIONAL,
lateNonCriticalExtension  OCTET STRING    OPTIONAL,
nonCriticalExtension   SidelinkUEInformation-v1310-IEs OPTIONAL
}
SidelinkUEInformation-v1310-IEs ::= SEQUENCE {
commTxResourceReqUC-r13  SL-CommTxResourceReq-r12 OPTIONAL,
commTxResourceInfoReqRelay-r13  SEQUENCE {
commTxResourceReqRelay-r13  SL-CommTxResourceReq-r12  OPTIONAL,
commTxResourceReqRelayUC-r13 SL-CommTxResourceReq-r12  OPTIONAL,
ue-Type-r13      ENUMERATED {relayUE, remoteUE} }
},
discTxResourceReq-v1310  SEQUENCE {
carrierFreqDiscTx-r13   INTEGER (1..maxFreq)  OPTIONAL,
discTxResourceReqAddFreq-r13  SL-DiscTxResourceReqPerFreqList-r13 OPTIONAL }
},
discTxResourceReqPS-r13  SL-DiscTxResourceReq-r13 OPTIONAL,
discRxGapReq-r13    SL-GapRequest-r13   OPTIONAL,
discTxGapReq-r13     SL-GapRequest-r13   OPTIONAL,
discSysInfoReportFreqList-r13  SL-DiscSysInfoReportFreqList-r13 OPTIONAL,
nonCriticalExtension   SEQUENCE {}     OPTIONAL
}
SL-CommTxResourceReq-r12 ::=  SEQUENCE {
carrierFreq-r12     ARFCN-ValueEUTRA-r9   OPTIONAL,
destinationInfoList-r12   SL-DestinationInfoList-r12
}
SL-DiscTxResourceReqPerFreqList-r13 ::= SEQUENCE (SIZE (1..maxFreq)) OF SL-DiscTxResourceReq-r13
SL-DiscTxResourceReq-r13 ::=  SEQUENCE {
carrierFreqDiscTx-r13   INTEGER (1..maxFreq)  OPTIONAL,
discTxResourceReqAddFreq-r13 SL-DiscTxResourceReqPerFreqList-r13 OPTIONAL }
}
SL-DestinationInfoList-r12 ::= SEQUENCE (SIZE (1..maxSL-Dest-r12)) OF SL-DestinationIdentity-r12
SL-DestinationIdentity-r12 ::= BIT STRING (SIZE (24))
```
### SidelinkUEInformation field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>carrierFreqDiscTx</td>
<td>Indicates the frequency by the index of the entry in field discInterFreqList within SystemInformationBlockType19. Value 1 corresponds to the first entry in discInterFreqList within SystemInformationBlockType19, value 2 corresponds to the second entry in this list and so on.</td>
</tr>
<tr>
<td>commRxInterestedFreq</td>
<td>Indicates the frequency on which the UE is interested to receive sidelink communication.</td>
</tr>
<tr>
<td>commTxResourceReq</td>
<td>Indicates the frequency on which the UE is interested to transmit non-relay related sidelink communication as well as the one-to-many sidelink communication transmission destination(s) for which the UE requests E-UTRAN to assign dedicated resources. NOTE 1.</td>
</tr>
<tr>
<td>commTxResourceReqRelay</td>
<td>Indicates the relay related one-to-many sidelink communication transmission destination(s) for which the sidelink relay UE requests E-UTRAN to assign dedicated resources.</td>
</tr>
<tr>
<td>commTxResourceReqRelayUC</td>
<td>Indicates the relay related one-to-one sidelink communication transmission destination(s) for which the sidelink relay UE or sidelink remote UE requests E-UTRAN to assign dedicated resources i.e. either contains the unicast destination identity of the sidelink relay UE or of the sidelink remote UE.</td>
</tr>
<tr>
<td>commTxResourceReqUC</td>
<td>Indicates the frequency on which the UE is interested to transmit non-relay related one-to-one sidelink communication as well as the sidelink communication transmission destination(s) for which the UE requests E-UTRAN to assign dedicated resources. NOTE 1.</td>
</tr>
<tr>
<td>destinationInfoList</td>
<td>Indicates the destination(s) for relay or non-relay related one-to-one or one-to-many sidelink communication. For one-to-one sidelink communication the destination is identified by the ProSe UE ID for unicast communication, while for one-to-many the destination it is identified by the ProSe Layer-2 Group ID as specified in TS 23.303 [68].</td>
</tr>
<tr>
<td>discRxInterest</td>
<td>Indicates that the UE is interested to monitor sidelink discovery announcements.</td>
</tr>
<tr>
<td>discSysInfoReportFreqList</td>
<td>Indicates, for one or more frequencies, a list of sidelink discovery related parameters acquired from system Information of cells on configured inter-frequency carriers.</td>
</tr>
<tr>
<td>discTxResourceReq</td>
<td>Indicates the number of separate discovery message(s) the UE wants to transmit every discovery period. This field concerns the resources the UE requires every discovery period for transmitting sidelink discovery announcement(s).</td>
</tr>
<tr>
<td>discTxResourceReqAddFreq</td>
<td>Indicates, for any frequencies in addition to the one covered by discTxResourceReq, the number of separate discovery message(s) the UE wants to transmit every discovery period. This field concerns the resources the UE requires every discovery period for transmitting sidelink discovery announcement(s).</td>
</tr>
<tr>
<td>discTxResourceReqPS</td>
<td>Indicates the number of separate PS related discovery message(s) the UE wants to transmit every discovery period. This field concerns the resources the UE requires every discovery period for transmitting PS related sidelink discovery announcement(s).</td>
</tr>
</tbody>
</table>

**NOTE 1:** When configuring commTxResourceReq, commTxResourceReqUC, commTxResourceReqRelay and commTxResourceReqRelayUC, E-UTRAN configures at most maxSL-Dest-r12 destinations in total (i.e. as included in the four fields together).

---

### SystemInformation

The **SystemInformation** message is used to convey one or more System Information Blocks. All the SIBs included are transmitted with the same periodicity. **SystemInformation-BR** uses the same structure as **SystemInformation**.

- Signalling radio bearer: N/A
- RLC-SAP: TM
- Logical channels: BCCH and BR-BCCH
- Direction: E-UTRAN to UE

---

**SystemInformation message**

```
-- ASN1START
SystemInformation-BR-r13 ::= SystemInformation
```
SystemInformation ::= SEQUENCE {
criticalExtensions CHOICE {
systemInformation-r8 SystemInformation-r8-IEs,
criticalExtensionsFuture SEQUENCE {}}
}
SystemInformation-r8-IEs ::= SEQUENCE {
sib-TypeAndInfo SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {
sib2 SystemInformationBlockType2,
sib3 SystemInformationBlockType3,
sib4 SystemInformationBlockType4,
sib5 SystemInformationBlockType5,
sib6 SystemInformationBlockType6,
sib7 SystemInformationBlockType7,
sib8 SystemInformationBlockType8,
sib9 SystemInformationBlockType9,
sib10 SystemInformationBlockType10,
sib11 SystemInformationBlockType11,
...,
sib12-v920 SystemInformationBlockType12-r9,
sib13-v920 SystemInformationBlockType13-r9,
sib14-v1130 SystemInformationBlockType14-r11,
sib15-v1130 SystemInformationBlockType15-r11,
sib16-v1130 SystemInformationBlockType16-r11,
sib17-v1250 SystemInformationBlockType17-r12,
sib18-v1250 SystemInformationBlockType18-r12,
sib19-v1250 SystemInformationBlockType19-r12,
sib20-v1310 SystemInformationBlockType20-r13
},
nonCriticalExtension SystemInformation-v8a0-IEs OPTIONAL
}
SystemInformation-v8a0-IEs ::= SEQUENCE {
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP

SystemInformationBlockType1

SystemInformationBlockType1 contains information relevant when evaluating if a UE is allowed to access a cell and defines the scheduling of other system information. SystemInformationBlockType1-BR uses the same structure as SystemInformationBlockType1.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH and BR-BCCH

Direction: E-UTRAN to UE

SystemInformationBlockType1 message

-- ASN1START

SystemInformationBlockType1-BR-r13 ::= SystemInformationBlockType1

SystemInformationBlockType1 ::= SEQUENCE {
cellAccessRelatedInfo SEQUENCE {
plmn-IdentityList PLMN-IdentityList,
trackingAreaCode TrackingAreaCode,
cellIdentity CellIdentity,
cellBarred ENUMERATED {barred, notBarred},
intraFreqReselection ENUMERATED {allowed, notAllowed},
csg-Indication BOOLEAN,
csg-Identity CSG-Identity OPTIONAL -- Need OR },
cellSelectionInfo SEQUENCE {
q-RxLevMin Q-RxLevMin,
q-RxLevMinOffset INTEGER (1..8) OPTIONAL -- Need OP
},
p-Max, P-Max, OPTIONAL, -- Need OP
freqBandIndicator, freqBandIndicator,
schedulingInfoList, SchedulingInfoList,
tdd-Config, TDD-Config, OPTIONAL, -- Cond TDD
si-WindowLength, ENUMERATED {ms1, ms2, ms5, ms10, ms15, ms20,
ms40},
systemInfoValueTag, INTEGER (0..31),
nonCriticalExtension, SystemInformationBlockType1-v890-IEs, OPTIONAL
}

SystemInformationBlockType1-v890-IEs ::= SEQUENCE {
lateNonCriticalExtension, OCTET STRING (CONTAINING SystemInformationBlockType1-v80-IEs),
onCriticalExtension, SystemInformationBlockType1-v920-IEs, OPTIONAL
}

-- Late non critical extensions
SystemInformationBlockType1-v9h0-IEs ::= SEQUENCE {
multiBandInfoList, MultiBandInfoList, OPTIONAL, -- Need OR
nonCriticalExtension, SystemInformationBlockType1-v9e0-IEs, OPTIONAL
}

SystemInformationBlockType1-v9e0-IEs ::= SEQUENCE {
freqBandIndicator-v9e0, FreqBandIndicator-v9e0, OPTIONAL, -- Cond FBI-max
multiBandInfoList-v9e0, MultiBandInfoList-v9e0, OPTIONAL, -- Cond mFBI-max
nonCriticalExtension, SystemInformationBlockType1-v10j0-IEs, OPTIONAL
}

SystemInformationBlockType1-v10j0-IEs ::= SEQUENCE {
freqBandInfo-r10, NS-PmaxList-r10, OPTIONAL, -- Need OR
multiBandInfoList-v10j0, MultiBandInfoList-v10j0, OPTIONAL, -- Need OR
nonCriticalExtension, SystemInformationBlockType1-v10l0-IEs, OPTIONAL
}

SystemInformationBlockType1-v10l0-IEs ::= SEQUENCE {
freqBandInfo-v10l0, NS-PmaxList-v10l0, OPTIONAL, -- Need OR
multiBandInfoList-v10l0, MultiBandInfoList-v10l0, OPTIONAL, -- Need OR
nonCriticalExtension, SEQUENCE {} , OPTIONAL
}

-- Regular non critical extensions
SystemInformationBlockType1-v920-IEs ::= SEQUENCE {
ims-EmergencySupport-r9, ENUMERATED {true} , OPTIONAL, -- Need OR
cellSelectionInfo-v920, CellSelectionInfo-v920, OPTIONAL, -- Cond RSRQ
nonCriticalExtension, SystemInformationBlockType1-v1130-IEs, OPTIONAL
}

SystemInformationBlockType1-v1130-IEs ::= SEQUENCE {
tdd-Config-v1130, TDD-Config-v1130, OPTIONAL, -- Cond TDD-OR
cellSelectionInfo-v1130, CellSelectionInfo-v1130, OPTIONAL, -- Cond WB-RSRQ
nonCriticalExtension, SystemInformationBlockType1-v1250-IEs, OPTIONAL
}

SystemInformationBlockType1-v1250-IEs ::= SEQUENCE {
cellAccessRelatedInfo-v1250, CellSelectionInfo-v1250, OPTIONAL, -- Cond RSRQ2
category0Allowed-r12, ENUMERATED {true} , OPTIONAL, -- Need OP
cellSelectionInfo-v1250, CellSelectionInfo-v1250, OPTIONAL, -- Cond RSRQ2
freqBandIndicatorPriority-r12, ENUMERATED {true} , OPTIONAL, -- Cond mFBI
nonCriticalExtension, SystemInformationBlockType1-v1310-IEs, OPTIONAL
}

SystemInformationBlockType1-v1310-IEs ::= SEQUENCE {
hyperSFN-r13, BIT STRING (SIZE (10)) , OPTIONAL, -- Need OR
deDRX-Allowed-r13, ENUMERATED {true} , OPTIONAL, -- Need OR
cellSelectionInfoCE-r13, CellSelectionInfo-v1310-IEs, OPTIONAL, -- Cond OP
bandwidthReducedAccessRelatedInfo-r13, BandwidthReducedAccessRelatedInfo-r13, SEQUENCE {
si-WindowLength-BR-r13, ENUMERATED {ms20, ms40, ms60, ms80, ms120,
ms160, ms200, spare},
si-RepetitionPattern-r13, ENUMERATED {everyRF, every2ndRF, every4thRF,
every8thRF},
schedulingInfoList-BR-r13, SchedulingInfoList-BR-r13, OPTIONAL, -- Cond SI-
BR
subframePattern10-r13, BIT STRING (SIZE (10)),
subframePattern40-r13, BIT STRING (SIZE (40))
}
SystemInformationBlockType1-v1320-IEs ::= SEQUENCE {
  freqHoppingParametersDL-r13   SEQUENCE {
    mpdcch-pdsch-HoppingNB-r13   ENUMERATED {nb2, nb4} OPTIONAL, -- Need OR
    interval-DLHoppingConfigCommonModeA-r13 CHOICE {
      interval-FDD-r13   ENUMERATED {int1, int2, int4, int8},
      interval-TDD-r13   ENUMERATED {int1, int5, int10, int20}
    } OPTIONAL, -- Need OR
    interval-DLHoppingConfigCommonModeB-r13 CHOICE {
      interval-FDD-r13   ENUMERATED {int2, int4, int8, int16},
      interval-TDD-r13   ENUMERATED {int5, int10, int20, int40}
    } OPTIONAL, -- Need OR
    mpdcch-pdsch-HoppingOffset-r13   INTEGER (1..maxAvailNarrowBands-r13) OPTIONAL -- Need OR
  } OPTIONAL, -- Cond Hopping
  nonCriticalExtension SystemInformationBlockType1-v1320-IEs OPTIONAL
}

SystemInformationBlockType1-v1350-IEs ::= SEQUENCE {
  cellSelectionInfoCE1-r13    CellSelectionInfoCE1-r13 OPTIONAL, -- Need OP
  nonCriticalExtension     SystemInformationBlockType1-v1350-IEs OPTIONAL
}

SystemInformationBlockType1-v1360-IEs ::= SEQUENCE {
  cellSelectionInfoCE1-v1360 CellSelectionInfoCE1-v1360 OPTIONAL, -- Cond QrxlevminCE1
  nonCriticalExtension   SEQUENCE {} OPTIONAL
}

PLMN-IdentityList ::=     SEQUENCE (SIZE (1..maxPLMN-r11)) OF PLMN-IdentityInfo
PLMN-IdentityInfo ::=     SEQUENCE {
  plmn-Identity       PLMN-Identity,
  cellReservedForOperatorUse    ENUMERATED {reserved, notReserved}
}

SchedulingInfoList ::= SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo
SchedulingInfo ::= SEQUENCE {
  si-Periodicity      ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},
  sib-MappingInfo      SIB-MappingInfo
}

SchedulingInfoList-BR-r13 ::= SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo-BR-r13
SchedulingInfo-BR-r13 ::= SEQUENCE {
  si-Narrowband-r13    INTEGER (1..maxAvailNarrowBands-r13),
  si-TBS-r13      ENUMERATED (b152, b208, b256, b328, b408, b504, b600, b712, b808, b936)
}

SIB-MappingInfo ::= SEQUENCE (SIZE (0..maxSIB-1)) OF SIB-Type
SIB-Type ::= ENUMERATED {
  sibType3, sibType4, sibType5, sibType6, sibType7, sibType8, sibType9, sibType10,
  sibType11, sibType12-v920, sibType13-v920, sibType14-v1130, sibType15-v1130,
  sibType16-v1130, sibType17-v1250, sibType18-v1250, ...
}

SystemInfoValueTagList-r13 ::= SEQUENCE (SIZE (1..maxSI-Message)) OF SystemInfoValueTagSI-r13
SystemInfoValueTagSI-r13 ::= INTEGER (0..3)
CellSelectionInfo-v920 ::= SEQUENCE {
  q-QualMin-r9      Q-QualMin-r9,
  q-QualMinOffset-r9 INTEGER (1..8) OPTIONAL -- Need OP
CellSelectionInfo-v1130 ::= SEQUENCE {
    q-QualMinWB-r11  Q-QualMin-r9
}

CellSelectionInfo-v1250 ::= SEQUENCE {
    q-QualMinRSRQ-OnAllSymbols-r12  Q-QualMin-r9
}

-- ASN1STOP
SystemInformationBlockType1 field descriptions

bandwidthReducedAccessRelatedInfo
Access related information for BL UEs and UEs in CE. NOTE 3.

category0Allowed
The presence of this field indicates category 0 UEs are allowed to access the cell.

cellBarred
barred means the cell is barred, as defined in TS 36.304 [4].

cellIdentity
Indicates the cell identity. NOTE 2.

cellReservedForOperatorUse
As defined in TS 36.304 [4].

cellSelectionInfoCE
Cell selection information for BL UEs and UEs in CE. If absent, coverage enhancement S criteria is not applicable. NOTE 3.

cellSelectionInfoCE1
Cell selection information for BL UEs and UEs in CE supporting CE Mode B. E-UTRAN includes this IE only if cellSelectionInfoCE is present in SystemInformationBlockType1-BR. NOTE 3.

csg-Identity
Identity of the Closed Subscriber Group the cell belongs to.

csg-Indication
If set to TRUE the UE is only allowed to access the cell if it is a CSG member cell, if selected during manual CSG selection or to obtain limited service, see TS 36.304 [4].

eDRX-Allowed
The presence of this field indicates if idle mode extended DRX is allowed in the cell. The UE shall stop using extended DRX in idle mode if eDRX-Allowed is not present.

fdd-DownlinkOrTddSubframeBitmapBR
The set of valid subframes for FDD downlink or TDD transmissions, see TS 36.213 [23].

fdd-UplinkSubframeBitmapBR
The set of valid subframes for FDD uplink transmissions for BL UEs, see TS 36.213 [23].

freqBandIndicatorPriority
If the field is present and supported by the UE, the UE shall prioritize the frequency bands in the multiBandInfoList field in decreasing priority order. Only if the UE does not support any of the frequency band in multiBandInfoList, the UE shall use the value in freqBandIndicator field. Otherwise, the UE applies frequency band according to the rules defined in multiBandInfoList. NOTE 2.

freqBandInfo
A list of additionalPmax and additionalSpectrumEmission values, as defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs, for the frequency band in freqBandIndicator.

freqHoppingParametersDL
Downlink frequency hopping parameters for BR versions of SI messages, MPDCCH/PDSCH of paging, MPDCCH/PDSCH of RAR/Msg4 and unicast MPDCCH/PDSCH. If not present, the UE is not configured downlink frequency hopping.

hyperSFN
Indicates hyper SFN which increments by one when the SFN wraps around.

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. NOTE 2.

intraFreqReselection
Used to control cell reselection to intra-frequency cells when the highest ranked cell is barred, or treated as barred by the UE, as specified in TS 36.304 [4]. NOTE 2.
A list of additional frequency band indicators, as defined in TS 36.101 [42, table 5.5-1] that the cell belongs to. If the UE supports the frequency band in the freqBandIndicator field it shall apply that frequency band. Otherwise, the UE shall apply the first listed band which it supports in the multiBandInfoList field. If E-UTRAN includes multiBandInfoList-v9e0 it includes the same number of entries, and listed in the same order, as in multiBandInfoList (i.e. without suffix). See Annex D for more descriptions. The UE shall ignore the rule defined in this field description if freqBandIndicatorPriority is present and supported by the UE.

If this field is present and supported by the UE, the UE shall apply the (default) value of 0 dB for Qrxlevminoffset Affects the minimum required Rx level in the cell.

Value applicable for the cell. If absent the UE applies the maximum power according to its capability as specified in TS 36.101 [42, 6.2.2]. NOTE 2.

Parameter "Qqualmin" in TS 36.304 [4]. If cellSelectionInfo-v920 is not present, the UE applies the (default) value of negative infinity for Qqualmin. NOTE 1.

Parameter "Qqualminoffset" in TS 36.304 [4]. Actual value Qqualminoffset = field value [dB]. If cellSelectionInfo-v920 is not present or the field is not present, the UE applies the (default) value of 0 dB for Qqualminoffset. Affects the minimum required quality level in the cell.

Parameter "Qrxlevmin" in TS 36.304 [4]. If cellSelectionInfo-v920 is not present, the UE applies the (default) value of negative infinity for Qrxlevmin. NOTE 1.

If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. NOTE 1.

If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16]. NOTE 1.

Parameter Qlevminoffset in TS 36.304 [4]. Actual value Qlevminoffset = field value * 2 [dB]. If absent, the UE applies the (default) value of 0 dB for Qlevminoffset. Affects the minimum required Rx level in the cell.

If the SI message is transmitted from the first radio frame of the SI window.

Indicates the transport block size information used to broadcast the SI message towards BL UEs and UEs in CE, see TS 36.213 [23, 7.1.6]. Field values (1..maxAvailableNarrowBands-r13) correspond to narrowband indices (0..[maxAvailableNarrowBands-r13]-1) as specified in TS 36.211 [21].

Indicates system information validity timer. If set to TRUE, the timer is set to 3h, otherwise the timer is set to 24h.

Common SI scheduling window for all SIs. Unit in milliseconds, where ms1 denotes 1 millisecond, ms2 denotes 2 milliseconds and so on. In case si-WindowLength-BR-r13 is present and the UE is a BL UE or a UE in CE, the UE shall use si-WindowLength-BR-r13 and ignore the original field si-WindowLength (without suffix). UEs other than BL UEs or UEs in CE shall ignore the extension field si-WindowLength-BR-r13.

List of PLMN identities. The first listed PLMN-Identity is the primary PLMN. NOTE 2.

List of Narrowband(s) used to broadcast the SI message towards BL UEs and UEs in CE, see TS 36.213 [23, Table 7.1.7.2.1-1] for a 6 PRB bandwidth and a QPSK modulation.
**SystemInformationBlockType1 field descriptions**

**startSymbolBR**
For BL UEs and UEs in CE, indicates the OFDM starting symbol for any MPDCCH, PDSCH scheduled on the same cell except the PDSCH carrying SystemInformationBlockType1-BR, see TS 36.213 [23]. Values 1, 2, and 3 are applicable for dl-Bandwidth greater than 10 resource blocks. Values 2, 3, and 4 are applicable otherwise.

**systemInfoValueTagList**
Indicates SI message specific value tags for BL UEs and UEs in CE. It includes the same number of entries, and listed in the same order, as in schedulingInfoList (without suffix).

**systemInfoValueTagSI**
SI message specific value tag as specified in subclause 5.2.1.3. Common for all SIBs within the SI message other than MIB, SIB1, SIB10, SIB11, SIB12 and SIB14.

**trackingAreaCode**
A trackingAreaCode that is common for all the PLMNs listed. NOTE 2.

**tdd-Config**
Specifies the TDD specific physical channel configurations. NOTE 2.

### NOTE 1:
The value the UE applies for parameter "Qqualmin" in TS 36.304 [4] depends on the \( q_{-}QualMin \) fields signalled by E-UTRAN and supported by the UE. In case multiple candidate options are available, the UE shall select the highest priority candidate option according to the priority order indicated by the following table (top row is highest priority).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Included</td>
<td>Included</td>
<td>( q_{-}QualMinRSRQ-OnAllSymbols - (q_{-}QualMin - q_{-}QualMinWB) )</td>
</tr>
<tr>
<td>Included</td>
<td>Not included</td>
<td>( q_{-}QualMinRSRQ-OnAllSymbols )</td>
</tr>
<tr>
<td>Not included</td>
<td>Included</td>
<td>( q_{-}QualMinWB )</td>
</tr>
<tr>
<td>Not included</td>
<td>Not included</td>
<td>( q_{-}QualMin )</td>
</tr>
</tbody>
</table>

### NOTE 2:
E-UTRAN sets this field to the same value for all instances of SIB1 message that are broadcasted within the same cell.

### NOTE 3:
E-UTRAN configures this field only in the BR version of SIB1 message.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BW-reduced</strong></td>
<td>The field is optional present, Need OR, if schedulingInfoSIB1-BR in MIB is set to a value greater than 0. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>FBI-max</strong></td>
<td>The field is mandatory present if freqBandIndicator (i.e. without suffix) is set to maxFBI. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>mFBI</strong></td>
<td>The field is optional present, Need OR, if multiBandInfoList is present. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>mFBI-max</strong></td>
<td>The field is mandatory present if one or more entries in multiBandInfoList (i.e. without suffix, introduced in -v8h0) is set to maxFBI. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>RSRQ</strong></td>
<td>The field is mandatory present if SIB3 is being broadcast and threshServingLowQ is present in SIB3; otherwise optionally present, Need OP.</td>
</tr>
<tr>
<td><strong>RSRQ2</strong></td>
<td>The field is mandatory present if q-QualMinRSRQ-OnAllSymbols is present in SIB3; otherwise it is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td><strong>Hopping</strong></td>
<td>The field is mandatory present if si-HoppingConfigCommon field is broadcasted and set to on. Otherwise the field is optionally present, need OP.</td>
</tr>
<tr>
<td><strong>QrxlevminCE1</strong></td>
<td>The field is optionally present, Need OR, if q-RxLevMinCE1-r13 is set below -140 dBm. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>TDD</strong></td>
<td>This field is mandatory present for TDD; it is not present for FDD and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td><strong>TDD-OR</strong></td>
<td>The field is optionally present for TDD, need OR; it is not present for FDD.</td>
</tr>
<tr>
<td><strong>WB-RSRQ</strong></td>
<td>The field is optionally present, need OP if the measurement bandwidth indicated by allowedMeasBandwidth in systemInformationBlockType3 is 50 resource blocks or larger; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>SI-BR</strong></td>
<td>The field is mandatory present if schedulingInfoSIB1-BR is included in MIB with a value greater than 0. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>
---

**UEAssistanceInformation**

The *UEAssistanceInformation* message is used for the indication of UE assistance information to the eNB.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

**UEAssistanceInformation message**

```asn1
UEAssistanceInformation-r11 ::=  SEQUENCE {
  criticalExtensions     CHOICE {
    c1         CHOICE {
      ueAssistanceInformation-r11   UEAssistanceInformation-r11-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}
UEAssistanceInformation-r11-IEs ::=  SEQUENCE {
  powerPrefIndication-r11    ENUMERATED {normal, lowPowerConsumption} OPTIONAL,
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
```

---

**UEAssistanceInformation field descriptions**

**powerPrefIndication**

Value *lowPowerConsumption* indicates the UE prefers a configuration that is primarily optimised for power saving. Otherwise the value is set to *normal*.

---

**UECapabilityEnquiry**

The *UECapabilityEnquiry* message is used to request the transfer of UE radio access capabilities for E-UTRA as well as for other RATs.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

**UECapabilityEnquiry message**

```asn1
UECapabilityEnquiry ::=    SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1         CHOICE {
      ueCapabilityEnquiry-r8    UECapabilityEnquiry-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}
UECapabilityEnquiry-r8-IEs ::=  SEQUENCE {
  ue-CapabilityRequest    UE-CapabilityRequest,
  nonCriticalExtension    UECapabilityEnquiry-v8a0-IEs  OPTIONAL
}
```
UECapabilityEnquiry-v8a0-IEs ::= SEQUENCE { 
  lateNonCriticalExtension OCTET STRING OPTIONAL, 
  nonCriticalExtension UECapabilityEnquiry-v1180-IEs OPTIONAL }

UECapabilityEnquiry-v1180-IEs ::= SEQUENCE { 
  requestedFrequencyBands-r11 SEQUENCE (SIZE (1..16)) OF FreqBandIndicator-r11 OPTIONAL, 
  nonCriticalExtension UECapabilityEnquiry-v1310-IEs OPTIONAL }

UECapabilityEnquiry-v1310-IEs ::= SEQUENCE { 
  requestReducedFormat-r13 ENUMERATED {true} OPTIONAL, -- Need ON 
  requestSkipFallbackComb-r13 ENUMERATED {true} OPTIONAL, -- Need ON 
  requestedMaxCCsDL-r13 INTEGER (2..32) OPTIONAL, -- Need ON 
  requestedMaxCCsUL-r13 INTEGER (2..32) OPTIONAL, -- Need ON 
  requestReducedIntNonContComb-r13 ENUMERATED {true} OPTIONAL, -- Need ON 
  nonCriticalExtension SEQUENCE {} OPTIONAL }

UE-CapabilityRequest ::= SEQUENCE (SIZE (1..maxRAT-Capabilities)) OF RAT-Type 

-- ASN1STOP

**UECapabilityEnquiry field descriptions**

**requestReducedFormat**
Indicates that the UE if supported is requested to provide supported CA band combinations in the supportedBandCombinationReduced-r13 instead of the supportedBandCombination-r10. The E-UTRAN includes this field if requestSkipFallbackComb is included in the message.

**requestSkipFallbackComb**
Indicates that the UE shall explicitly exclude fallback CA band combinations in capability signalling.

**ue-CapabilityRequest**
List of the RATs for which the UE is requested to transfer the UE radio access capabilities i.e. E-UTRA, UTRA, GERAN-CS, GERAN-PS, CDMA2000.

**requestedFrequencyBands**
List of frequency bands for which the UE is requested to provide supported CA band combinations and non CA bands.

**requestedMaxCCsDL, requestedMaxCCsUL**
Indicates the maximum number of CCs for which the UE is requested to provide supported CA band combinations and non-CA bands.

**requestReducedIntNonContComb**
Indicates that the UE shall explicitly exclude supported intra-band non-contiguous CA band combinations other than included in capability signalling as specified in TS 36.306 [5, 4.3.5.21].

---

**UECapabilityInformation**

The *UECapabilityInformation* message is used to transfer of UE radio access capabilities requested by the E-UTRAN.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

-- ASN1START

UECapabilityInformation ::= SEQUENCE { 
  rrc-TransactionIdentifier RRC-TransactionIdentifier, 
  criticalExtensions CHOICE { 
    ueCapabilityInformation-r8 UECapabilityInformation-r8-IEs, 
    spare7 NULL, 
    spare6 NULL, spare5 NULL, spare4 NULL, 
    spare3 NULL, spare2 NULL, spare1 NULL }
}
criticalExtensionsFuture  SEQUENCE {}

UECapabilityInformation-r8-IEs ::= SEQUENCE {
    ue-CapabilityRAT-ContainerList  UE-CapabilityRAT-ContainerList,
    nonCriticalExtension    UECapabilityInformation-v8a0-IEs OPTIONAL
}

UECapabilityInformation-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension   OCTET STRING      OPTIONAL,
    nonCriticalExtension    UECapabilityInformation-v1250-IEs OPTIONAL
}

UECapabilityInformation-v1250-IEs ::= SEQUENCE {
    ue-RadioPagingInfo-r12    UE-RadioPagingInfo-r12    OPTIONAL,
    nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

--- ASN1STOP

**UECapabilityInformation field descriptions**

**ue-RadioPagingInfo**
This field contains UE capability information used for paging.

---

**UEInformationRequest**

The **UEInformationRequest** is the command used by E-UTRAN to retrieve information from the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

---

**UEInformationRequest message**

--- ASN1START

UEInformationRequest-r9 ::= SEQUENCE {
    rrc-TransactionIdentifier  RRC-TransactionIdentifier,
    criticalExtensions    CHOICE {
        c1        CHOICE {
            ueInformationRequest-r9    UEInformationRequest-r9-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture   SEQUENCE {}
    }
}

UEInformationRequest-r9-IEs ::=  SEQUENCE {
    rach-ReportReq-r9     BOOLEAN,
    rlf-ReportReq-r9     BOOLEAN,
    nonCriticalExtension    UEInformationRequest-v930-IEs  OPTIONAL
}

UEInformationRequest-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension   OCTET STRING      OPTIONAL,
    nonCriticalExtension    UEInformationRequest-v1020-IEs  OPTIONAL
}

UEInformationRequest-v1020-IEs ::= SEQUENCE {
    logMeasReportReq-r10    ENUMERATED {true}     OPTIONAL, -- Need ON
    nonCriticalExtension    UEInformationRequest-v1130-IEs  OPTIONAL
}

UEInformationRequest-v1130-IEs ::= SEQUENCE {
    connEstFailReportReq-r11   ENUMERATED {true}     OPTIONAL, -- Need ON
    nonCriticalExtension    UEInformationRequest-v1250-IEs  OPTIONAL
}

--- ASN1STOP
**UEInformationRequest field descriptions**

**rach-ReportReq**
This field is used to indicate whether the UE shall report information about the random access procedure.

---

**UEInformationResponse**

The **UEInformationResponse** message is used by the UE to transfer the information requested by the E-UTRAN.

Signalling radio bearer: SRB1 or SRB2 (when logged measurement information is included)

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

---

**UEInformationResponse message**

```asn1
UEInformationRequest-v1250-IEs ::= SEQUENCE {
  mobilityHistoryReportReq-r12 ENUMERATED {true} OPTIONAL, -- Need ON
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP

UEInformationResponse-r9 ::=   SEQUENCE {
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  criticalExtensions CHOICE {
    c1 CHOICE {
      ueInformationResponse-r9 UEInformationResponse-r9-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
      criticalExtensionsFuture SEQUENCE {}
  }
}

UEInformationResponse-r9-IEs ::=  SEQUENCE {
  rach-Report-r9       SEQUENCE {
    numberOfPreamblesSent-r9    NumberOfPreamblesSent-r11,
    contentionDetected-r9     BOOLEAN
  } OPTIONAL,
  rlf-Report-r9       RLF-Report-r9   OPTIONAL,
  nonCriticalExtension    UEInformationResponse-v930-IEs    OPTIONAL
}

-- Late non critical extensions
UEInformationResponse-v9e0-IEs ::= SEQUENCE {
  rlf-Report-v9e0      RLF-Report-v9e0     OPTIONAL,
  nonCriticalExtension    SEQUENCE {}      OPTIONAL
}

-- Regular non critical extensions
UEInformationResponse-v930-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING (CONTAINING UEInformationResponse-v9e0-IEs)
  OPTIONAL,
  nonCriticalExtension    UEInformationResponse-v1020-IEs  OPTIONAL
}

UEInformationResponse-v1020-IEs ::= SEQUENCE {
  logMeasReport-r10     LogMeasReport-r10    OPTIONAL,
  nonCriticalExtension    UEInformationResponse-v1130-IEs OPTIONAL
}

UEInformationResponse-v1130-IEs ::= SEQUENCE {
  connEstFailReport-r11    ConnEstFailReport-r11   OPTIONAL,
  nonCriticalExtension    UEInformationResponse-v1250-IEs OPTIONAL
}

UEInformationResponse-v1250-IEs ::= SEQUENCE {
  mobilityHistoryReport-r12 MobilityHistoryReport-r12 OPTIONAL,
  nonCriticalExtension    SEQUENCE {}     OPTIONAL
}
```
RLF-Report-r9 := SEQUENCE {
  measResultLastServCell-r9
    SEQUENCE {
      rsrpResult-r9
        RSRP-Range,
      rsrqResult-r9
        RSRQ-Range
    },
  measResultNeighCells-r9
    SEQUENCE {
      measResultListEUTRA-r9
        MeasResultList2EUTRA-r9
        OPTIONAL,
      measResultListUTRA-r9
        MeasResultList2UTRA-r9
        OPTIONAL,
      measResultListGERAN-r9
        MeasResultList2GERAN
        OPTIONAL,
      measResultsCDMA2000-r9
        MeasResultList2CDMA2000-r9
        OPTIONAL,
    } OPTIONAL,
  locationInfo-r10
    LocationInfo-r10
    OPTIONAL,
  failedPCellId-r10
    CHOICE {
      cellGlobalId-r10
        CellGlobalIdEUTRA,
      pci-arfcn-r10
        SEQUENCE {
          physCellId-r10
            PhysCellId,
          carrierFreq-r10
            ARFCN-ValueEUTRA
        }
    } OPTIONAL,
  reestablishmentCellId-r10
    CellGlobalIdEUTRA
    OPTIONAL,
  timeConnFailure-r10
    INTEGER (0..1023)
    OPTIONAL,
  connectionFailureType-r10
    ENUMERATED {rlf, hof}
    OPTIONAL,
  previousPCellId-r10
    CellGlobalIdEUTRA
    OPTIONAL,
},
[[ failedPCellId-v1090
  carrierFreq-v1090
    ARFCN-ValueEUTRA-v9e0
] OPTIONAL],
[[ basicFields-r11
  c-RNTI-r11
    C-RNTI,
  rlf-Cause-r11
    ENUMERATED {
      t310-Expiry, randomAccessProblem,
      rlc-MaxNumRetx, t312-Expiry-r12},
  timeSinceFailure-r11
    TimeSinceFailure-r11
] OPTIONAL,
  previousUTRA-CellId-r11
    ARFCN-ValueUTRA,
  physCellId-r11
    CHOICE {
      fdd-r11
        PhysCellIdUTRA-FDD,
      tdd-r11
        PhysCellIdUTRA-TDD
    },
  cellGlobalId-r11
    CellGlobalIdUTRA
    OPTIONAL,
] OPTIONAL,
  selectedUTRA-CellId-r11
    ARFCN-ValueUTRA,
  physCellId-r11
    CHOICE {
      fdd-r11
        PhysCellIdUTRA-FDD,
      tdd-r11
        PhysCellIdUTRA-TDD
    }
] OPTIONAL,
[[ failedPCellId-v1250
  tac-FailedPCell-r12
    TrackingAreaCode
] OPTIONAL,
  measResultLastServCell-v1250
    RSRQ-Range-v1250
    OPTIONAL,
  lastServCell1RQ-Type-r12
    RSRQ-Type-r12
    OPTIONAL,
  measResultListEUTRA-v1250
    MeasResultList2EUTRA-v1250
    OPTIONAL,
],
[[ drb-EstablishedWithQCI-1-r13
  ENUMERATED {qci1}
] OPTIONAL,
[[ measResultLastServCell-v1360
  RSRP-Range-v1360
] OPTIONAL,
}]
RLF-Report-v9e0 := SEQUENCE {
  measResultListEUTRA-v9e0
    MeasResultList2EUTRA-v9e0
}
carrierFreq-r9  ARFCN-ValueEUTRA,
measResultList-r9  MeasResultListEUTRA
}

MeasResult2EUTRA-v9e0 ::= SEQUENCE {
carrierFreq-v9e0  ARFCN-ValueEUTRA-v9e0  OPTIONAL
}

MeasResult2EUTRA-v1250 ::= SEQUENCE {
rsrq-Type-r12  RSRQ-Type-r12  OPTIONAL
}

MeasResultList2EUTRA-r9 ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-r9

MeasResult2CDMA2000-r9 ::= SEQUENCE {
carrierFreq-r9  CarrierFreqCDMA2000,
measResultList-r9  MeasResultsCDMA2000
}

LogMeasReport-r10 ::= SEQUENCE {
absoluteTimeStamp-r10  AbsoluteTimeInfo-r10,
traceReference-r10  TraceReference-r10,
tce-Id-r10  OCTET STRING (SIZE (1)),
logMeasInfoList-r10  LogMeasInfoList-r10,
logMeasAvailable-r10  ENUMERATED {true}  OPTIONAL,
...}

LogMeasInfoList-r10 ::= SEQUENCE (SIZE (1..maxLogMeasReport-r10)) OF LogMeasInfo-r10

LogMeasInfo-r10 ::= SEQUENCE {
locationInfo-r10  LocationInfo-r10  OPTIONAL,
relativeTimeStamp-r10  INTEGER (0..7200),
servCellIdentity-r10  CellGlobalIdEUTRA,
measResultServCell-r10  SEQUENCE {
rsrpResult-r10  RSRP-Range,
rsrqResult-r10  RSRQ-Range
},
measResultNeighborCells-r10  SEQUENCE {
measResultListEUTRA-r10  MeasResultList2EUTRA-r9  OPTIONAL,
measResultListUTRA-r10  MeasResultList2UTRA-r9  OPTIONAL,
measResultListGERAN-r10  MeasResultList2GERAN-r10  OPTIONAL,
measResultListCDMA2000-r10  MeasResultList2CDMA2000-r9  OPTIONAL,
...[
[ measResultListEUTRA-v1090  MeasResultList2EUTRA-v9e0  OPTIONAL
],[
[ measResultListMBSFN-r12  MeasResultListMBSFN-r12  OPTIONAL,
  measResultServCell-v1250  RSRP-Range-v1250  OPTIONAL,
  servCellRSRpType-r12  RSRQ-Type-r12  OPTIONAL,
  measResultListEUTRA-v1250  MeasResultList2EUTRA-v1250  OPTIONAL
],
[ inDeviceCoexDetected-r13  ENUMERATED {true}  OPTIONAL
],
[ measResultServCell-v1360  RSRP-Range-v1360  OPTIONAL
]]
]

MeasResultListMBSFN-r12 ::= SEQUENCE (SIZE (1..maxMBSFN-Area)) OF MeasResultMBSFN-r12

MeasResultMBSFN-r12 ::= SEQUENCE {
mbsfn-Area-r12  MBSFN-Area-r12,
carrierFreq-r12  ARFCN-ValueEUTRA-r9,
rsrpResultMBSFN-r12  RSRP-Range,
rsrqResultMBSFN-r12  MBSFN-RSRQ-Range-r12,
signallingBLERResult-r12  BLER-Result-r12  OPTIONAL,
dataBLER-MCH-ResultList-r12  DataBLER-MCH-ResultList-r12  OPTIONAL,
...
DataBLER-MCH-ResultList-r12 ::= SEQUENCE (SIZE (1..maxPMCH-PerMBSFN)) OF DataBLER-MCH-Result-r12

DataBLER-MCH-Result-r12 ::= SEQUENCE { mch-Index-r12 INTEGER (1..maxPMCH-PerMBSFN), dataBLERResult-r12 BLER-Result-r12 }

BLER-Result-r12 ::= SEQUENCE { bler-r12 BLER-Range-r12, blocksReceived-r12 SEQUENCE { n-r12 BIT STRING (SIZE (3)), m-r12 BIT STRING (SIZE (8)) } }

BLER-Range-r12 ::= INTEGER(0..31)

MeasResultList2GERAN-r10 ::= SEQUENCE (SIZE (1..maxCellListGERAN)) OF MeasResultListGERAN

ConnEstFailReport-r11 ::= SEQUENCE { failedCellId-r11 CellGlobalIdEUTRA, locationInfo-r11 LocationInfo-r10 OPTIONAL, measResultFailedCell-r11 SEQUENCE { rsrpResult-r11 RSRP-Range, rsrqResult-r11 RSRQ-Range OPTIONAL }, measResultNeighCells-r11 SEQUENCE { measResultListEUTRA-r11 MeasResultList2EUTRA-r9 OPTIONAL, measResultListUTRA-r11 MeasResultList2UTRA-r9 OPTIONAL, measResultListGERAN-r11 MeasResultListGERAN OPTIONAL, measResultListCDMA2000-r11 MeasResultList2CDMA2000-r9 OPTIONAL }, numberOfPreamblesSent-r11 NumberOfPreamblesSent-r11, contentionDetected-r11 BOOLEAN, maxTxPowerReached-r11 BOOLEAN, timeSinceFailure-r11 TimeSinceFailure-r11, measResultListEUTRA-v1130 MeasResultList2EUTRA-v9e0 OPTIONAL, }, [
  [ measResultFailedCell-v1250 RSRQ-Range-v1250 OPTIONAL, failedCellRSRQ-Type-r12 RSRQ-Type-r12 OPTIONAL, measResultListEUTRA-v1250 MeasResultList2EUTRA-v1250 OPTIONAL ],
  [ measResultFailedCell-v1360 RSRP-Range-v1360 OPTIONAL ]
],
}

NumberOfPreamblesSent-r11 ::= INTEGER (1..200)

TimeSinceFailure-r11 ::= INTEGER (0..172800)

MobilityHistoryReport-r12 ::= VisitedCellInfoList-r12

-- ASN1STOP
## UEInformationResponse field descriptions

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>absoluteTimeStamp</strong></td>
<td>Indicates the absolute time when the logged measurement configuration logging is provided, as indicated by E-UTRAN within absoluteTimeInfo.</td>
</tr>
<tr>
<td><strong>bler</strong></td>
<td>Indicates the measured BLER value. The coding of BLER value is defined in TS 36.133 [16].</td>
</tr>
<tr>
<td><strong>blocksReceived</strong></td>
<td>Indicates total number of BLER blocks, which were received by the UE and used for the corresponding BLER calculation, within the measurement period as defined in TS 36.133 [16].</td>
</tr>
<tr>
<td><strong>carrierFreq</strong></td>
<td>In case the UE includes carrierFreq-v9e0 and/ or carrierFreq-v1090, the UE shall set the corresponding entry of carrierFreq-r9 and/ or carrierFreq-r10 respectively to maxEARFCN. For E-UTRA and UTRA frequencies, the UE sets the ARFCN according to the band used when obtaining the concerned measurement results.</td>
</tr>
<tr>
<td><strong>connectionFailureType</strong></td>
<td>This field is used to indicate whether the connection failure is due to radio link failure or handover failure.</td>
</tr>
<tr>
<td><strong>contentionDetected</strong></td>
<td>This field is used to indicate that contention was detected for at least one of the transmitted preambles, see TS 36.321 [6].</td>
</tr>
<tr>
<td><strong>c-RNTI</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>dataBLER-MCH-ResultList</strong></td>
<td>Includes a BLER result per MCH on subframes using dataMCS, with the applicable MCH(s) listed in the same order as in pmch-InfoList within MBSFNAreaConfiguration.</td>
</tr>
<tr>
<td><strong>drb-EstablishedWithQCI-1</strong></td>
<td>This field is used to indicate the radio link failure occurred while a bearer with QCI value equal to 1 was configured, see TS 24.301 [35].</td>
</tr>
<tr>
<td><strong>failedCellId</strong></td>
<td>This field is used to indicate the cell in which connection establishment failed.</td>
</tr>
<tr>
<td><strong>failedPCellId</strong></td>
<td>This field is used to indicate the PCell in which RLF is detected or the target PCell of the failed handover. The UE sets the EARFCN according to the band used for transmission/ reception when the failure occurred.</td>
</tr>
<tr>
<td><strong>inDeviceCoexDetected</strong></td>
<td>Indicates that measurement logging is suspended due to IDC problem detection.</td>
</tr>
<tr>
<td><strong>maxTxPowerReached</strong></td>
<td>This field is used to indicate whether or not the maximum power level was used for the last transmitted preamble, see TS 36.321 [6].</td>
</tr>
<tr>
<td><strong>mch-index</strong></td>
<td>Indicates the MCH by referring to the entry as listed in pmch-InfoList within MBSFNAreaConfiguration.</td>
</tr>
<tr>
<td><strong>measResultFailedCell</strong></td>
<td>This field refers to the last measurement results taken in the cell, where connection establishment failure happened. For BL UEs or UEs in CE, when operating in CE Mode B, measResultFailedCell-v1360 is reported if the measured RSRP is less than -140 dBm.</td>
</tr>
<tr>
<td><strong>measResultLastServCell</strong></td>
<td>This field refers to the last measurement results taken in the PCell, where radio link failure or handover failure happened. For BL UEs or UEs in CE, when operating in CE Mode B, measResultLastServCell-v1360 is reported if the measured RSRP is less than -140 dBm.</td>
</tr>
<tr>
<td><strong>measResultListEUTRA</strong></td>
<td>If measResultListEUTRA-v9e0, measResultListEUTRA-v1090 or measResultListEUTRA-v1130 is included, the UE shall include the same number of entries, and listed in the same order, as in measResultListEUTRA-r9, measResultListEUTRA-r10 and/or measResultListEUTRA-r11 respectively.</td>
</tr>
<tr>
<td><strong>measResultListEUTRA-v1250</strong></td>
<td>If included in RLF-Report-r9 the UE shall include the same number of entries, and listed in the same order, as in measResultListEUTRA-r9; If included in LogMeasInfo-r10 the UE shall include the same number of entries, and listed in the same order, as in measResultListEUTRA-r10; If included in ConnEstFailReport-r11 the UE shall include the same number of entries, and listed in the same order, as in measResultListEUTRA-r11;</td>
</tr>
<tr>
<td><strong>measResultServCell</strong></td>
<td>This field refers to the log measurement results taken in the Serving cell. For BL UEs or UEs in CE, when operating in CE Mode B, measResultServCell-v1360 is reported if the measured RSRP is less than -140 dBm.</td>
</tr>
<tr>
<td><strong>mobilityHistoryReport</strong></td>
<td>This field is used to indicate the time of stay in 16 most recently visited E-UTRA cells or of stay out of E-UTRA.</td>
</tr>
<tr>
<td><strong>numberOfPreamblesSent</strong></td>
<td>This field is used to indicate the number of RACH preambles that were transmitted. Corresponds to parameter PREAMBLE_TRANSMISSION_COUNTER in TS 36.321 [6].</td>
</tr>
</tbody>
</table>
**UEInformationResponse field descriptions**

**previousPCellId**
This field is used to indicate the source PCell of the last handover (source PCell when the last RRC-Connection-Reconfiguration message including mobilityControlInfo was received).

**previousUTRA-CellId**
This field is used to indicate the source UTRA cell of the last successful handover to E-UTRAN, when RLF occurred at the target PCell. The UE sets the ARFCN according to the band used for transmission/reception on the concerned cell.

**reestablishmentCellId**
This field is used to indicate the cell in which the re-establishment attempt was made after connection failure.

**relativeTimeStamp**
Indicates the time of logging measurement results, measured relative to the absoluteTimeStamp. Value in seconds.

**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.

**selectedUTRA-CellId**
This field is used to indicate the UTRA cell that the UE selects after RLF is detected, while T311 is running. The UE sets the ARFCN according to the band selected for transmission/reception on the concerned cell.

**signallingBLER-Result**
Includes a BLER result of MBSFN subframes using signallingMCS.

**tac-FailedPCell**
This field is used to indicate the Tracking Area Code of the PCell in which RLF is detected.

**tce-Id**
Parameter Trace Collection Entity Id: See TS 32.422 [58].

**timeConnFailure**
This field is used to indicate the time elapsed since the last HO initialization until connection failure. Actual value = field value * 100ms. The maximum value 1023 means 102.3s or longer.

**timeSinceFailure**
This field is used to indicate the time that elapsed since the connection (establishment) failure. Value in seconds. The maximum value 172800 means 172800s or longer.

**traceRecordingSessionRef**
Parameter Trace Recording Session Reference: See TS 32.422 [58].

---

**ULHandoverPreparationTransfer (CDMA2000)**

The ULHandoverPreparationTransfer message is used for the uplink transfer of handover related CDMA2000 information when requested by the higher layers.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

**ULHandoverPreparationTransfer message**

```asn1
-- ASN1START

ULHandoverPreparationTransfer ::= SEQUENCE {
  criticalExtensions  CHOICE {
    c1       CHOICE {
      ulHandoverPreparationTransfer-r8  ULHandoverPreparationTransfer-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture  SEQUENCE {}
  }
}

ULHandoverPreparationTransfer-r8-IEs ::= SEQUENCE {
  cdma2000-Type  CDMA2000-Type,
  meid         BIT STRING (SIZE (56)) OPTIONAL,
  dedicatedInfo DedicatedInfoCDMA2000,
  nonCriticalExtension  ULHandoverPreparationTransfer-v8a0-IEs OPTIONAL
}

ULHandoverPreparationTransfer-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension  OCTET STRING OPTIONAL,
}

-- ASN1END
```
ULHandoverPreparationTransfer field descriptions

meid
The 56 bit mobile identification number provided by the CDMA2000 Upper layers.

ULInformationTransfer

The ULInformationTransfer message is used for the uplink transfer of NAS or non-3GPP dedicated 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
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

ULInformationTransfer message

-- ASN1START

ULInformationTransfer ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1         CHOICE {
      ulInformationTransfer-r8   ULInformationTransfer-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}

ULInformationTransfer-r8-IEs ::= SEQUENCE {
  dedicatedInfoType   CHOICE {
    dedicatedInfoNAS     DedicatedInfoNAS,
    dedicatedInfoCDMA2000-1XRTT   DedicatedInfoCDMA2000,
    dedicatedInfoCDMA2000-HRPD   DedicatedInfoCDMA2000
  },
  nonCriticalExtension    ULInformationTransfer-v8a0-IEs OPTIONAL
}

ULInformationTransfer-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING OPTIONAL,
  nonCriticalExtension    SEQUENCE {} OPTIONAL
}

-- ASN1STOP

WLANConnectionStatusReport

The WLANConnectionStatusReport message is used to inform the successful connection to WLAN or failure of the WLAN connection or connection attempt(s).

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

WLANConnectionStatusReport message

-- ASN1START
WLANConnectionStatusReport-r13 ::= SEQUENCE {
  criticalExtensions       CHOICE {
    c1         CHOICE {
      wlanConnectionStatusReport-r13 WLANConnectionStatusReport-r13-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {}
  }
}

WLANConnectionStatusReport-r13-IEs ::= SEQUENCE {
  wlan-Status-r13     WLAN-Status-r13,
  lateNonCriticalExtension OCTET STRING      OPTIONAL,
  nonCriticalExtension   SEQUENCE {}       OPTIONAL
}

**WLANConnectionStatusReport field descriptions**

**wlan-Status**
Indicates the connection status to WLAN and the cause of failures.

6.3 RRC information elements

6.3.1 System information blocks

- **SystemInformationBlockType2**

The IE SystemInformationBlockType2 contains radio resource configuration information that is common for all UEs.

NOTE: UE timers and constants related to functionality for which parameters are provided in another SIB are included in the corresponding SIB.

**SystemInformationBlockType2 information element**

--- ASN1START

SystemInformationBlockType2 ::=  SEQUENCE {
  ac-BarringInfo      SEQUENCE {
    ac-BarringForEmergency    BOOLEAN, -- Need OP
    ac-BarringForMO-Signalling   AC-BarringConfig    OPTIONAL, -- Need OP
    ac-BarringForMO-Data    AC-BarringConfig    OPTIONAL -- Need OP
  }                  OPTIONAL, -- Need OP
  radioResourceConfigCommon RadioResourceConfigCommonSIB,
  ue-TimersAndConstants    UE-TimersAndConstants,
  freqInfoInfo    SEQUENCE {
    ul-CarrierFreq      ARFCN-ValueEUTRA    OPTIONAL, -- Need OP
    ul-Bandwidth      ENUMERATED {n6, n15, n25, n50, n75, n100} OPTIONAL, -- Need OP
    additionalSpectrumEmission   AdditionalSpectrumEmission
  },
  mbsfn-SubframeConfigList   MBSFN-SubframeConfigList   OPTIONAL, -- Need OR
  timeAlignmentTimerCommon   TimeAlignmentTimer,
  ...,
  lateNonCriticalExtension OCTET STRING (CONTAINING SystemInformationBlockType2-v8h0-IEs) OPTIONAL,
  ...
}

--- ASN1STOP
SystemInformationBlockType2-v8h0-IEs ::= SEQUENCE {
  multiBandInfoList    SEQUENCE (SIZE (1..maxMultiBands)) OF AdditionalSpectrumEmission
      OPTIONAL, -- Need OR
  nonCriticalExtension SystemInformationBlockType2-v9e0-IEs OPTIONAL
}

SystemInformationBlockType2-v9e0-IEs ::= SEQUENCE {
  ul-CarrierFreq-v9e0     ARFCN-ValueEUTRA-v9e0   OPTIONAL, -- Cond ul-FreqMax
  nonCriticalExtension    SystemInformationBlockType2-v910-IEs  OPTIONAL
}

SystemInformationBlockType2-v910-IEs ::= SEQUENCE {
  -- Following field is for any non-critical extensions from REL-9
  nonCriticalExtension OCTET STRING (CONTAINING SystemInformationBlockType2-v10m0-IEs) OPTIONAL,
  dummy   SEQUENCE {}  OPTIONAL
}

SystemInformationBlockType2-v10m0-IEs ::= SEQUENCE {
  freqInfo-v10l0    SEQUENCE {
      additionalSpectrumEmission-v10l0   AdditionalSpectrumEmission-v10l0
      }                  OPTIONAL,
  multiBandInfoList-v10l0  SEQUENCE (SIZE (1..maxMultiBands)) OF AdditionalSpectrumEmission-v10l0
      OPTIONAL,
  nonCriticalExtension  SystemInformationBlockType2-v10x0-IEs  OPTIONAL
}

SystemInformationBlockType2-v10x0-IEs ::= SEQUENCE {
  -- Following field is for non-critical extensions up-to REL-12
  lateNonCriticalExtension OCTET STRING        OPTIONAL,
  nonCriticalExtension    SystemInformationBlockType2-v13c0-IEs  OPTIONAL
}

SystemInformationBlockType2-v13c0-IEs ::= SEQUENCE {
  uplinkPowerControlCommon-v13c0 UplinkPowerControlCommon-v1310   OPTIONAL, -- Need OR
  -- Following field is for non-critical extensions from REL-13
  nonCriticalExtension  SEQUENCE {}         OPTIONAL
}

AC-BarringConfig ::=    SEQUENCE {
  ac-BarringFactor     ENUMERATED {
    p00, p05, p10, p15, p20, p25, p30, p40,
    p50, p60, p70, p75, p80, p85, p90, p955,
    p90, p95},
  ac-BarringTime      ENUMERATED {s4, s8, s16, s32, s64, s128, s256, s512},
  ac-BarringForSpecialAC    BIT STRING (SIZE(5))
}

MBSFN-SubframeConfigList ::=  SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig

AC-BarringPerPLMN-List-r12 ::= SEQUENCE (SIZE (1.. maxPLMN-r11)) OF AC-BarringPerPLMN-r12

AC-BarringPerPLMN-r12 ::= SEQUENCE {
  plmn-IdentityIndex-r12     INTEGER (1..maxPLMN-r11),
  ac-BarringInfo-r12    SEQUENCE {
    ac-BarringForEmergency-r12 BOOLEAN,
    ac-BarringForMO-Signalling-r12 AC-BarringConfig OPTIONAL, -- Need OP
    ac-BarringForMO-Data-r12  AC-BarringConfig OPTIONAL, -- Need OP
  }                  OPTIONAL,
  ac-BarringSkipForMMTEL-Voice-r12 ENumerated {true}    OPTIONAL, -- Need OP
  ac-BarringSkipForMMTEL-Video-r12 ENUMERATED {true}    OPTIONAL, -- Need OP
  ac-BarringSkipForSMS-r12     ENUMERATED {true}    OPTIONAL, -- Need OP
  ac-BarringForCSFB-r12     AC-BarringConfig OPTIONAL, -- Need OP
  ssac-BarringForMMTEL-Voice-r12 AC-BarringConfig OPTIONAL, -- Need OP
  ssac-BarringForMMTEL-Video-r12 AC-BarringConfig OPTIONAL, -- Need OP
}

ACDC-BarringForCommon-r13 ::=   SEQUENCE {
  [u1dt-RestrictingForCommon-r13 UDT-Restricting-r13 OPTIONAL, -- Need OP
  udt-RestrictingPerPLMN-List-r13 UDT-RestrictingPerPLMN-List-r13 OPTIONAL, -- Need OR
  cIoT-EPS-OptimisationInfo-r13 CIoT-EPS-OptimisationInfo-r13 OPTIONAL, -- Need OP
  useFullResumeID-r13 ENUMERATED {true}    OPTIONAL -- Need OP
],
  [unicastFreqHoppingInd-r13 ENUMERATED {true}    OPTIONAL -- Need OP
}]}
ACDC-BarringPerPLMN-List-r13 ::= SEQUENCE (SIZE (1.. maxPLMN-r11)) OF ACDC-BarringPerPLMN-r13

ACDC-BarringPerPLMN-r13 ::= SEQUENCE {
  plmn-IdentityIndex-r13    INTEGER (1..maxPLMN-r11),
  acdc-OnlyForHPLMN-r13     BOOLEAN,
  barringPerACDC-CategoryList-r13    BarringPerACDC-CategoryList-r13
}

BarringPerACDC-CategoryList-r13 ::= SEQUENCE (SIZE (1..maxACDC-Cat-r13)) OF BarringPerACDC-Category-r13

BarringPerACDC-Category-r13 ::= SEQUENCE {
  acdc-Category-r13    INTEGER (1..maxACDC-Cat-r13),
  acdc-BarringConfig-r13   SEQUENCE {
    ac-BarringFactor-r13   ENUMERATED {
      p00, p05, p10, p15, p20, p25, p30, p40,
      p50, p60, p70, p75, p80, p85, p90, p95},
    ac-BarringTime-r13    ENUMERATED {s4, s8, s16, s32, s64, s128, s256, s512}
  }  OPTIONAL -- Need OP
}

UDT-Restricting-r13 ::= SEQUENCE {
  udt-Restricting-r13     ENUMERATED {true}   OPTIONAL, --Need OR
  udt-RestrictingTime-r13    ENUMERATED {s4, s8, s16, s32, s64, s128, s256, s512}  OPTIONAL --Need OR
}

UDT-RestrictingPerPLMN-List-r13 ::= SEQUENCE (SIZE (1..maxPLMN-r11)) OF UDT-RestrictingPerPLMN-r13

UDT-RestrictingPerPLMN-r13 ::= SEQUENCE {
  plmn-IdentityIndex-r13     INTEGER (1..maxPLMN-r11),
  udt-Restricting-r13      UDT-Restricting-r13  OPTIONAL --Need OR
}

CIOT-EPS-OptimisationInfo-r13 ::= SEQUENCE (SIZE (1.. maxPLMN-r11)) OF CIOT-OptimisationPLMN-r13

CIOT-OptimisationPLMN-r13::= SEQUENCE {
  up-CIOT-EPS-Optimisation-r13  ENUMERATED {true}   OPTIONAL, -- Need OP
  cp-CIOT-EPS-Optimisation-r13  ENUMERATED {true}   OPTIONAL, -- Need OP
  attachWithoutPDN-Connectivity-r13 ENUMERATED {true}   OPTIONAL -- Need OP
}

-- ASN1STOP
<table>
<thead>
<tr>
<th>SystemInformationBlockType2 field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ac-BarringFactor</strong></td>
</tr>
<tr>
<td>If the random number drawn by the UE is lower than this value, access is allowed. Otherwise the access is barred. The values are interpreted in the range [0,1): p00 = 0, p05 = 0.05, p10 = 0.10,..., p95 = 0.95. Values other than p00 can only be set if all bits of the corresponding ac-BarringForSpecialAC are set to 0.</td>
</tr>
<tr>
<td><strong>ac-BarringForCSFB</strong></td>
</tr>
<tr>
<td>Access class barring for mobile originating CS fallback.</td>
</tr>
<tr>
<td><strong>ac-BarringForEmergency</strong></td>
</tr>
<tr>
<td>Access class barring for AC 10.</td>
</tr>
<tr>
<td><strong>ac-BarringForMO-Data</strong></td>
</tr>
<tr>
<td>Access class barring for mobile originating calls.</td>
</tr>
<tr>
<td><strong>ac-BarringForMO-Signalling</strong></td>
</tr>
<tr>
<td>Access class barring for mobile originating signalling.</td>
</tr>
<tr>
<td><strong>ac-BarringForSpecialAC</strong></td>
</tr>
<tr>
<td>Access class barring for AC 11-15. The first/ leftmost bit is for AC 11, the second bit is for AC 12, and so on.</td>
</tr>
<tr>
<td><strong>ac-BarringTime</strong></td>
</tr>
<tr>
<td>Mean access barring time value in seconds.</td>
</tr>
<tr>
<td><strong>acdc-BarringConfig</strong></td>
</tr>
<tr>
<td>Barring configuration for an ACDC category. If the field is absent, access to the cell is considered as not barred for the ACDC category in accordance with subclause 5.3.3.13.</td>
</tr>
<tr>
<td><strong>acdc-Category</strong></td>
</tr>
<tr>
<td>Indicates the ACDC category as defined in TS 24.105 [72].</td>
</tr>
<tr>
<td><strong>acdc-OnlyForHPLMN</strong></td>
</tr>
<tr>
<td>Indicates whether ACDC is applicable for UEs not in their HPLMN for the corresponding PLMN. TRUE indicates that ACDC is applicable only for UEs in their HPLMN for the corresponding PLMN. FALSE indicates that ACDC is applicable for both UEs in their HPLMN and UEs not in their HPLMN for the corresponding PLMN.</td>
</tr>
<tr>
<td><strong>additionalSpectrumEmission</strong></td>
</tr>
<tr>
<td>The UE requirements related to IE AdditionalSpectrumEmission are defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs. NOTE 1.</td>
</tr>
<tr>
<td><strong>attachWithoutPDN-Connectivity</strong></td>
</tr>
<tr>
<td>If present, the field indicates that attach without PDN connectivity as specified in TS 24.301 [35] is supported for this PLMN.</td>
</tr>
<tr>
<td><strong>barringPerACDC-CategoryList</strong></td>
</tr>
<tr>
<td>A list of barring information per ACDC category according to the order defined in TS 22.011 [10]. The first entry in the list corresponds to the highest ACDC category of which applications are the least restricted in access attempts at a cell, the second entry in the list corresponds to the ACDC category of which applications are restricted more than applications of the highest ACDC category in access attempts at a cell, and so on. The last entry in the list corresponds to the lowest ACDC category of which applications are the most restricted in access attempts at a cell.</td>
</tr>
<tr>
<td><strong>cp-CIoT-EPS-Optimisation</strong></td>
</tr>
<tr>
<td>This field indicates if the UE is allowed to establish the connection with Control plane CIoT EPS Optimisation, see TS 24.301 [35].</td>
</tr>
<tr>
<td><strong>dummy</strong></td>
</tr>
<tr>
<td>This field is not used in the specification. If received it shall be ignored by the UE.</td>
</tr>
<tr>
<td><strong>mbfsn-SubframeConfigList</strong></td>
</tr>
<tr>
<td>Defines the subframes that are reserved for MBSFN in downlink. NOTE 1.</td>
</tr>
<tr>
<td><strong>multiBandInfoList</strong></td>
</tr>
<tr>
<td>A list of AdditionalSpectrumEmission i.e. one for each additional frequency band included in multiBandInfoList in SystemInformationBlockType1, listed in the same order. If E-UTRAN includes multiBandInfoList-v1010 it includes the same number of entries, and listed in the same order, as in multiBandInfoList.</td>
</tr>
<tr>
<td><strong>plmn-IdentityIndex</strong></td>
</tr>
<tr>
<td>Index of the PLMN in plmn-IdentityList included in SIB1. Value 1 indicates the PLMN listed 1st in plmn-IdentityList included in SIB1. Value 2 indicates the PLMN listed 2nd in plmn-IdentityList included in SIB1 and so on. NOTE 1.</td>
</tr>
<tr>
<td><strong>ssac-BarringForMMTEL-Video</strong></td>
</tr>
<tr>
<td>Service specific access class barring for MMTEL video originating calls.</td>
</tr>
<tr>
<td><strong>ssac-BarringForMMTEL-Voice</strong></td>
</tr>
<tr>
<td>Service specific access class barring for MMTEL voice originating calls.</td>
</tr>
<tr>
<td><strong>udt-Restricting</strong></td>
</tr>
<tr>
<td>Value TRUE indicates that the UE should indicate to the higher layers to restrict unattended data traffic TS 22.101 [77] irrespective of the UE being in RRC_IDLE or RRC_CONNECTED. The UE shall not indicate to the higher layers if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11].</td>
</tr>
<tr>
<td><strong>udt-RestrictingTime</strong></td>
</tr>
<tr>
<td>If present and when the udt-Restricting changes from TRUE, the UE runs a timer for a period equal to rand * udt-RestrictingTime, where rand is a random number drawn that is uniformly distributed in the range 0 ≤ rand &lt; 1 value in seconds. The timer stops if udt-Restricting changes to TRUE. Upon timer expiry, the UE indicates to the higher layers that the restriction is alleviated.</td>
</tr>
</tbody>
</table>
### **SystemInformationBlockType2 field descriptions**

**ul-Bandwidth**  
Parameter: transmission bandwidth configuration, NRB, in uplink, see TS 36.101 [42, table 5.6-1]. Value n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on. If for FDD this parameter is absent, the uplink bandwidth is equal to the downlink bandwidth. For TDD this parameter is absent and it is equal to the downlink bandwidth. NOTE 1.

**ul-CarrierFreq**  
For FDD: If absent, the (default) value determined from the default TX-RX frequency separation defined in TS 36.101 [42, table 5.7.3-1] applies.  
For TDD: This parameter is absent and it is equal to the downlink frequency. NOTE 1.

**unicastFreqHoppingInd**  
This field indicates if the UE is allowed to indicate support of frequency hopping for unicast MPDCCH/PDSCH/PUSCH as described in TS 36.321 [6]. This field is included only in the BR version of SI message carrying SystemInformationBlockType2.

**up-CIoT-EPS-Optimisation**  
This field indicates if the UE is allowed to resume the connection with User plane CIoT EPS Optimisation, see TS 24.301 [35].

**useFullResumeID**  
This field indicates if the UE indicates full resume ID of 40 bits in RRCConnectionResumeRequest.

**voiceServiceCauseIndication**  
Indicates whether UE is requested to use the establishment cause mo-VoiceCall for mobile originating MMTEL voice calls.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ul-FreqMax</strong></td>
<td>The field is mandatory present if ul-CarrierFreq (i.e. without suffix) is present and set to maxEARFCN. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

**NOTE 1:** E-UTRAN sets this field to the same value for all instances of SI message that are broadcasted within the same cell.

---

### **SystemInformationBlockType3**

The IE SystemInformationBlockType3 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.

**SystemInformationBlockType3 information element**

```
-- ASN1START
SystemInformationBlockType3 ::= SEQUENCE {
    cellReselectionInfoCommon     SEQUENCE {
        q-Hyst        ENUMERATED {
            dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
            dB12, dB14, dB16, dB18, dB20, dB22, dB24},
        speedStateReelectionPars      SEQUENCE {
            mobilityStateParameters    MobilityStateParameters,
            q-HystSF                  ENUMERATED {
                dB-6, dB-4, dB-2, dB0},
            sf-Medium                 ENUMERATED {
                dB-6, dB-4, dB-2, dB0},
            sf-High                   ENUMERATED {
                dB-6, dB-4, dB-2, dB0}
        },
        s-NonIntraSearch    ReselectionThreshold  OPTIONAL,  -- Need OP
        threshServingLow     ReselectionThreshold,  cellReelectionPriority    CellReelectionPriority,
    },
    intraFreqCellReelectionInfo SEQUENCE {
        q-RxLevMin        Q-RxLevMin,  p-Max        P-Max  OPTIONAL,  -- Need OP
        s-IntraSearch    ReselectionThreshold,  allowedMeasBandwidth  AllowedMeasBandwidth  OPTIONAL,  -- Need OP
        presenceAntennaPort1 PresenceAntennaPort1,  neighCellConfig    NeighCellConfig,
    },
    cellReselectionServingFreqInfo SEQUENCE {
        s-NonIntraSearch    ReselectionThreshold  OPTIONAL,  -- Need OP
        neighCellConfig    NeighCellConfig,
    },
    cellReselectionInfoCommon     SEQUENCE {
        q-Hyst        ENUMERATED {
            dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
            dB12, dB14, dB16, dB18, dB20, dB22, dB24},
        speedStateReelectionPars      SEQUENCE {
            mobilityStateParameters    MobilityStateParameters,
            q-HystSF                  ENUMERATED {
                dB-6, dB-4, dB-2, dB0},
            sf-Medium                 ENUMERATED {
                dB-6, dB-4, dB-2, dB0},
            sf-High                   ENUMERATED {
                dB-6, dB-4, dB-2, dB0}
        },
        s-NonIntraSearch    ReselectionThreshold  OPTIONAL,  -- Need OP
        threshServingLow     ReselectionThreshold,  cellReelectionPriority    CellReelectionPriority,
    },
};
-- ASN1END
```
t-ReselectionEUTRA     T-Reselection,
t-ReselectionEUTRA-SF    SpeedStateScaleFactors OPTIONAL -- Need OP
},
lateNonCriticalExtension    OCTET STRING (CONTAINING SystemInformationBlockType3-v10j0-IEs) OPTIONAL,
[[ s-IntraSearch-v920    SEQUENCE {
    s-IntraSearchP-r9     ReselectionThreshold,
    s-IntraSearchQ-r9     ReselectionThresholdQ-r9
    OPTIONAL, -- Need OP
}
s-NonIntraSearch-v920    SEQUENCE {
    s-NonIntraSearchP-r9   ReselectionThreshold,
    s-NonIntraSearchQ-r9   ReselectionThresholdQ-r9
    } OPTIONAL, -- Need OP
]
q-QualMin-r9      Q-QualMin-r9     OPTIONAL -- Need OP
threshServingLowQ-r9  ReselectionThresholdQ-r9 OPTIONAL -- Need OP
]],
[[ q-QualMinWB-r11      Q-QualMin-r9 OPTIONAL -- Cond WB-RSRQ
]][:
[[ q-QualMinRSRQ-OnAllSymbols-r12 Q-QualMin-r9 OPTIONAL -- Cond RSRQ
]]
RedistributionServingInfo-r13 ::=  SEQUENCE {
    redistributionFactorServing-r13  INTEGER(0..10),
    redistributionFactorCell-r13  ENUMERATED{true} OPTIONAL, --Need OP
    t360-r13       ENUMERATED {min4, min8, min16, min32,infinity, spare3,spare2,spare1},
    redistrOnPagingOnly-r13  ENUMERATED {true} OPTIONAL --Need OP
}
CellReselectionServingFreqInfo-v1310 ::= SEQUENCE {
    cellReselectionSubPriority-r13    CellReselectionSubPriority-r13
}
**SystemInformationBlockType3 field descriptions**

**allowedMeasBandwidth**
If absent, the value corresponding to the downlink bandwidth indicated by the dl-Bandwidth included in MasterInformationBlock applies.

**cellSelectionInfoCE**
Parameters included in coverage enhancement S criteria for BL UEs and UEs in CE, applicable for intra-frequency neighbour cells. If absent, coverage enhancement S criteria is not applicable.

**cellSelectionInfoCE1**
Parameters included in coverage enhancement S criteria for BL UEs and UEs in CE supporting CE Mode B, applicable for intra-frequency neighbour cells. E-UTRAN includes this IE only if cellSelectionInfoCE in SIB3 is present.

**cellReselectionInfoCommon**
Cell re-selection information common for cells.

**cellReselectionServingFreqInfo**
Information common for Cell re-selection to inter-frequency and inter-RAT cells.

**freqBandInfo**
A list of additionalPmax and additionalSpectrumEmission values, as defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs, applicable for the intra-frequency neighouring E-UTRA cells if the UE selects the frequency band from freqBandIndicator in SystemInformationBlockType1. If E-UTRAN includes freqBandInfo-v10l0 it includes the same number of entries, and listed in the same order, as in freqBandInfo-v10.

**freqBandInfo**
A list of additionalPmax and additionalSpectrumEmission values, as defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs, applicable for the intra-frequency neighouring E-UTRA cells if the UE selects the frequency bands in multiBandInfoList (i.e. without suffix) or multiBandInfoList-v9e0. If E-UTRAN includes multiBandInfoList-v10j0, it includes the same number of entries, and listed in the same order, as in multiBandInfoList (i.e. without suffix). If E-UTRAN includes multiBandInfoList-v10l0 it includes the same number of entries, and listed in the same order, as in multiBandInfoList-v10j0.

**p-Max**
Value applicable for the intra-frequency neighouring E-UTRA cells. If absent the UE applies the maximum power according to its capability as specified in TS 36.101 [42, 6.2.2].

**p-Max**
Value applicable for the intra-frequency neighouring E-UTRA cells. If absent the UE applies the maximum power according to its capability as specified in TS 36.101 [42, 6.2.2].

**redistrOnPagingOnly**
If this field is present and the UE is redistribution capable, the UE shall only wait for the paging message to trigger E-UTRAN inter-frequency redistribution procedure as specified in 5.2.4.10 of TS 36.304 [4].

**q-Hyst**
Parameter Qhyst in TS 36.304 [4]. 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 36.304 [4]. 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 36.304 [4]. In dB. Value dB-6 corresponds to -6dB, dB-4 corresponds to -4dB and so on.

**q-QualMin**
Parameter “Qqualmin” in TS 36.304 [4], applicable for intra-frequency neighbour cells. If the field is not present, the UE applies the (default) value of negative infinity for Qqualmin. NOTE 1.

**q-QualMinRSRQ-OnAllSymbols**
If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. NOTE 1.

**q-QualMinWB**
If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16]. NOTE 1.

**q-RxLevMin**
Parameter “Qrxlevmin” in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of 0 dB for Qrxlevmin.

**redistributionFactorCell**
If redistributionFactorCell is present, redistributionFactorServing is only applicable for the serving cell otherwise it is applicable for serving frequency.

**redistributionFactorServing**
Parameter redistributionFactorServing in TS 36.304 [4].

**s-IntraSearch**
Parameter “s-IntraSearchP” in TS 36.304 [4]. If the field s-IntraSearchP is present, the UE applies the value of s-IntraSearchP instead. Otherwise if neither s-IntraSearch nor s-IntraSearchP is present, the UE applies the (default) value of infinity for s-IntraSearchP.

**s-IntraSearch**

**s-IntraSearchQ**
Parameter “s-IntraSearchQ” in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of 0 dB for s-IntraSearchQ.
**SystemInformationBlockType3 field descriptions**

**s-NonIntraSearch**
Parameter "s-NonIntraSearch" in TS 36.304 [4]. If the field s-NonIntraSearch is present, the UE applies the value of s-NonIntraSearch instead. Otherwise if neither s-NonIntraSearch nor s-NonIntraSearchP is present, the UE applies the (default) value of infinity for $S_{\text{NonIntraSearch}}$.

**s-NonIntraSearchP**

**s-NonIntraSearchQ**
Parameter "s-NonIntraSearchQ" in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of 0 dB for $S_{\text{NonIntraSearchQ}}$.

**speedStateReselectionParams**
Speed dependent reselection parameters, see TS 36.304 [4]. If this field is absent, i.e., mobilityStateParameters is also not present, UE behaviour is specified in TS 36.304 [4].

**t360**
Parameter "T360" in TS 36.304 [4]. Value min4 corresponds to 4 minutes, value min8 corresponds to 8 minutes, and so on.

**threshServingLow**
Parameter "ThresholdServing, Low" in TS 36.304 [4].

**threshServingLowQ**
Parameter "ThresholdServing, LowQ" in TS 36.304 [4].

**t-ReselectionEUTRA**
Parameter "TreselectionEUTRA" in TS 36.304 [4].

**t-ReselectionEUTRA-SF**
Parameter "Speed dependent ScalingFactor for TreselectionEUTRA" in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].

**NOTE 1:** The value the UE applies for parameter "$Q_{\text{QualMin}}$" in TS 36.304 [4] depends on the $q-QualMin$ fields signalled by E-UTRAN and supported by the UE. In case multiple candidate options are available, the UE shall select the highest priority candidate option according to the priority order indicated by the following table (top row is highest priority).

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{QrxlevminCE1}$</td>
<td>The field is optionally present, Need OR, if $q$-$\text{RxLevMinCE1-r13}$ is set below -140 dBm. Otherwise the field is not present.</td>
</tr>
<tr>
<td>$\text{RSRQ}$</td>
<td>The field is optionally present, Need OR, if $\text{threshServingLowQ}$ is present in SIB3; otherwise it is not present.</td>
</tr>
<tr>
<td>$\text{WB-RSRQ}$</td>
<td>The field is optionally present, need OP if the measurement bandwidth indicated by \text{allowedMeasBandwidth} is 50 resource blocks or larger; otherwise it is not present.</td>
</tr>
</tbody>
</table>

**SystemInformationBlockType4**

The IE SystemInformationBlockType4 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 blacklisted cells.

**SystemInformationBlockType4 information element**

```
-- ASN1START

SystemInformationBlockType4 ::= SEQUENCE {
  intraFreqNeighCellList    IntraFreqNeighCellList  OPTIONAL, -- Need OR
  intraFreqBlackCellList    IntraFreqBlackCellList  OPTIONAL, -- Need OR
  csg-PhysCellIdRange       PhysCellIdRange    OPTIONAL, -- Cond CSG
  ...,
  lateNonCriticalExtension  OCTET STRING    OPTIONAL
}

IntraFreqNeighCellList ::= SEQUENCE (SIZE (1..maxCellIntra)) OF IntraFreqCellInfo

IntraFreqNeighCellInfo ::= SEQUENCE {

-- ASN1END
```

IntraFreqBlackCellList ::= SEQUENCE (SIZE (1..maxCellBlack)) OF PhysCellIdRange

**SystemInformationBlockType4 field descriptions**

csg-PhysCellIdRange
Set of physical cell identities reserved for CSG cells on the frequency on which this field was received. The received csg-PhysCellIdRange applies if less than 24 hours has elapsed since it was received and the UE is camped on a cell of the same primary PLMN where this field was received. The 3 hour validity restriction (section 5.2.1.3) does not apply to this field. The UE shall not apply any stored csg-PhysCellIdRange when it is in any cell selection state defined in TS 36.304 [4].

intraFreqBlackCellList
List of blacklisted intra-frequency neighbouring cells.

intraFreqNeighbCellList
List of intra-frequency neighbouring cells with specific cell re-selection parameters.

q-OffsetCell
Parameter "Qoffsets,n" in TS 36.304 [4].

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSG</td>
<td>This field is optional, need OP, for non-CSG cells, and mandatory for CSG cells.</td>
</tr>
</tbody>
</table>

**SystemInformationBlockType5**

The IE SystemInformationBlockType5 contains information relevant only for inter-frequency cell re-selection i.e. information about other E-UTRA frequencies and inter-frequency neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.

**SystemInformationBlockType5 information element**

```
SystemInformationBlockType5 ::= SEQUENCE {
  interFreqCarrierFreqList   InterFreqCarrierFreqList,
  ...,
  lateNonCriticalExtension   OCTET STRING (CONTAINING SystemInformationBlockType5-v8h0-IEs) OPTIONAL,
  [[ interFreqCarrierFreqList-v1250 InterFreqCarrierFreqList-v1250 OPTIONAL, -- Need OR
    interFreqCarrierFreqListExt-r12 InterFreqCarrierFreqListExt-r12 OPTIONAL -- Need OR
  ]],
  [[ interFreqCarrierFreqListExt-v1280 InterFreqCarrierFreqListExt-v1280 OPTIONAL -- Need
    interFreqCarrierFreqListExt-v1310 InterFreqCarrierFreqListExt-v1310 OPTIONAL, -- Need
    interFreqCarrierFreqListExt-v1310 InterFreqCarrierFreqListExt-v1310 OPTIONAL -- Need OR
    interFreqCarrierFreqListExt-v1350 InterFreqCarrierFreqListExt-v1350 OPTIONAL, -- Need OR
    interFreqCarrierFreqListExt-v1360 InterFreqCarrierFreqListExt-v1360 OPTIONAL -- Need OR
  ]],
  -- Late non critical extensions
  SystemInformationBlockType5-v8h0-IEs ::= SEQUENCE {
    interFreqCarrierFreqList-v8h0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v8h0 OPTIONAL, -- Need OP
    nonCriticalExtension SystemInformationBlockType5-v9e0-IEs OPTIONAL
  }
  SystemInformationBlockType5-v9e0-IEs ::= SEQUENCE {
    ...}
```

-- ASN1STOP
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interFreqCarrierFreqList-v9e0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v9e0
OPTIONAL, -- Need OR
nonCriticalExtension SystemInformationBlockType5-v10j0-IEs OPTIONAL

SystemInformationBlockType5-v10j0-IEs ::= SEQUENCE {
interFreqCarrierFreqList-v10j0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v10j0
OPTIONAL, -- Need OR
nonCriticalExtension SystemInformationBlockType5-v1010-IEs
OPTIONAL
}

SystemInformationBlockType5-v10l0-IEs ::= SEQUENCE {
interFreqCarrierFreqList-v10l0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v10l0
OPTIONAL, -- Need OR
nonCriticalExtension SystemInformationBlockType5-v13a0-IEs
OPTIONAL
}

SystemInformationBlockType5-v13a0-IEs ::= SEQUENCE {
-- Late non critical extensions from REL-10 upto REL-12
lateNonCriticalExtension OCTET STRING OPTIONAL, -- Need OR
interFreqCarrierFreqList-v13a0 InterFreqCarrierFreqList-v13a0 OPTIONAL, -- Need OR
-- Late non critical extensions from REL-13
nonCriticalExtension SEQUENCE () OPTIONAL
}

InterFreqCarrierFreqList ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo

InterFreqCarrierFreqList-v1250 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1250

InterFreqCarrierFreqListExt-r12 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-r12

InterFreqCarrierFreqListExt-v1280 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1280

InterFreqCarrierFreqList-v1310 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1310

InterFreqCarrierFreqListExt-v1310 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1310

InterFreqCarrierFreqListExt-v1350 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1350

InterFreqCarrierFreqListExt-v1360 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1360

InterFreqCarrierFreqList-v13a0 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v13a0

InterFreqCarrierFreqInfo ::= SEQUENCE {
  dl-CarrierFreq ARFCN-ValueEUTRA,
  q-RxLevMin Q-RxLevMin,
  p-Max P-Max OPTIONAL, -- Need OP
t-ReselectionEUTRA T-Reselection,
t-ReselectionEUTRA-SF SpeedStateScaleFactors OPTIONAL, -- Need OP
threshX-High ReselectionThreshold
threshX-Low ReselectionThreshold
allowedMeasBandwidth AllowedMeasBandwidth
presenceAntennaPort1 PresenceAntennaPort1,
cellReselectionPriority CellReselectionPriority OPTIONAL, -- Need OP
neighCellConfig NeighCellConfig,
q-OffsetFreq Q-OffsetRange DEFAULT dB0,
interFreqNeighborCellList InterFreqNeighborCellList OPTIONAL, -- Need OR
interFreqBlackCellList InterFreqBlackCellList OPTIONAL, -- Need OR
...,
[[ q-QualMin-r9 Q-QualMin-r9 OPTIONAL, -- Need OP
threshX-HighQ-r9 ReselectionThresholdQ-r9,
threshX-LowQ-r9 ReselectionThresholdQ-r9, thresIdentity
]] OPTIONAL -- Cond RSRQ
},
[[ q-QualMinWB-r11 Q-QualMin-r9 OPTIONAL -- Cond WB-RSRQ
]]
}

InterFreqCarrierFreqInfo-v8h0 ::= SEQUENCE {
  multiBandInfoList MultiBandInfoList OPTIONAL -- Need OR
InterFreqCarrierFreqInfo-v9e0 ::= SEQUENCE {
  dl-CarrierFreq-v9e0     ARFCN-ValueEUTRA-v9e0 OPTIONAL, -- Cond dl-FreqMax
  multiBandInfoList-v9e0  MultiBandInfoList-v9e0 OPTIONAL -- Need OR
}

InterFreqCarrierFreqInfo-v10j0 ::= SEQUENCE {
  freqBandInfo-r10      NS-PmaxList-r10 OPTIONAL, -- Need OR
  multiBandInfoList-v10j0 MultiBandInfoList-v10j0 OPTIONAL -- Need OR
}

InterFreqCarrierFreqInfo-v10l0 ::= SEQUENCE {
  freqBandInfo-v10l0     NS-PmaxList-v10l0 OPTIONAL, -- Need OR
  multiBandInfoList-v10l0 MultiBandInfoList-v10l0 OPTIONAL -- Need OR
}

InterFreqCarrierFreqInfo-v1250 ::=  SEQUENCE {
  reducedMeasPerformance-r12 ENUMERATED {true} OPTIONAL, -- Need OP
  q-QualMinRSRQ-OnAllSymbols-r12 Q-QualMin-r9     OPTIONAL, -- Cond RSRQ2
}

InterFreqCarrierFreqInfo-r12 ::=  SEQUENCE {
  dl-CarrierFreq-r12     ARFCN-ValueEUTRA-r9,
  q-RxLevMin-r12         Q-RxLevMin,
  p-Max-r12              P-Max
      OPTIONAL, -- Need OP
  t-ReselectionEUTRA-r12 T-Reselection,
  t-ReselectionEUTRA-SF-r12 SpeedStateScaleFactors
      OPTIONAL, -- Need OP
  threshX-Low-r12        ReselectionThreshold,
  allowedMeasBandwidth-r12 AllowedMeasBandwidth,
  presenceAntennaPort1-r12 PresenceAntennaPort1,
  cellReselectionPriority-r12 CellReselectionPriority
      OPTIONAL, -- Need OP
  neighCellInfoConfig-r12 NeighCellConfig,
  q-OffsetFreq-r12       Q-OffsetRange
     DEFAULT dB0,
  interFreqNeighCellList-r12 InterFreqNeighCellList
      OPTIONAL, -- Need OR
  interFreqBlackCellList-r12 InterFreqBlackCellList
      OPTIONAL, -- Need OR
  q-QualMin-r12          Q-QualMin-r9
      OPTIONAL, -- Cond RSRQ2
  threshX-HighQ-r12      ReselectionThresholdQ-r9,
  threshX-LowQ-r12       ReselectionThresholdQ-r9
      OPTIONAL, -- Cond RSRQ2
  ...}

InterFreqCarrierFreqInfo-v1310 ::= SEQUENCE {
  cellReselectionSubPriority-r13 CellReselectionSubPriority-r13
      OPTIONAL, -- Need OP
  redistributionInterFreqInfo-r13 RedistributionInterFreqInfo-r13
      OPTIONAL, -- Need OP
  cellSelectionInfoCE-r13    CellSelectionInfoCE-r13
      OPTIONAL, -- Need OP
  t-ReselectionEUTRA-CE-r13 T-ReselectionEUTRA-CE-r13
      OPTIONAL, -- Need OP
}

InterFreqCarrierFreqInfo-v1350 ::= SEQUENCE {
  cellSelectionInfoCE1-r13 CellSelectionInfoCE1-r13
      OPTIONAL, -- Need OP
}

InterFreqCarrierFreqInfo-v1360 ::= SEQUENCE {
  cellSelectionInfoCE1-v1360 CellSelectionInfoCE1-v1360
      OPTIONAL, -- Cond QrxlevminCE1
}

InterFreqNeighCellList ::=   SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo

InterFreqNeighCellInfo ::=   SEQUENCE {
  physicCellId           PhysicCellId,
  q-OffsetCell           Q-OffsetRange
}

InterFreqBlackCellList ::=   SEQUENCE (SIZE (1..maxCellBlack)) OF PhysicCellIdRange

RedistributionInterFreqInfo-r13 ::=  SEQUENCE {
  redistributionFactorFreq-r13 RedistributionFactor-r13
      OPTIONAL, -- Need OP
  redistributionNeighCellList-r13 RedistributionNeighCellList-r13
      OPTIONAL, -- Need OP
}
RedistributionNeighCellList-r13 ::= SEQUENCE {SIZE (1..maxCellInter)) OF RedistributionNeighCell-r13

RedistributionNeighCell-r13 ::= SEQUENCE {
  physCellId-r13       PhysCellId,
  redistributionFactorCell-r13     RedistributionFactor-r13
}

RedistributionFactor-r13 ::= INTEGER(1..10)

-- ASN1STOP
### SystemInformationBlockType5 field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cellSelectionInfoCE</td>
<td>Parameters included in coverage enhancement S criteria for BL UEs and UEs in CE, applicable for inter-frequency neighbour cells. If absent, coverage enhancement S criteria is not applicable.</td>
</tr>
<tr>
<td>cellSelectionInfoCE1</td>
<td>Parameters included in coverage enhancement S criteria for BL UEs and UEs in CE supporting CE Mode B. E-UTRAN includes this IE in an entry of InterFreqCarrierFreqList-v1350 or InterFreqCarrierFreqListExt-v1350 only if cellSelectionInfoCE is present in the corresponding entry of InterFreqCarrierFreqList-v1310 or InterFreqCarrierFreqListExt-v1310.</td>
</tr>
<tr>
<td>freqBandinfo</td>
<td>A list of additionalPmax and additionalSpectrumEmission values, as defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs, for the frequency band represented by dl-CarrierFreq for which cell re-selection parameters are common. If E-UTRAN includes freqBandinfo-v10l0 it includes the same number of entries, and listed in the same order, as in freqBandInfo-r10.</td>
</tr>
<tr>
<td>interFreqBlackCellList</td>
<td>List of blacklisted inter-frequency neighbouring cells.</td>
</tr>
<tr>
<td>interFreqCarrierFreqList</td>
<td>List of neighbouring inter-frequencies. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the E-ARFCN used to indicate this. If E-UTRAN includes interFreqCarrierFreqList-v8h0, interFreqCarrierFreqList-v9e0, InterFreqCarrierFreqList-v1250, InterFreqCarrierFreqList-v1310, InterFreqCarrierFreqList-v1350 and/or InterFreqCarrierFreqList-v13a0, it includes the same number of entries, and listed in the same order, as in interFreqCarrierFreqList (i.e. without suffix). See Annex D for more descriptions.</td>
</tr>
<tr>
<td>interFreqCarrierFreqListExt</td>
<td>List of additional neighbouring inter-frequencies, i.e. extending the size of the inter-frequency carrier list using the general principles specified in 5.1.2. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the E-ARFCN used to indicate this. EUTRAN may include interFreqCarrierFreqListExt even if interFreqCarrierFreqList (i.e. without suffix) does not include maxFreq entries. If E-UTRAN includes InterFreqCarrierFreqListExt-v1310, InterFreqCarrierFreqListExt-v1350 and/or InterFreqCarrierFreqListExt-v1360, it includes the same number of entries, and listed in the same order, as in interFreqCarrierFreqListExt-r12.</td>
</tr>
<tr>
<td>interFreqNeighCellList</td>
<td>List of inter-frequency neighbouring cells with specific cell re-selection parameters.</td>
</tr>
<tr>
<td>multiBandInfoList-v10j0</td>
<td>Indicates the list of frequency bands in addition to the band represented by dl-CarrierFreq for which cell reselection parameters are common. E-UTRAN indicates at most maxMultiBands frequency bands (i.e. the total number of entries across both multiBandInfoList and multiBandInfoList-v9e0 is below this limit). A list of additionalPmax and additionalSpectrumEmission values, as defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs, for the frequency bands in multiBandInfoList (i.e. without suffix) and multiBandInfoList-v9e0. If E-UTRAN includes multiBandInfoList-v10j0, it includes the same number of entries, and listed in the same order, as in multiBandInfoList (i.e. without suffix). If E-UTRAN includes multiBandInfoList-v10l0 it includes the same number of entries, and listed in the same order, as in multiBandInfoList-v10j0.</td>
</tr>
<tr>
<td>p-Max</td>
<td>Value applicable for the neighbouring E-UTRA cells on this carrier frequency. If absent the UE applies the maximum power according to its capability as specified in TS 36.101 [42, 6.2.2].</td>
</tr>
<tr>
<td>q-OffsetCell</td>
<td>Parameter “Qoffsetcell,” in TS 36.304 [4].</td>
</tr>
<tr>
<td>q-OffsetFreq</td>
<td>Parameter “Qoffsetfrequency,” in TS 36.304 [4].</td>
</tr>
<tr>
<td>q-QualMin</td>
<td>Parameter “Qqualmin,” in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of negative infinity for Qqualmin. NOTE 1.</td>
</tr>
<tr>
<td>q-QualMinRSRQ-OnAllSymbols</td>
<td>If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. NOTE 1.</td>
</tr>
<tr>
<td>q-QualMinWB</td>
<td>If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16]. NOTE 1.</td>
</tr>
<tr>
<td>redistributionFactorFreq</td>
<td>Parameter redistributionFactorFreq in TS 36.304 [4].</td>
</tr>
<tr>
<td>redistributionFactorCell</td>
<td>Parameter redistributionFactorCell in TS 36.304 [4].</td>
</tr>
<tr>
<td>reducedMeasPerformance</td>
<td>Value TRUE indicates that the neighbouring inter-frequency is configured for reduced measurement performance, see TS 36.133 [16]. If the field is not included, the neighbouring inter-frequency is configured for normal measurement performance, see TS 36.133 [16].</td>
</tr>
<tr>
<td>threshX-High</td>
<td>Parameter &quot;Threshx, (x)&quot; in TS 36.304 [4].</td>
</tr>
</tbody>
</table>
### SystemInformationBlockType5 field descriptions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ThreshX-HighQ</td>
<td>Parameter &quot;Threshx, HighQ&quot; in TS 36.304 [4].</td>
</tr>
<tr>
<td>ThreshX-Low</td>
<td>Parameter &quot;Threshx, LowP&quot; in TS 36.304 [4].</td>
</tr>
<tr>
<td>ThreshX-LowQ</td>
<td>Parameter &quot;Threshx, LowQ&quot; in TS 36.304 [4].</td>
</tr>
<tr>
<td>t-ReselectionEUTRA</td>
<td>Parameter &quot;TreselectionEUTRA&quot; in TS 36.304 [4].</td>
</tr>
<tr>
<td>t-ReselectionEUTRA-SF</td>
<td>Parameter &quot;Speed dependent ScalingFactor for TreselectionEUTRA&quot; in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].</td>
</tr>
</tbody>
</table>

NOTE 1: The value the UE applies for parameter "Q\text{qualmin}" in TS 36.304 [4] depends on the $q_{\text{QualMin}}$ fields signalled by E-UTRAN and supported by the UE. In case multiple candidate options are available, the UE shall select the highest priority candidate option according to the priority order indicated by the following table (top row is highest priority).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Included</td>
<td>Included</td>
<td>q-QualMinRSRQ-OnAllSymbols = (q-QualMin - q-QualMinWB)</td>
</tr>
<tr>
<td>Included</td>
<td>Not included</td>
<td>q-QualMinRSRQ-OnAllSymbols</td>
</tr>
<tr>
<td>Not included</td>
<td>Included</td>
<td>q-QualMinWB</td>
</tr>
<tr>
<td>Not included</td>
<td>Not included</td>
<td>q-QualMin</td>
</tr>
</tbody>
</table>

#### Conditional presence

<table>
<thead>
<tr>
<th>dl-FreqMax</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Included</td>
<td>The field is mandatory present if, for the corresponding entry in InterFreqCarrierFreqList (i.e. without suffix), dl-CarrierFreq (i.e. without suffix) is set to maxEARFCON. Otherwise the field is not present.</td>
</tr>
<tr>
<td>QrxlevminCE1</td>
<td>If $q_{\text{RxLevMinCE1}}$ is set below -140 dBm. Otherwise the field is not present.</td>
</tr>
<tr>
<td>RSRQ</td>
<td>If $q_{\text{ServingLowQ}}$ is present in systemInformationBlockType3; otherwise it is not present.</td>
</tr>
<tr>
<td>RSRQ2</td>
<td>The field is mandatory present for all EUTRA carriers listed in SIB5 if $q_{\text{QualMinRSRQ-OnAllSymbols}}$ is present in SIB3; otherwise it is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>WB-RSRQ</td>
<td>The field is optionally present, need OP if the measurement bandwidth indicated by allowedMeasBandwidth is 50 resource blocks or larger; otherwise it is not present.</td>
</tr>
</tbody>
</table>

### SystemInformationBlockType6

The IE SystemInformationBlockType6 contains information relevant only for inter-RAT cell re-selection i.e. information about UTRA frequencies and UTRA neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency.

#### SystemInformationBlockType6 information element

```asn1
SystemInformationBlockType6 ::= SEQUENCE {
  carrierFreqListUTRA-FDD CarrierFreqListUTRA-FDD OPTIONAL, -- Need OR,
  carrierFreqListUTRA-TDD CarrierFreqListUTRA-TDD OPTIONAL, -- Need OR,
  t-ReselectionUTRA     T-Reselection,
  t-ReselectionUTRA-SF SpeedStateScaleFactors OPTIONAL, -- Need OP
  ...,
  lateNonCriticalExtension OCTET STRING (CONTAINING SystemInformationBlockType6-v8h0-IEs) OPTIONAL,
}
[[
  carrierFreqListUTRA-FDD-v1250 SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF
    CarrierFreqInfoUTRA-v1250 OPTIONAL, -- Cond UTRA-FDD
  carrierFreqListUTRA-TDD-v1250 SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF
    CarrierFreqInfoUTRA-v1250 OPTIONAL, -- Cond UTRA-TDD
  carrierFreqListUTRA-FDD-Ext-r12 CarrierFreqListUTRA-FDD-Ext-r12 OPTIONAL, -- Cond UTRA-FDD
  carrierFreqListUTRA-TDD-Ext-r12 CarrierFreqListUTRA-TDD-Ext-r12 OPTIONAL, -- Cond UTRA-TDD
]]
SystemInformationBlockType6-v8h0-IEs ::= SEQUENCE {
  carrierFreqListUTRA-FDD-v8h0 SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqInfoUTRA-
  FDD-v8h0 OPTIONAL,    -- Cond UTRA-FDD
  nonCriticalExtension SEQUENCE () OPTIONAL
}

CarrierFreqInfoUTRA-v1250 ::= SEQUENCE {
  reducedMeasPerformance-r12 ENUMERATED {true} OPTIONAL -- Need OP
}

CarrierFreqListUTRA-FDD ::= SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqUTRA-FDD

CarrierFreqUTRA-FDD ::= SEQUENCE {
  carrierFreq ARFCN-ValueUTRA,
  cellReselectionPriority CellReselectionPriority OPTIONAL,    -- Need OP
  threshX-High ReselectionThreshold,
  threshX-Low ReselectionThreshold,
  q-RxLevMin INTEGER (-60..-13),
  p-MaxUTRA INTEGER (-50..33),
  q-QualMin INTEGER (-24..0),
  ...
  [  threshX-Q-r9 SEQUENCE {
    threshX-HighQ-r9 ReselectionThresholdQ-r9,
    threshX-LowQ-r9 ReselectionThresholdQ-r9
    } OPTIONAL -- Cond RSRQ
  ]
}

CarrierFreqInfoUTRA-FDD-v8h0 ::= SEQUENCE {
  multiBandInfoList SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-
  UTRA-FDD OPTIONAL -- Need OR
}

CarrierFreqListUTRA-FDD-Ext-r12 ::= SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqUTRA-FDD-Ext-r12

CarrierFreqUTRA-FDD-Ext-r12 ::= SEQUENCE {
  carrierFreq-r12 ARFCN-ValueUTRA,
  cellReselectionPriority-r12 CellReselectionPriority OPTIONAL,    -- Need OP
  threshX-High-r12 ReselectionThreshold,
  threshX-Low-r12 ReselectionThreshold,
  q-RxLevMin-r12 INTEGER (-60..-13),
  p-MaxUTRA-r12 INTEGER (-50..33),
  q-QualMin-r12 INTEGER (-24..0),
  threshX-Q-r12 SEQUENCE {
    threshX-HighQ-r12 ReselectionThresholdQ-r9,
    threshX-LowQ-r12 ReselectionThresholdQ-r9
    } OPTIONAL -- Cond RSRQ
  }

CarrierFreqListUTRA-TDD ::= SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF CarrierFreqUTRA-TDD

CarrierFreqUTRA-TDD ::= SEQUENCE {
  carrierFreq ARFCN-ValueUTRA,
  cellReselectionPriority CellReselectionPriority OPTIONAL,    -- Need OP
  threshX-High ReselectionThreshold,
  threshX-Low ReselectionThreshold,
  q-RxLevMin INTEGER (-60..-13),
  p-MaxUTRA INTEGER (-50..33),
  ...
SystemInformationBlockType6 field descriptions

**carrierFreqListUTRA-FDD**
List of carrier frequencies of UTRA FDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. If E-UTRAN includes `carrierFreqListUTRA-FDD-v8h0` and/or `carrierFreqListUTRA-FDD-v1250`, it includes the same number of entries, and listed in the same order, as in `carrierFreqListUTRA-FDD` (i.e. without suffix). See Annex D for more descriptions.

**carrierFreqListUTRA-FDD-Ext**
List of additional carrier frequencies of UTRA FDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. EUTRAN may include `carrierFreqListUTRA-FDD-Ext` even if `carrierFreqListUTRA-FDD` (i.e without suffix) does not include `maxUTRA-FDD-Carrier` entries.

**carrierFreqListUTRA-TDD**
List of carrier frequencies of UTRA TDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. EUTRAN may include `carrierFreqListUTRA-TDD-Ext` even if `carrierFreqListUTRA-TDD` (i.e without suffix) does not include `maxUTRA-TDD-Carrier` entries.

**carrierFreqListUTRA-TDD-Ext**
List of additional carrier frequencies of UTRA TDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. EUTRAN may include `carrierFreqListUTRA-TDD-Ext` even if `carrierFreqListUTRA-TDD` (i.e without suffix) does not include `maxUTRA-TDD-Carrier` entries.

**multiBandInfoList**
Indicates the list of frequency bands in addition to the band represented by `carrierFreq` in the `CarrierFreqUTRA-FDD` for which UTRA cell reselection parameters are common.

**p-MaxUTRA**
The maximum allowed transmission power on the (uplink) carrier frequency, see TS 25.304 [40]. In dBm

**q-QualMin**
Parameter "Q_{qualmin}" in TS 25.304 [40]. Actual value = field value [dB].

**q-RxLevMin**
Parameter "Q_{rxlevmin}" in TS 25.304 [40]. Actual value = field value * 2+1 [dB].

**reducedMeasPerformance**
Value `TRUE` indicates that the UTRA carrier frequency is configured for reduced measurement performance, see TS 36.133 [16]. If the field is not included, the UTRA carrier frequency is configured for normal measurement performance, see TS 36.133 [16].

**t-ReselectionUTRA**
Parameter "TreselectionUTRAN" in TS 36.304 [4].

**t-ReselectionUTRA-SF**
Parameter "Speed dependent ScalingFactor for Treselection_{UTRAN}" in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].

**threshX-High**
Parameter "ThreshX_{HighP}" in TS 36.304 [4].

**threshX-HighQ**
Parameter "ThreshX_{HighQ}" in TS 36.304 [4].

**threshX-Low**
Parameter "ThreshX_{LowP}" in TS 36.304 [4].

**threshX-LowQ**
Parameter "ThreshX_{LowQ}" in TS 36.304 [4].

---

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSRQ</td>
<td>The field is mandatory present if the <code>threshServingLowQ</code> is present in <code>SystemInformationBlockType3</code>, otherwise it is not present.</td>
</tr>
<tr>
<td>UTRA-FDD</td>
<td>The field is optionally present, need OR, if the <code>carrierFreqListUTRA-FDD</code> is present. Otherwise it is not present.</td>
</tr>
<tr>
<td>UTRA-TDD</td>
<td>The field is optionally present, need OR, if the <code>carrierFreqListUTRA-TDD</code> is present. Otherwise it is not present.</td>
</tr>
</tbody>
</table>

---

**SystemInformationBlockType7**
The IE `SystemInformationBlockType7` contains information relevant only for inter-RAT cell re-selection i.e. information about GERAN frequencies relevant for cell re-selection. The IE includes cell re-selection parameters for each frequency.
SystemInformationBlockType7 information element

```asn1
SystemInformationBlockType7 ::= SEQUENCE {
  t-ReselectionGERAN     T-Reselection,
  t-ReselectionGERAN-SF    SpeedStateScaleFactors OPTIONAL, -- Need OR
  carrierFreqsInfoList    CarrierFreqsInfoListGERAN OPTIONAL, -- Need OR
  ...,
  lateNonCriticalExtension OCTET STRING OPTIONAL
}

CarrierFreqsInfoListGERAN ::= SEQUENCE (SIZE (1..maxGNFG)) OF CarrierFreqsInfoGERAN

CarrierFreqsInfoGERAN ::= SEQUENCE {
  carrierFreqs      CarrierFreqsGERAN,
  commonInfo       SEQUENCE {
    cellReselectionPriority    CellReselectionPriority OPTIONAL, -- Need OP
    ncc-Permitted      BIT STRING (SIZE (8)),
    q-RxLevMin       INTEGER (0..45),
    p-MaxGERAN       INTEGER (0..39) OPTIONAL, -- Need OP
    threshX-High      ReselectionThreshold,
    threshX-Low       ReselectionThreshold
  },
  ...,

-- ASN1STOP
```

**SystemInformationBlockType7 field descriptions**

- **carrierFreqs**
  The list of GERAN carrier frequencies organised into one group of GERAN carrier frequencies.

- **carrierFreqsInfoList**
  Provides a list of neighbouring GERAN carrier frequencies, which may be monitored for neighbouring GERAN cells. The GERAN carrier frequencies are organised in groups and the cell reselection parameters are provided per group of GERAN carrier frequencies.

- **commonInfo**
  Defines the set of cell reselection parameters for the group of GERAN carrier frequencies.

- **ncc-Permitted**
  Field encoded as a bit map, where bit N is set to "0" if a BCCH carrier with NCC = N-1 is not permitted for monitoring and set to "1" if the BCCH carrier with NCC = N-1 is permitted for monitoring; N = 1 to 8; bit 1 of the bitmap is the leading bit of the bit string.

- **p-MaxGERAN**
  Maximum allowed transmission power for GERAN on an uplink carrier frequency, see TS 45.008 [28]. Value in dBm. Applicable for the neighbouring GERAN cells on this carrier frequency. If pmaxGERAN is absent, the maximum power according to the UE capability is used.

- **q-RxLevMin**
  Parameter "Qrxlevmin" in TS 36.304 [4], minimum required RX level in the GSM cell. The actual value of Qrxlevmin in dBm = (field value * 2) – 115.

- **threshX-High**
  Parameter "Threshx_Highp" in TS 36.304 [4].

- **threshX-Low**
  Parameter "Threshx_Lowp" in TS 36.304 [4].

- **t-ReselectionGERAN**
  Parameter "TreselectionGERAN" in TS 36.304 [4].

- **t-ReselectionGERAN-SF**
  Parameter "Speed dependent ScalingFactor for TreselectionGERAN" in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].

---

SystemInformationBlockType8

The IE SystemInformationBlockType8 contains information relevant only for inter-RAT cell re-selection i.e. information about CDMA2000 frequencies and CDMA2000 neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.
SystemInformationBlockType8 ::= SEQUENCE {
  systemTimeInfo SystemTimeInfoCDMA2000 OPTIONAL, -- Need OR
  searchWindowSize INTEGER (0..15) OPTIONAL, -- Need OR
  parametersHRPD Sequence {
    preRegistrationInfoHRPD PreRegistrationInfoHRPD,
    cellReselectionParametersHRPD CellReselectionParametersCDMA2000 OPTIONAL -- Need OR
  } OPTIONAL, -- Need OR
  parameters1XRTT Sequence {
    csfb-RegistrationParam1XRTT CSFB-RegistrationParam1XRTT OPTIONAL, -- Need OR
    longCodeState1XRTT BIT STRING (SIZE (4)) OPTIONAL, -- Need OR
    cellReselectionParameters1XRTT CellReselectionParametersCDMA2000 OPTIONAL -- Need OR
  } OPTIONAL, -- Need OR
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  [[
    csfb-SupportForDualRxUEs-r9 BOOLEAN OPTIONAL -- Need OR
    cellReselectionParametersHRPD-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL, --
    Cond NCL-HRPD
    cellReselectionParameters1XRTT-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL, --
    Cond NCL-1XRTT
    cellReselectionParametersHRPD-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL, --
    Cond NCL-HRPD
    cellReselectionParameters1XRTT-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL, --
    Cond NCL-1XRTT
    cellReselectionParametersHRPD-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL, --
    Cond NCL-HRPD
    cellReselectionParameters1XRTT-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL, --
    Cond NCL-1XRTT
    cellReselectionParametersHRPD-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL, --
    Cond NCL-HRPD
    cellReselectionParameters1XRTT-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL, --
    Cond NCL-1XRTT
    cellReselectionParametersHRPD-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL, --
    Cond NCL-HRPD
    cellReselectionParameters1XRTT-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL, --
    Cond NCL-1XRTT
  ]],
  [[
    csfb-DualRxTxSupport-r10 ENUMERATED {true} OPTIONAL -- Cond REG-1XRTT
  ]],
  [[
    sib8-PerPLMN-List-r11 SIB8-PerPLMN-List-r11 OPTIONAL -- Need OR
  ]]]
}

CellReselectionParametersCDMA2000 ::= SEQUENCE {
  bandClassList BandClassListCDMA2000,
  neighCellList NeighCellListCDMA2000,
  t-ReselectionCDMA2000 T-Reselection,
  t-ReselectionCDMA2000-SF SpeedStateScaleFactors OPTIONAL -- Need OP
}

CellReselectionParametersCDMA2000-r11 ::= SEQUENCE {
  bandClassList BandClassListCDMA2000,
  neighCellList-r11 NeighCellListCDMA2000-r11,
  t-ReselectionCDMA2000 T-Reselection,
  t-ReselectionCDMA2000-SF SpeedStateScaleFactors OPTIONAL -- Need OP
}

CellReselectionParametersCDMA2000-v920 ::= SEQUENCE {
  neighCellList-v920 NeighCellListCDMA2000-v920
}

NeighCellListCDMA2000 ::= SEQUENCE {
  NeighCell1CDMA2000 ::= SEQUENCE {
    bandClass BandclassCDMA2000,
    neighCellsPerFreqList NeighCellsPerBandclassListCDMA2000
  }
}

NeighCell1CDMA2000-r11 ::= SEQUENCE {
  bandClass BandclassCDMA2000,
  neighFreqInfoList-r11 NeighCellsPerBandclassListCDMA2000-r11
}

NeighCellsPerBandclassListCDMA2000 ::= SEQUENCE {
  NeighCellsPerBandclassListCDMA2000 ::= SEQUENCE {
    arfcn ARFCN-ValueCDMA2000,
    physCellIdList PhysCellIdListCDMA2000
  }
}

NeighCellsPerBandclassListCDMA2000-r11 ::= SEQUENCE {
  arfcn ARFCN-ValueCDMA2000,
  physCellIdList-r11 PhysCellIdListCDMA2000
}

NeighCellListCDMA2000-v920 ::= SEQUENCE {
  NeighCellListCDMA2000-v920 ::= SEQUENCE {
    NeighCellsPerBandclassListCDMA2000-v920 NeighCellsPerBandclassListCDMA2000-v920
  }
}

NeighCell1CDMA2000-v920 ::= SEQUENCE {
  NeighCell1CDMA2000-v920 ::= SEQUENCE {
    NeighCellsPerBandclassListCDMA2000-v920 NeighCellsPerBandclassListCDMA2000-v920
  }
}
NeighCellsPerBandclassListCDMA2000-v920 ::= SEQUENCE (SIZE (1..16)) OF NeighCellsPerBandclassListCDMA2000-v920

NeighCellsPerBandclassListCDMA2000-v920 ::= SEQUENCE {
  physCellIdList-v920  PhysCellIdListCDMA2000-v920
}

PhysCellIdListCDMA2000 ::= SEQUENCE (SIZE (1..16)) OF PhysCellIdCDMA2000

PhysCellIdListCDMA2000-v920 ::= SEQUENCE (SIZE (0..24)) OF PhysCellIdCDMA2000

BandClassInfoCDMA2000 ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandClassInfoCDMA2000

BandClassInfoCDMA2000 ::= SEQUENCE {
  bandClass       BandclassCDMA2000,
  cellReselectionPriority    CellReselectionPriority    OPTIONAL, -- Need OP
  threshX-High      INTEGER (0..63),
  threshX-Low       INTEGER (0..63),
  ...
}

AC-BarringConfig1XRTT-r9 ::=  SEQUENCE {
  ac-Barring0to9-r9     INTEGER (0..63),
  ac-Barring10-r9       INTEGER (0..7),
  ac-Barring11-r9       INTEGER (0..7),
  ac-Barring12-r9       INTEGER (0..7),
  ac-Barring13-r9       INTEGER (0..7),
  ac-Barring14-r9       INTEGER (0..7),
  ac-Barring15-r9       INTEGER (0..7),
  ac-BarringMsg-r9      INTEGER (0..7),
  ac-BarringReg-r9      INTEGER (0..7),
  ac-BarringEmg-r9      INTEGER (0..7)
}

SIB8-PerPLMN-List-r11 ::=   SEQUENCE (SIZE (1..maxPLMN-r11)) OF SIB8-PerPLMN-r11

SIB8-PerPLMN-r11 ::=    SEQUENCE {
  plmn-Identity-r11     INTEGER (1..maxPLMN-r11),
  parametersCDMA2000-r11    CHOICE {
    explicitValue      ParametersCDMA2000-r11,
    defaultValue      NULL
  }
}

ParametersCDMA2000-r11 ::=   SEQUENCE {
  systemTimeInfo-r11     CHOICE {
    explicitValue      SystemTimeInfoCDMA2000,
    defaultValue      NULL
  }  OPTIONAL, -- Need OR
  searchWindowSize-r11    INTEGER (0..15),
  parametersHRPD-r11     SEQUENCE {
    preRegistrationInfoHRPD-r11   PreRegistrationInfoHRPD,
    cellReselectionParametersHRPD-r11 CellReselectionParametersCDMA2000-r11 OPTIONAL -- Need OR
  }  OPTIONAL, -- Need OR
  REG-1XRTT-PerPLMN {
    longCodeState1XRTT-r11    BIT STRING (SIZE (42)) OPTIONAL, -- Cond PerPLMN-LC
    cellReselectionParameters1XRTT-r11 CellReselectionParametersCDMA2000-r11 OPTIONAL, -- Need OR
  }  OPTIONAL, -- Cond
  ac-BarringConfig1XRTT-r9     AC-BarringConfig1XRTT-r9 OPTIONAL, -- Cond
  REG-1XRTT-PerPLMN {
    csfb-SupportForDualRxUEs-r11  BOOLEAN OPTIONAL, -- Need OR
    csfb-DualRxTxSupport-r11    ENUMERATED {true} OPTIONAL -- Cond REG-1XRTT-PerPLMN
  }
}  OPTIONAL, -- Need OR

-- ASN1STOP
### SystemInformationBlockType8 field descriptions

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ac-BarringConfig1XRTT</td>
<td>Contains the access class barring parameters the UE uses to calculate the access class barring factor, see C.S0097 [53].</td>
</tr>
<tr>
<td>ac-Barring0to9</td>
<td>Parameter used for calculating the access class barring factor for access overload classes 0 through 9. It is the parameter &quot;PSIST&quot; in C.S0004 [34] for access overload classes 0 through 9.</td>
</tr>
<tr>
<td>ac-BarringEmg</td>
<td>Parameter used for calculating the access class barring factor for emergency calls and emergency message transmissions for access overload classes 0 through 9. It is the parameter &quot;PSIST_EMG&quot; in C.S0004 [34].</td>
</tr>
<tr>
<td>ac-BarringMsg</td>
<td>Parameter used for modifying the access class barring factor for message transmissions. It is the parameter &quot;MSG_PSIST&quot; in C.S0004 [34].</td>
</tr>
<tr>
<td>ac-BarringN</td>
<td>Parameter used for calculating the access class barring factor for access overload class N (N = 10 to 15). It is the parameter &quot;PSIST&quot; in C.S0004 [34] for access overload class N.</td>
</tr>
<tr>
<td>ac-BarringReg</td>
<td>Parameter used for modifying the access class barring factor for autonomous registrations. It is the parameter &quot;REG_PSIST&quot; in C.S0004 [34].</td>
</tr>
<tr>
<td>bandClass</td>
<td>Identifies the Frequency Band in which the Carrier can be found. Details can be found in C.S0057 [24, Table 1.5].</td>
</tr>
<tr>
<td>bandClassList</td>
<td>List of CDMA2000 frequency bands.</td>
</tr>
<tr>
<td>cellReselectionParameters1XRTT</td>
<td>Cell reselection parameters applicable only to CDMA2000 1xRTT system.</td>
</tr>
<tr>
<td>cellReselectionParameters1XRTT-Ext</td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 1XRTT system.</td>
</tr>
<tr>
<td>cellReselectionParameters1XRTT-v920</td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 1XRTT system. The field is not present if cellReselectionParameters1XRTT is not present; otherwise it is optionally present.</td>
</tr>
<tr>
<td>cellReselectionParametersHRPD</td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system</td>
</tr>
<tr>
<td>cellReselectionParametersHRPD-Ext</td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system.</td>
</tr>
<tr>
<td>cellReselectionParametersHRPD-v920</td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system. The field is not present if cellReselectionParametersHRPD is not present; otherwise it is optionally present.</td>
</tr>
<tr>
<td>csfb-DualRxTxSupport</td>
<td>Value TRUE indicates that the network supports dual Rx/Tx enhanced 1xCSFB, which enables UEs capable of dual Rx/Tx enhanced 1xCSFB to switch off their 1xRTT receiver/transmitter while camped in E-UTRAN [51].</td>
</tr>
<tr>
<td>csfb-RegistrationParam1XRTT</td>
<td>Contains the parameters the UE will use to determine if it should perform a CDMA2000 1xRTT Registration/Re-Registration. This field is included if either CSFB or enhanced CS fallback to CDMA2000 1xRTT is supported.</td>
</tr>
<tr>
<td>csfb-SupportForDualRxUEs</td>
<td>Value TRUE indicates that the network supports dual Rx CSFB [51].</td>
</tr>
</tbody>
</table>
| longCodeState1XRTT       | The state of long code generation registers in CDMA2000 1XRTT system as defined in C.S0002 [12, Section 1.3] at \[
\left\lfloor \frac{t}{10} \right\rfloor \times 10 + 320 \text{ ms}, \text{where } t \text{ equals to the cdma-SystemTime}. \text{This field is required for reporting CGI for 1xRTT, SRVCC handover and enhanced CS fallback to CDMA2000 1xRTT operation. Otherwise this IE is not needed. This field is excluded when estimating changes in system information, i.e. changes of longCodeState1XRTT should neither result in system information change notifications nor in a modification of systemInfoValueTag in SIB1. |
| neighCellList            | List of CDMA2000 neighbouring cells. The total number of neighbouring cells in neighCellList for each RAT (1XRTT or HRPD) is limited to 32.                                                                  |
| neighCellList-v920       | Extended List of CDMA2000 neighbouring cells. The combined total number of CDMA2000 neighbouring cells in both neighCellList and neighCellList-v920 is limited to 32 for HRPD and 40 for 1xRTT. |
### SystemInformationBlockType8 field descriptions

**neighCellsPerFreqList**  
List of carrier frequencies and neighbour cell ids in each frequency within a CDMA2000 Band, see C.S0002 [12] or C.S0024 [26].

**neighCellsPerFreqList-v920**  
Extended list of neighbour cell ids, in the same CDMA2000 Frequency Band as the corresponding instance in "NeighCellListCDMA2000".

**parameters1XRTT**  
Parameters applicable for interworking with CDMA2000 1XRTT system.

**parametersCDMA2000**  
Provides the corresponding SIB8 parameters for the CDMA2000 network associated with the PLMN indicated in plmn-Identity. A choice is used to indicate whether for this PLMN the parameters are signalled explicitly or set to the (default) values common for all PLMNs i.e. the values not included in sib8-PerPLMN-List.

**parametersHRPD**  
Parameters applicable only for interworking with CDMA2000 HRPD systems.

**physCellIdList**  
Identifies the list of CDMA2000 cell ids, see C.S0002 [12] or C.S0024 [26].

**physCellIdList-v920**  
Extended list of CDMA2000 cell ids, in the same CDMA2000 ARFCN as the corresponding instance in "NeighCellsPerBandclassCDMA2000".

**plmn-Identity**  
Indicates the PLMN associated with this CDMA2000 network. Value 1 indicates the PLMN listed 1st in plmn-IdentityList included in SIB1, value 2 indicates the PLMN listed 2nd in plmn-IdentityList included in SIB1 and so on. A PLMN which identity is not indicated in the sib8-PerPLMN-List, does not support inter-working with CDMA2000.

**preRegistrationInfoHRPD**  
The CDMA2000 HRPD Pre-Registration Information tells the UE if it should pre-register with the CDMA2000 HRPD network and identifies the Pre-registration zone to the UE.

**searchWindowSize**  
The search window size is a CDMA2000 parameter to be used to assist in searching for the neighbouring pilots. For values see C.S0005 [25, Table 2.6.6.2.1-1] and C.S0024 [26, Table 8.7.6.2-4]. This field is required for a UE with rx-ConfigHRPD= single and/ or rx-Config1XRTT= single to perform handover, cell re-selection, UE measurement based redirection and enhanced 1XRTT CS fallback from E-UTRAN to CDMA2000 according to this specification and TS 36.304 [4].

**sib8-PerPLMN-List**  
This field provides the values for the interworking CDMA2000 networks corresponding, if any, to the UE's RPLMN.

**systemTimeInfo**  
Information on CDMA2000 system time. This field is required for a UE with rx-ConfigHRPD= single and/ or rx-Config1XRTT= single to perform handover, cell re-selection, UE measurement based redirection and enhanced 1xRTT CS fallback from E-UTRAN to CDMA2000 according to this specification and TS 36.304 [4]. This field is excluded when estimating changes in system information, i.e. changes of systemTimeInfo should neither result in system information change notifications nor in a modification of systemInfoValueTag in SIB1. For the field included in ParametersCDMA2000, a choice is used to indicate whether for this PLMN the parameters are signalled explicitly or set to the (default) value common for all PLMNs i.e. the value not included in sib8-PerPLMN-List.

**threshX-High**  
Parameter "ThreshX, HighP" in TS 36.304 [4]. This specifies the high threshold used in reselection towards this CDMA2000 band class expressed as an unsigned binary number equal to FLOOR (-2 x 10 x log10 E_c/I_o) in units of 0.5 dB, as defined in C.S0005 [25].

**threshX-Low**  
Parameter "ThreshX, LowP" in TS 36.304 [4]. This specifies the low threshold used in reselection towards this CDMA2000 band class expressed as an unsigned binary number equal to FLOOR (-2 x 10 x log10 E_c/I_o) in units of 0.5 dB, as defined in C.S0005 [25].

**t-ReselectionCDMA2000**  
Parameter "TreselectionCDMA_HRPD" or "TreselectionCDMA_1XRTT" in TS 36.304 [4].

**t-ReselectionCDMA2000-SF**  
Parameter "Speed dependent ScalingFactor for TreselectionCDMA_HRPD" or "TreselectionCDMA_1XRTT" in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].
### Conditional presence

<table>
<thead>
<tr>
<th></th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NCL-1XRTT</strong></td>
<td>The field is optional present, need OR, if cellReselectionParameters1xRTT is present; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>NCL-HRPD</strong></td>
<td>The field is optional present, need OR, if cellReselectionParametersHRPD is present; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>PerPLMN-LC</strong></td>
<td>The field is optional present, need OR, when systemTimeInfo is included in SIB8PerPLMN for this CDMA2000 network; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>REG-1XRTT</strong></td>
<td>The field is optional present, need OR, if csfb-RegistrationParam1XRTT is present; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>REG-1XRTT-PerPLMN</strong></td>
<td>The field is optional present, need OR, if csfb-RegistrationParam1XRTT is included in SIB8PerPLMN for this CDMA2000 network; otherwise it is not present.</td>
</tr>
</tbody>
</table>

---

**SystemInformationBlockType9**

The IE `SystemInformationBlockType9` contains a home eNB name (HNB Name).

---

**SystemInformationBlockType9 information element**

```asciidoctor
SystemInformationBlockType9 ::= SEQUENCE {
  hnb-Name            OCTET STRING (SIZE(1..48))  OPTIONAL,       -- Need OR
  ...,
  lateNonCriticalExtension    OCTET STRING    OPTIONAL
}
```

**SystemInformationBlockType9 field descriptions**

- **hnb-Name**
  Carries the name of the home eNB, coded in UTF-8 with variable number of bytes per character, see TS 22.011 [10].

---

**SystemInformationBlockType10**

The IE `SystemInformationBlockType10` contains an ETWS primary notification.

---

**SystemInformationBlockType10 information element**

```asciidoctor
SystemInformationBlockType10 ::= SEQUENCE {
  messageIdentifier     BIT STRING (SIZE (16)),
  serialNumber      BIT STRING (SIZE (16)),
  warningType       OCTET STRING (SIZE (2)),
  dummy        OCTET STRING (SIZE (50)) OPTIONAL,       -- Need OP
  ...,
  lateNonCriticalExtension   OCTET STRING    OPTIONAL
}
```

---
**SystemInformationBlockType10 field descriptions**

**messageIdentifier**
Identifies the source and type of ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.44]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.1], while the trailing bit contains bit 0 of the second octet of the same equivalent IE.

**serialNumber**
Identifies variations of an ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.45]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.2], while the trailing bit contains bit 0 of the second octet of the same equivalent IE.

**dummy**
This field is not used in the specification. If received it shall be ignored by the UE.

**warningType**
Identifies the warning type of the ETWS primary notification and provides information on emergency user alert and UE popup. The first octet (which is equivalent to the first octet of the equivalent IE defined in TS 36.413 [39, 9.2.1.50]) contains the first octet of the equivalent IE defined in and encoded according to TS 23.041 [37, 9.3.24], and so on.

---

**SystemInformationBlockType11**
The IE SystemInformationBlockType11 contains an ETWS secondary notification.

**SystemInformationBlockType11 information element**

```
-- ASN1START
SystemInformationBlockType11 ::= 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

-- ASN1STOP
```

**SystemInformationBlockType11 field descriptions**

**dataCodingScheme**
Identifies the alphabet/coding and the language applied variations of an ETWS notification. The octet (which is equivalent to the octet of the equivalent IE defined in TS 36.413 [39, 9.2.1.52]) contains the octet of the equivalent IE defined in TS 23.041 [37, 9.4.3.2.3] and encoded according to TS 23.038 [38].

**messageIdentifier**
Identifies the source and type of ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.44]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.1], while the trailing bit contains bit 0 of second octet of the same equivalent IE.

**serialNumber**
Identifies variations of an ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.45]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.2], while the trailing bit contains bit 0 of second octet of the same equivalent IE.

**warningMessageSegment**
Carries a segment of the Warning Message Contents IE defined in TS 36.413 [39, 9.2.1.53]. 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 [37, 9.4.2.2.5] and so on.

**warningMessageSegmentNumber**
Segment number of the ETWS 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.

**warningMessageSegmentType**
Indicates whether the included ETWS warning message segment is the last segment or not.
SystemInformationBlockType12

The IE SystemInformationBlockType12 contains a CMAS notification.

SystemInformationBlockType12 information element

---

Conditional presence | Explanation
Segment1 | The field is mandatory present in the first segment of SIB11, otherwise it is not present.
---

---

SystemInformationBlockType13

The IE SystemInformationBlockType13 contains the information required to acquire the MBMS control information associated with one or more MBSFN areas.

SystemInformationBlockType13 information element

---

Conditional presence | Explanation
Segment1 | The field is mandatory present in the first segment of SIB12, otherwise it is not present.
SystemInformationBlockType13 field descriptions

notificationConfig
Indicates the MBMS notification related configuration parameters. The UE shall ignore this field when dl-Bandwidth included in MasterInformationBlock is set to 6.

SystemInformationBlockType14

The IE SystemInformationBlockType14 contains the EAB parameters.

SystemInformationBlockType14 information element

SystemInformationBlockType14 field descriptions

eab-BarringBitmap
Extended access class barring for AC 0-9. The first/ leftmost bit is for AC 0, the second bit is for AC 1, and so on.

eab-Category
Indicates the category of UEs for which EAB applies. Value a corresponds to all UEs, value b corresponds to the UEs that are neither in their HPLMN nor in a PLMN that is equivalent to it, and value c corresponds to the UEs that are neither in the PLMN listed as most preferred PLMN of the country where the UEs are roaming in the operator-defined PLMN selector list on the USIM, nor in their HPLMN nor in a PLMN that is equivalent to their HPLMN, see TS 22.011 [10].

eab-Common
The EAB parameters applicable for all PLMN(s).

eab-PerPLMN-List
The EAB parameters per PLMN, listed in the same order as the PLMN(s) occur in plmn-IdentityList in SystemInformationBlockType1.

SystemInformationBlockType15

The IE SystemInformationBlockType15 contains the MBMS Service Area Identities (SAI) of the current and/ or neighbouring carrier frequencies.

SystemInformationBlockType15 information element
MBMS-SAI-List-r11 ::= SEQUENCE (SIZE (1..maxSAI-MBMS-r11)) OF MBMS-SAI-r11

MBMS-SAI-r11 ::= INTEGER (0..65535)

MBMS-SAI-InterFreqList-r11 ::= SEQUENCE (SIZE (1..maxFreq)) OF MBMS-SAI-InterFreq-r11

MBMS-SAI-InterFreqList-v1140 ::= SEQUENCE (SIZE (1..maxFreq)) OF MBMS-SAI-InterFreq-v1140

MBMS-SAI-InterFreq-r11 ::= SEQUENCE {
  dl-CarrierFreq-r11      ARFCN-ValueEUTRA-r9,
  mbms-SAI-List-r11      MBMS-SAI-List-r11
}

MBMS-SAI-InterFreq-v1140 ::= SEQUENCE {
  multiBandInfoList-r11  MultiBandInfoList-r11 OPTIONAL -- Need OR
}

-- ASN1STOP

SystemInformationBlockType15 field descriptions

mbms-SAI-InterFreqList
Contains a list of neighboring frequencies including additional bands, if any, that provide MBMS services and the corresponding MBMS SAI.

mbms-SAI-IntraFreq
Contains the list of MBMS SAI for the current frequency. A duplicate MBMS SAI indicates that this and all following SAI are not offered by this cell but only by neighbor cells on the current frequency. For MBMS service continuity, the UE shall use all MBMS SAI listed in mbms-SAI-IntraFreq to derive the MBMS frequencies of interest.

mbms-SAI-List
Contains a list of MBMS SAI for a specific frequency.

multiBandInfoList
A list of additional frequency bands applicable for the cells participating in the MBSFN transmission.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>InterFreq</td>
<td>The field is optionally present, need OR, if the mbms-SAI-InterFreqList-r11 is present. Otherwise it is not present.</td>
</tr>
</tbody>
</table>

--

SystemInformationBlockType16

The IE SystemInformationBlockType16 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 (a.o. to determine MBMS session start/ stop).

SystemInformationBlockType16 information element

-- ASN1START

SystemInformationBlockType16-r11 ::= SEQUENCE {
  timeInfo-r11       SEQUENCE {
    timeInfoUTC-r11      INTEGER (0..549755813887),
    daylightSavingsTime-r11    BIT STRING (SIZE (2)) OPTIONAL, -- Need OR
    leapSeconds-r11      INTEGER (-127..128) OPTIONAL, -- Need OR
    localTimeoffset-r11     INTEGER (-63..64) OPTIONAL, -- Need OR
  } OPTIONAL, -- Need OR
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  ...
}

-- ASN1STOP
### SystemInformationBlockType16 field descriptions

**dayLightSavingTime**

It indicates if and how daylight saving time (DST) is applied to obtain the local time. The semantics is the same as the semantics of the *Daylight Saving Time* IE in TS 24.301 [35] and TS 24.008 [49]. The first/leftmost bit of the bit string contains the b2 of octet 3, i.e. the value part of the *Daylight Saving Time* IE, and the second bit of the bit string contains b1 of octet 3.

**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 *SystemInformationBlockType16* 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). NOTE 1.

This field is excluded when estimating changes in system information, i.e. changes of timeInfoUTC should neither result in system information change notifications nor in a modification of systemInfoValueTag 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).

---

### SystemInformationBlockType17

The IE *SystemInformationBlockType17* contains information relevant for traffic steering between E-UTRAN and WLAN.

**SystemInformationBlockType17** information element

```
-- ASN1START

SystemInformationBlockType17-r12 ::= SEQUENCE {
    wlan-OffloadInfoPerPLMN-List-r12  SEQUENCE (SIZE (1..maxPLMN-r11)) OF WLAN-OffloadInfoPerPLMN-r12   OPTIONAL, -- Need OR
    lateNonCriticalExtension    OCTET STRING    OPTIONAL,
    ... }

WLAN-OffloadInfoPerPLMN-r12 ::= SEQUENCE {
    wlan-OffloadConfigCommon-r12  WLAN-OffloadConfig-r12  OPTIONAL, -- Need OR
    wlan-Id-List-r12     WLAN-Id-List-r12   OPTIONAL, -- Need OR
    ... }

WLAN-Id-List-r12 ::=    SEQUENCE (SIZE (1..maxWLAN-Id-r12)) OF WLAN-Identifiers-r12

WLAN-Identifiers-r12 ::=   SEQUENCE {
    ssid-r12      OCTET STRING (SIZE (1..32))  OPTIONAL, -- Need OR
    bssid-r12      OCTET STRING (SIZE (6))   OPTIONAL, -- Need OR
    hessid-r12      OCTET STRING (SIZE (6))   OPTIONAL, -- Need OR
    ... }

-- ASN1STOP
```

### SystemInformationBlockType17 field descriptions

**bssid**

Basic Service Set Identifier (BSSID) defined in IEEE 802.11-2012 [67].

**hessid**

Homogenous Extended Service Set Identifier (HESSID) defined in IEEE 802.11-2012 [67].

**ssid**

Service Set Identifier (SSID) defined in IEEE 802.11-2012 [67].
SystemInformationBlockType17 field descriptions

wlan-OffloadInfoPerPLMN-List
The WLAN offload configuration per PLMN includes the same number of entries, listed in the same order as the PLMN(s) in plmn-IdentityList in SystemInformationBlockType1.

SystemInformationBlockType18

The IE SystemInformationBlockType18 indicates E-UTRAN supports the sidelink UE information procedure and may contain sidelink communication related resource configuration information.

SystemInformationBlockType18 information element

-- ASN1START

SystemInformationBlockType18-r12 ::= SEQUENCE {
  commRxPool-r12       SL-CommRxPoolList-r12,  OPTIONAL, -- Need OR
  commTxPoolNormalCommon-r12     SL-CommTxPoolList-r12  OPTIONAL, -- Need OR
  commTxPoolExceptional-r12      SL-CommTxPoolList-r12  OPTIONAL, " Need OR
  commSyncConfig-r12           SL-SyncConfigList-r12  OPTIONAL -- Need OR
  lateNonCriticalExtension   OCTET STRING      OPTIONAL, -- Need OR
  ...
[ [ commTxPoolNormalCommonExt-r13   SL-CommTxPoolListExt-r13 OPTIONAL, -- Need OR
  commTxResourceUC-ReqAllowed-r13 ENUMERATED {true}  OPTIONAL, -- Need OR
  commTxAllowRelayCommon-r13    ENUMERATED {true}   OPTIONAL -- Need OR
  ] ]
}

-- ASN1STOP

SystemInformationBlockType18 field descriptions

commRxPool
Indicates the resources by which the UE is allowed to receive sidelink communication while in RRC_IDLE and while in RRC_CONNECTED.

commSyncConfig
Indicates the configuration by which the UE is allowed to receive and transmit synchronisation information. E-UTRAN configures commSyncConfig including txParameters when configuring UEs by dedicated signalling to transmit synchronisation information.

commTxAllowRelayCommon
Indicates whether the UE is allowed to transmit relay related sidelink communication data using the transmission pools included in SystemInformationBlockType18 i.e. either via commTxPoolNormalCommon, commTxPoolNormalCommonExt or via commTxPoolExceptional.

commTxPoolNormalCommon
Indicates the resources by which the UE is allowed to transmit sidelink communication in exceptional conditions, as specified in 5.10.4.

commTxPoolExceptional
Indicates the resources by which the UE is allowed to transmit sidelink communication while in RRC_IDLE or when in RRC_CONNECTED while transmitting sidelink via a frequency other than the primary.

commTxPoolNormalCommonExt
Indicates transmission resource pool(s) in addition to the pool(s) indicated by field commTxPoolNormalCommon, by which the UE is allowed to transmit sidelink communication while in RRC_IDLE or when in RRC_CONNECTED while transmitting sidelink via a frequency other than the primary. E-UTRAN configures commTxPoolNormalCommonExt only when it configures commTxPoolNormalCommon.

commTxResourceUC-ReqAllowed
Indicates whether the UE is allowed to request transmission pools for non-relay related one-to-one sidelink communication.

SystemInformationBlockType19

The IE SystemInformationBlockType19 indicates E-UTRAN supports the sidelink UE information procedure and may contain sidelink discovery related resource configuration information.

SystemInformationBlockType19 information element

-- ASN1START
SystemInformationBlockType19-r12 ::= SEQUENCE {
  discConfig-r12  SEQUENCE {
    discRxPool1-r12  SL-DiscRxPoolList-r12,  OPTIONAL, -- Need OR
    discTxPoolCommon-r12  SL-DiscTxPowerInfoList-r12  OPTIONAL, -- Cond Tx
    discSyncConfig-r12  SL-SyncConfigList-r12  OPTIONAL -- Need OR
  }  OPTIONAL, -- Need OR
  discInterFreqList-r12  SL-CarrierFreqInfoList-r12  OPTIONAL, -- Need OR
  lateNonCriticalExtension  OCTET STRING  OPTIONAL,
  ...[
    discConfig-v1310  SEQUENCE {
      discInterFreqList-v1310  SL-CarrierFreqInfoList-v1310  OPTIONAL, -- Need OR
      gapRequestsAllowedCommon  ENUMERATED {true}  OPTIONAL -- Need OR
    }  OPTIONAL, -- Need OR
    discConfigRelay-r13  SEQUENCE {
      relayUE-Config-r13  SL-DiscConfigRelayUE-r13,
      remoteUE-Config-r13  SL-DiscConfigRemoteUE-r13
    }  OPTIONAL, -- Need OR
    discConfigPS-13  SEQUENCE {
      discRxPoolPS-r13  SL-DiscRxPoolList-r12,
      discTxPoolPS-Common-r13  SL-DiscTxPoolList-r12  OPTIONAL -- Need OR
    }  OPTIONAL -- Need OR
  }  ]
}

SL-CarrierFreqInfoList-r12 ::= SEQUENCE (SIZE (1..maxFreq)) OF SL-CarrierFreqInfo-r12
SL-CarrierFreqInfoList-v1310 ::= SEQUENCE (SIZE (1..maxFreq)) OF SL-CarrierFreqInfo-v1310
SL-CarrierFreqInfo-r12 ::= SEQUENCE {
  carrierFreq-r12  ARFCN-ValueEUTRA-r9,
  plmn-IdentityList-r12  PLMN-IdentityList4-r12  OPTIONAL -- Need OR
}

SL-DiscConfigRelayUE-r13 ::= SEQUENCE {
  threshHigh-r13  RSRP-RangeSL4-r13  OPTIONAL, -- Need OR
  threshLow-r13  RSRP-RangeSL4-r13  OPTIONAL, -- Need OR
  hystMax-r13  ENUMERATED {dB0, dB3, dB6, dB9, dB12, dBinf}  OPTIONAL, -- Cond ThreshHigh
  hystMin-r13  ENUMERATED {dB0, dB3, dB6, dB9, dB12}  OPTIONAL -- Cond ThreshLow
}

SL-DiscConfigRemoteUE-r13 ::= SEQUENCE {
  threshHigh-r13  RSRP-RangeSL4-r13  OPTIONAL, -- Need OR
  hystMax-r13  ENUMERATED {dB0, dB3, dB6, dB9, dB12}  OPTIONAL, -- Cond ThreshHigh
  reselectionInfoIC-r13  ReselectionInfoRelay-r13
}

ReselectionInfoRelay-r13 ::= SEQUENCE {
  q-RxLevMin-r13  Q-RxLevMin,
  -- Note that the mapping of individual values may be different for PC5, but the granularity/
  -- number of values is same as for Uu
  filterCoefficient-r13  FilterCoefficient,
  minHyst-r13  ENUMERATED {dB0, dB3, dB6, dB9, dB12, dBinf}  OPTIONAL -- Need OR
}

SL-CarrierFreqInfo-v1310 ::= SEQUENCE {
  discResourcesNonPS-r13  SL-ResourcesInterFreq-r13  OPTIONAL, -- Need OR
  discResourcesPS-r13  SL-ResourcesInterFreq-r13  OPTIONAL, -- Need OR
  discConfigOther-r13  SL-DiscConfigOtherInterFreq-r13  OPTIONAL, -- Need OR
  ...
}

PLMN-IdentityList4-r12 ::= SEQUENCE (SIZE (1..maxPLMN-r11)) OF PLMN-IdentityInfo2-r12
PLMN-IdentityInfo2-r12 ::= CHOICE {
  plmn-Index-r12  INTEGER (1..maxPLMN-r11),
  plmnIdentity-r12  PLMN-Identity
}

SL-DiscTxResourcesInterFreq-r13 ::= CHOICE {
  acquireSI-FromCarrier-r13  NULL,
  discTxPoolCommon-r13  SL-DiscTxPoolList-r12,
  requestDedicated-r13  NULL,
  noTxOnCarrier-r13  NULL
}
**SystemInformationBlockType19 field descriptions**

**discCellSelectionInfo**  
Parameters that may be used by the UE to select/ reselect a cell on the concerned non serving frequency. If absent, the UE acquires the information from the target cell on the concerned frequency. See TS 36.304 [4, 11.4].

**discInterFreqList**  
Indicates the neighbouring frequencies on which sidelink discovery announcement is supported. May also provide further information i.e. reception resource pool and/ or transmission resource pool, or an indication how resources could be obtained.

**discRxPool**  
Indicates the resources by which the UE is allowed to receive non-PS related sidelink discovery announcements while in RRC_IDLE and while in RRC_CONNECTED.

**discRxPoolPS**  
Indicates the resources by which the UE is allowed to receive PS related sidelink discovery announcements while in RRC_IDLE and while in RRC_CONNECTED.

**discRxResourcesInterFreq**  
Indicates the resource pool configuration for receiving discovery announcements on a carrier frequency.

**discSyncConfig**  
Indicates the configuration by which the UE is allowed to receive and transmit synchronisation information. E-UTRAN configures `discSyncConfig` including `txParameters` when configuring UEs by dedicated signalling to transmit synchronisation information.

**discTxPoolCommon**  
Indicates the resources by which the UE is allowed to transmit non-PS related sidelink discovery announcements while in RRC_IDLE.

**discTxPoolPS-Common**  
Indicates the resources by which the UE is allowed to transmit PS related sidelink discovery announcements while in RRC_IDLE.

**discTxResourcesInterFreq**  
For the concerned frequency, either provides the UE with a pool of sidelink discovery announcement transmission resources the UE is allowed to use while in RRC_IDLE, or indicates whether such transmission is allowed, and if so how the UE may obtain the required resources. Value `noTxOnCarrier` indicates that the UE is not allowed to transmit sidelink discovery announcements on the concerned frequency. Value `acquireSI-FromCarrier` indicates that the required resources are to be obtained by autonomously acquiring SIB19 and other relevant SIBs from the concerned frequency. Value `requestDedicated` indicates, that for the concerned carrier, the required sidelink discovery resources are to be obtained by means of a dedicated resource request using the SideLinkUEInformation message.

**plmn-IdentityList**  
List of PLMN identities for the neighbouring frequency indicated by `carrierFreq`. Absence of the field indicates the same PLMN identities as listed in `plmn-IdentityList` (without suffix) in `SystemInformationBlockType1`.  

**plmn-Index**  
Index of the corresponding entry in field `plmn-IdentityList` (without suffix) within `SystemInformationBlockType1`.  

**refCarrierCommon**  
Indicates if the PCell (RRC_CONNECTED) / serving cell (RRC_IDLE) is to be used as reference for DL measurements and synchronization, instead of the DL frequency paired with the one used to transmit sidelink discovery announcements on, see TS 36.213 [23, 14.3.1].

**reselectionInfoIoC**  
Includes the parameters used by the UE when selecting/ reselecting a sidelink relay UE.

**SL-CarrierFreqInfoList-v1310**  
If included, the UE shall include the same number of entries, and listed in the same order, as in `SL-CarrierFreqInfoList-r12`.

**threshHigh, threshLow (relayUE)**  
Indicates when a sidelink remote UE or sidelink relay UE that is in network coverage may use the broadcast PS related sidelink discovery Tx resource pool, if broadcast, or request Tx resources by dedicated signalling otherwise. For remote UEs, this parameter is used similarly for relay related sidelink communication.
**SystemInformationBlockType20**

The IE `SystemInformationBlockType20` contains the information required to acquire the control information associated transmission of MBMS using SC-PTM.

### SystemInformationBlockType20 information element

```asn1
SystemInformationBlockType20-r13 ::= SEQUENCE {
    sc-mcch-RepetitionPeriod-r13 ENUMERATED {rf2, rf4, rf8, rf16, rf32, rf64, rf128, rf256},
    sc-mcch-Offset-r13    INTEGER (0..10),
    sc-mcch-FirstSubframe-r13  INTEGER (0..9),
    sc-mcch-duration-r13   INTEGER (2..9) OPTIONAL,
    sc-mcch-ModificationPeriod-r13 ENUMERATED {rf2, rf4, rf8, rf16, rf32, rf64, rf128, rf256, rf512, rf1024, r2048, rf4096, rf8192, rf16384, rf32768, rf65536},
    lateNonCriticalExtension OCTET STRING     OPTIONAL,
    ... }
```

### SystemInformationBlockType20 field descriptions

**sc-mcch-ModificationPeriod**
Defines periodically appearing boundaries, i.e. radio frames for which SFN mod `sc-mcch-ModificationPeriod` = 0. The contents of different transmissions of SC-MCCH information can only be different if there is at least one such boundary in-between them. Value rf2 corresponds to 2 radio frames, value rf4 corresponds to 4 radio frames and so on.

**sc-mcch-duration**
Indicates, starting from the subframe indicated by `sc-mcch-FirstSubframe`, the duration in subframes during which SC-MCCH may be scheduled in PDCCH sub-frames, see TS 36.321 [6]. Absence of this IE means that SC-MCCH is only scheduled in the subframe indicated by `sc-mcch-FirstSubframe`.

**sc-mcch-Offset**
Indicates, together with the `sc-mcch-RepetitionPeriod`, the radio frames in which SC-MCCH is scheduled i.e. SC-MCCH is scheduled in radio frames for which: SFN mod `sc-mcch-RepetitionPeriod` = `sc-mcch-Offset`.

**sc-mcch-FirstSubframe**
Indicates the first subframe in which SC-MCCH is scheduled.

**sc-mcch-RepetitionPeriod**
Defines the interval between transmissions of SC-MCCH information, in radio frames. Value rf2 corresponds to 2 radio frames, rf4 corresponds to 4 radio frames and so on.

### 6.3.2 Radio resource control information elements

**AntennaInfo**

The IE `AntennaInfoCommon` and the `AntennaInfoDedicated` are used to specify the common and the UE specific antenna configuration respectively.

```asn1
AntennaInfoCommon ::=    SEQUENCE {
    antennaPortsCount     ENUMERATED {an1, an2, an4, spare1}
}
AntennaInfoDedicated ::=   SEQUENCE {
    transmissionMode     ENUMERATED {
```
AntennaInfoDedicated-v920 ::= SEQUENCE {
  codebookSubsetRestriction-v920  CHOICE {
    n2TxAntenna-tm8-r9     BIT STRING (SIZE (6)),
    n4TxAntenna-tm8-r9     BIT STRING (SIZE (32))
  } OPTIONAL               -- Cond TM8
}

AntennaInfoDedicated-r10 ::= SEQUENCE {
  transmissionMode-r10    ENUMERATED {
    tm1, tm2, tm3, tm4, tm5, tm6, tm7, tm8-v920,
    tm9-v1020, tm10-v1130, spare6, spare5, spare4,
    spare3, spare2, spare1
  },
  codebookSubsetRestriction-r10  BIT STRING OPTIONAL,   -- Cond TMX
  ue-TransmitAntennaSelection  CHOICE{
    release       NULL,
    setup       ENUMERATED {closedLoop, openLoop}
  }
}

AntennaInfoDedicated-v10i0::= SEQUENCE {
  maxLayersMIMO-r10   ENUMERATED {twoLayers, fourLayers, eightLayers} OPTIONAL -- Need OR
}

AntennaInfoDedicated-v1250 ::= SEQUENCE {
  alternativeCodebookEnabledFor4TX-r12  BOOLEAN
}
## AntennaInfo field descriptions

### alternativeCodebookEnabledFor4TX
Indicates whether code book in TS 36.213 [23] Table 7.2.4-0A to Table 7.2.4-0D is being used for deriving CSI feedback and reporting. E-UTRAN only configures the field if the UE is configured with a) \textit{tm8} with 4 CRS ports, \textit{tm9} or \textit{tm10} with 4 CSI-RS ports and b) PMI/RI reporting.

### antennaPortsCount
Parameter represents the number of cell specific antenna ports where an1 corresponds to 1, an2 to 2 antenna ports etc. see TS 36.211 [21, 6.2.1].

### codebookSubsetRestriction
Parameter: \textit{codebookSubsetRestriction}, see TS 36.213 [23, 7.2] and TS 36.211 [21, 6.3.4.2.3]. The number of bits in the \textit{codebookSubsetRestriction} for applicable transmission modes is defined in TS 36.213 [23, Table 7.2-1b]. If the UE is configured with \textit{transmissionMode} \textit{tm8}, E-UTRAN configures the field \textit{codebookSubsetRestriction} if PMI/RI reporting is configured. If the UE is configured with \textit{transmissionMode} \textit{tm9}, E-UTRAN configures the field \textit{codebookSubsetRestriction} if PMI/RI reporting is configured and if the number of CSI-RS ports is greater than 1. E-UTRAN does not configure the field \textit{codebookSubsetRestriction} in other cases where the UE is configured with \textit{transmissionMode} \textit{tm8} or \textit{tm9}. Furthermore, E-UTRAN does not configure the field \textit{codebookSubsetRestriction} if the UE is configured with eMIMO-Type unless it is set to \textit{beamformed}, \textit{alternativeCodebookEnabledBeamformed} is set to \textit{FALSE} and \textit{csi-RS-ConfigNZPIdListExt} is not configured.

### maxLayersMIMO
Indicates the maximum number of layers for spatial multiplexing used to determine the rank indication bit width and Kc determination of the soft buffer size for the corresponding serving cell according to TS 36.212 [22]. EUTRAN configures this field only when \textit{transmissionMode} is set to \textit{tm3}, \textit{tm4}, \textit{tm9} or \textit{tm10} for the corresponding serving cell. When configuring the field for a serving cell which \textit{transmissionMode} is set to \textit{tm3} or \textit{tm4}, EUTRAN only configures value \textit{fourLayers}: For a serving cell which \textit{transmissionMode} is set to \textit{tm9} or \textit{tm10}, EUTRAN only configures the field when \textit{transmissionMode} is set to \textit{tm8} or \textit{tm9}. EUTRAN does not configure the field \textit{transmissionMode} \textit{tm8} or \textit{tm9}. Furthermore, E-UTRAN does not configure the field \textit{transmissionMode} \textit{tm8} or \textit{tm9} if the \textit{UE} is configured with eMIMO-Type unless it is set to \textit{beamformed}, \textit{alternativeCodebookEnabledBeamformed} is set to \textit{FALSE} and \textit{csi-RS-ConfigNZPIdListExt} is not configured.

### transmissionMode
Points to one of Transmission modes defined in TS 36.213 [23, 7.1] where \textit{tm1} refers to transmission mode 1, \textit{tm2} to transmission mode 2 etc.

### ue-TransmitAntennaSelection
For value \textit{setup}, the field indicates whether UE transmit antenna selection control is closed-loop or open-loop as described in TS 36.213 [23, 8.7].

### Conditional presence

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TM</strong></td>
<td>The field is mandatory present if the \textit{transmissionMode} is set to \textit{tm3}, \textit{tm4}, \textit{tm5} or \textit{tm6}. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td><strong>TM8</strong></td>
<td>The field is optional present, need OR, if \textit{AntennaInfoDedicated} is included and \textit{transmissionMode} is set to \textit{tm8}. If \textit{AntennaInfoDedicated} is included and \textit{transmissionMode} is set to a value other than \textit{tm8}, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>TMX</strong></td>
<td>The field is mandatory present if the \textit{transmissionMode-r10} is set to \textit{tm3}, \textit{tm4}, \textit{tm5} or \textit{tm6}. The field is optionally present, need OR, if the \textit{transmissionMode-r10} is set to \textit{tm8} or \textit{tm9}. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

**AntennaInfoUL**

The IE \textit{AntennaInfoUL} is used to specify the UL antenna configuration.

### AntennaInfoUL information elements

```asn1
AntennaInfoUL-r10 ::= SEQUENCE {
    transmissionModeUL-r10 ENUMERATED {tm1, tm2, spare6, spare5, spare4, spare3, spare2, spare1} OPTIONAL, -- Need OR
    fourAntennaPortActivated-r10 ENUMERATED {setup} OPTIONAL -- Need OR
}
```

---

---

---

---

---

---
AntennaInfoUL field descriptions

fourAntennaPortActivated
Parameter indicates if four antenna ports are used. See TS 36.213 [23, 8.2]. E-UTRAN optionally configures fourAntennaPortActivated only if transmissionModeUL is set to tm2.

transmissionModeUL
Points to one of UL Transmission modes defined in TS 36.213 [23, 8.0] where tm1 refers to transmission mode 1, tm2 to transmission mode 2 etc.

---

CQI-ReportConfig

The IE CQI-ReportConfig is used to specify the CQI reporting configuration.

CQI-ReportConfig information elements

---

-- ASN1START

CQI-ReportConfig ::= SEQUENCE {
   cqi-ReportModeAperiodic CQI-ReportModeAperiodic OPTIONAL, -- Need OR
   nomPDSCH-RE-EPRE-Offset INTEGER (-1..6),
   cqi-ReportPeriodic CQI-ReportPeriodic OPTIONAL -- Need ON
}  
CQI-ReportConfig-v920 ::= SEQUENCE {
   cqi-Mask-r9 ENUMERATED (setup) OPTIONAL, -- Cond cqi-Setup
   pmi-R1-Report-r9 ENUMERATED (setup) OPTIONAL -- Cond PMIRI
}  
CQI-ReportConfig-r10 ::= SEQUENCE {
   cqi-ReportPeriodic-r10 CQI-ReportPeriodic-r10 OPTIONAL, -- Need ON
   nomPDSCH-RE-EPRE-Offset r10 INTEGER (-1..6),
   cqi-ReportPeriodic-r10 CQI-ReportPeriodic-r10 OPTIONAL, -- Need ON
   pmi-R1-report-r9 ENUMERATED (setup) OPTIONAL, -- Cond
   PMIRIPcell
   csi-SubframePatternConfig-r10 CHOICE {
      release NULL,
      setup SEQUENCE {
         csi-MeasSubframeSet1-r10 MeasSubframePattern-r10,
         csi-MeasSubframeSet2-r10 MeasSubframePattern-r10
      }
   }
}  
CQI-ReportConfig-v1130 ::= SEQUENCE {
   CQI-ReportPeriodic-v1130,
   CQI-ReportBoth-r11
}  
CQI-ReportConfig-v1250 ::= SEQUENCE {
   CQI-ReportPeriodic-v1250,
   CQI-ReportBoth-v1250
}  
CQI-ReportConfig-v1310 ::= SEQUENCE {
   cqi-ReportBoth-v1310 CQI-ReportBoth-v1310 OPTIONAL, -- Need ON
   cqi-ReportPeriodic-v1310 CQI-ReportPeriodic-v1310 OPTIONAL, -- Need ON
}  
CQI-ReportConfig-v1320 ::= SEQUENCE {
   CQI-ReportPeriodic-v1320 CQI-ReportPeriodic-v1320 OPTIONAL -- Need ON
}  
CQI-ReportConfig-v1330 ::= SEQUENCE {
   CQI-ReportPeriodic-v1330 CQI-ReportPeriodic-v1330 OPTIONAL,
   cqi-ReportPeriodic-v1330 CQI-ReportPeriodic-v1330 OPTIONAL,
}  
CQI-ReportConfigSCell-r10 ::= SEQUENCE {
   cqi-ReportModeAperiodic-r10 CQI-ReportModeAperiodic OPTIONAL, -- Need OR
   nomPDSCH-RE-EPRE-Offset-r10 INTEGER (-1..6),
   cqi-ReportPeriodicSCell-r10 CQI-ReportPeriodic-v1310 OPTIONAL, -- Need ON
}  
-- ASN1END---
pmi-RI-Report-r10

PMIRISCell

CQI-ReportPeriodic ::= CHOICE {
  release       NULL,
  setup        SEQUENCE {
    cqi-PUCCH-ResourceIndex    INTEGER (0..1185),
    cqi-pmi-ConfigIndex    INTEGER (0..1023),
    cqi-FormatIndicatorPeriodic   CHOICE {
      widebandCQI NULL,
      subbandCQI  SEQUENCE {
        k         INTEGER (1..4) ,
      }
    }
    ri-ConfigIndex     INTEGER (0..1023) OPTIONAL, -- Cond
    simultaneousAckNackAndCQI   BOOLEAN
  }
}

CQI-ReportPeriodic-r10 ::=  CHOICE {
  release        NULL,
  setup        SEQUENCE {
    cqi-PUCCH-ResourceIndex-r10   INTEGER (0..1184),
    cqi-PUCCH-ResourceIndexP1-r10  INTEGER (0..1184) OPTIONAL, -- Cond
    cqi-pmi-ConfigIndex-r10  INTEGER (0..1023),
    cqi-FormatIndicatorPeriodic-r10  CHOICE {
      widebandCQI-r10                  SEQUENCE {
        csi-ReportMode-r10  ENUMERATED {submode1, submode2} OPTIONAL -- Cond
      } ,
      subbandCQI-r10      SEQUENCE {
        k        INTEGER (1..4),
        periodicityFactor-r10    ENUMERATED {n2, n4}
      }
    }
    ri-ConfigIndex     INTEGER (0..1023) OPTIONAL, -- Cond
    simultaneousAckNackAndCQI   BOOLEAN,
    cqi-Mask-r9      ENUMERATED {setup} OPTIONAL, -- Cond
    cqi-pmi-ConfigIndex2-r10  INTEGER (0..1023),
    ri-ConfigIndex2-r10    INTEGER (0..1023) OPTIONAL  -- Cond
  }
}

CQI-ReportPeriodic-v1130 ::= SEQUENCE {
  simultaneousAckNackAndCQI-r11 ENumerated {setup} OPTIONAL, -- Cond
  cqi-ReportPeriodicProcExtToAddModList-r11  CQI-ReportPeriodicProcExtToAddModList-r11 OPTIONAL
}

CQI-ReportPeriodic-v1310 ::= SEQUENCE {
  cri-ReportConfig-r13   CRI-ReportConfig-r13 OPTIONAL, -- Cond
  simultaneousAckNackAndCQI-r13 ENumerated {setup} OPTIONAL-- Cond
}

CQI-ReportPeriodic-v1320 ::= SEQUENCE {
  periodicityFactorWB-r13   ENUMERATED {n2, n4} OPTIONAL -- Cond
}

CQI-ReportPeriodicProcExtToAddModList-r11 ::= SEQUENCE (SIZE (1..
maxCQI-ProcExt-r11)) OF CQI-ReportPeriodicProcExt-r11

CQI-ReportPeriodicProcExtToReleaseList-r11 ::= SEQUENCE (SIZE (1..
maxCQI-ProcExt-r11)) OF CQI-ReportPeriodicProcExtId-r11

CQI-ReportPeriodicProcExtExtToReleaseList-r11 ::= SEQUENCE (SIZE (1..
maxCQI-ProcExt-r11)) OF CQI-ReportPeriodicProcExtId-r11

ETSI
CQI-ReportAperiodic-r10 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    cqi-ReportModeAperiodic-r10 CQI-ReportModeAperiodic,
    aperiodicCSI-Trigger-r10 SEQUENCE {
      trigger1-r10 BIT STRING (SIZE (8)),
      trigger2-r10 BIT STRING (SIZE (8))
    } OPTIONAL -- Need OR
  }
}

CQI-ReportAperiodic-v1250 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    aperiodicCSI-Trigger-v1250 SEQUENCE {
      trigger-SubframeSetIndicator-r12 ENUMERATED {s1, s2},
      trigger1-SubframeSetIndicator-r12 BIT STRING (SIZE (8)),
      trigger2-SubframeSetIndicator-r12 BIT STRING (SIZE (8))
    }
  }
}

CQI-ReportAperiodic-v1310 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    aperiodicCSI-Trigger-v1310 SEQUENCE {
      trigger1-r13 BIT STRING (SIZE (32)),
      trigger2-r13 BIT STRING (SIZE (32)),
      trigger3-r13 BIT STRING (SIZE (32)),
      trigger4-r13 BIT STRING (SIZE (32)),
      trigger5-r13 BIT STRING (SIZE (32)),
      trigger6-r13 BIT STRING (SIZE (32))
    } OPTIONAL -- Need ON
    aperiodicCSI-Trigger2-r13 CHOICE {
      release NULL,
      setup SEQUENCE {
        trigger1-SubframeSetIndicator-r13 BIT STRING (SIZE (32)),
        trigger2-SubframeSetIndicator-r13 BIT STRING (SIZE (32)),
        trigger3-SubframeSetIndicator-r13 BIT STRING (SIZE (32)),
        trigger4-SubframeSetIndicator-r13 BIT STRING (SIZE (32)),
        trigger5-SubframeSetIndicator-r13 BIT STRING (SIZE (32)),
        trigger6-SubframeSetIndicator-r13 BIT STRING (SIZE (32))
      }
    }
  }
}

CQI-ReportAperiodicProc-r11 ::= SEQUENCE {
  cqi-ReportModeAperiodic-r11 CQI-ReportModeAperiodic,
  trigger01-r11 BOOLEAN,
  trigger10-r11 BOOLEAN,
  trigger11-r11 BOOLEAN
}

CQI-ReportAperiodicProc-v1310 ::= SEQUENCE {
  trigger001-r13 BOOLEAN,
  trigger010-r13 BOOLEAN,
trigger011-r13 BOOLEAN,
trigger100-r13 BOOLEAN,
trigger101-r13 BOOLEAN,
trigger110-r13 BOOLEAN,
trigger111-r13 BOOLEAN
}

CQI-ReportModeAperiodic ::= ENUMERATED {
  rm12, rm20, rm22, rm30, rm31,
  rm32-v1250, rm10-v1310, rm11-v1310
}

CQI-ReportBoth-r11 ::= SEQUENCE {
  csi-IM-ConfigToReleaseList-r11  CSI-IM-ConfigToReleaseList-r11 OPTIONAL, -- Need ON
  csi-IM-ConfigToAddModList-r11  CSI-IM-ConfigToAddModList-r11 OPTIONAL, -- Need ON
  csi-ProcessToReleaseList-r11  CSI-ProcessToReleaseList-r11 OPTIONAL, -- Need ON
  csi-ProcessToAddModList-r11  CSI-ProcessToAddModList-r11 OPTIONAL -- Need ON
}

CQI-ReportBoth-v1250 ::= SEQUENCE {
  csi-IM-ConfigToReleaseListExt-r12  CSI-IM-Config-v1250 OPTIONAL, -- Need ON
  csi-IM-ConfigToAddModListExt-r12  CSI-IM-ConfigExt-r12 OPTIONAL -- Need ON
}

CQI-ReportBoth-v1310 ::= SEQUENCE {
  csi-IM-ConfigToReleaseListExt-r13  CSI-IM-ConfigId-v1310 OPTIONAL, -- Need ON
  csi-IM-ConfigToAddModListExt-r13  CSI-IM-ConfigExt-r13 OPTIONAL -- Need ON
}

CSI-IM-ConfigToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF CSI-IM-Config-r11

CSI-IM-ConfigToAddModListExt-r13 ::= SEQUENCE (SIZE (1..maxCSI-IM-v1310)) OF CSI-IM-ConfigExt-r12

CSI-IM-ConfigToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF CSI-IM-ConfigId-r11

CSI-IM-ConfigToReleaseListExt-r13 ::= SEQUENCE (SIZE (1..maxCSI-IM-v1310)) OF CSI-IM-ConfigId-v1310

CSI-ProcessToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF CSI-Process-r11

CSI-ProcessToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF CSI-ProcessId-r11

CQI-ReportBothProc-r11 ::= SEQUENCE {
  ri-Ref-CSI-ProcessId-r11  CSI-ProcessId-r11 OPTIONAL, -- Need OR
  pmi-RI-Report-r11 ENUMERATED {setup} OPTIONAL -- Need OR
}

CRI-ReportConfig-r13 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    cri-ConfigIndex-r13  CRI-ConfigIndex-r13,
    cri-ConfigIndex2-r13  CRI-ConfigIndex-r13 OPTIONAL -- Need OR
  }
}

CRI-ConfigIndex-r13 ::= INTEGER (0..1023)

-- ASN1STOP
CQI-ReportConfig field descriptions

altCQI-Table
Indicates the applicability of the alternative CQI table (i.e. Table 7.2.3-2 in TS 36.213 [23]) for both aperiodic and periodic CSI reporting for the concerned serving cell. Value allSubframes means the alternative CQI table applies to all the subframes and CSI processes, if configured, and value csi-SubframeSet1 means the alternative CQI table applies to CSI subframe set1, and value csi-SubframeSet2 means the alternative CQI table applies to CSI subframe set2. EUTRAN sets the value to csi-SubframeSet1 or csi-SubframeSet2 only if transmissionMode is set in range tm1 to tm9 and csi-SubframePatternConfig-r10 is configured for the concerned serving cell and different CQI tables apply to the two CSI subframe sets; otherwise EUTRAN sets the value to allSubframes. If this field is not present, the UE shall use Table 7.2.3-1 in TS 36.213 [23] for all subframes and CSI processes, if configured.

aperiodicCSI-Trigger
Indicates for which serving cell(s) the aperiodic CSI report is triggered when one or more SCells are configured. trigger1 corresponds to the CSI request field 10 or 010, trigger2 corresponds to the CSI request field 11 or 011, trigger3 corresponds to the CSI request field 100, see TS 36.213 [23, table 7.2.1-1A], and so on. The leftmost bit, bit 0 in the bit string corresponds to the cell with ServCellIndex=0 and bit 1 in the bit string corresponds to the cell with ServCellIndex=1 etc. Each bit has either value 0 (means no aperiodic CSI report is triggered) or value 1 (means the aperiodic CSI report is triggered). At most 5 bits can be set to value 1 in the bit string in aperiodicCSI-Trigger-r10 and in aperiodicCSI-Trigger-v1250 and at most 32 bits can be set to value 1 in the bit string in aperiodicCSI-Trigger-v1310. E-UTRAN configures value 1 only for cells configured with transmissionMode set in range tm1 to tm9. One value applies for all serving cells configured with transmissionMode set in range tm1 to tm9 (the associated functionality is common i.e. not performed independently for each cell).

cqi-Mask
Limits CQI/PMI/PTI/RI reports to the on-duration period of the DRX cycle, see TS 36.321 [6]. One value applies for all CSI processes and all serving cells (the associated functionality is common i.e. not performed independently for each cell).

cqi-FormatIndicatorPeriodic
Parameter: PUCCH CQI Feedback Type, see TS 36.213 [23, table 7.2.2-1]. Depending on transmissionMode, reporting mode is implicitly given from the table.

cqi-pmi-ConfigIndex
Parameter: CQI/PMI Periodicity and Offset Configuration Index lCQI/PMI, see TS 36.213 [23, tables 7.2.2-1A and 7.2.2-1C]. If subframe patterns for CSI (CQI/PMI/PTI/RI) reporting are configured (i.e. csi-SubframePatternConfig is configured), the parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet1 or corresponding to the CSI subframe set 1 indicated by csi-MeasSubframeSets-r12.

cqi-pmi-ConfigIndex2
Parameter: CQI/PMI Periodicity and Offset Configuration Index lCQI/PMI, see TS 36.213 [23, tables 7.2.2-1A and 7.2.2-1C]. The parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet2 or corresponding to the CSI subframe set 2 indicated by csi-MeasSubframeSets-r12.

cqi-PUCCH-ResourceIndex, cqi-PUCCH-ResourceIndexP1
Parameter $r^{(2,p)}_{PUCCH}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 7.2]. E-UTRAN does not apply value 1185. One value applies for all CSI processes.

cqi-ReportAperiodic
E-UTRAN does not configure CQI-ReportAperiodic when transmission mode 10 is configured for all serving cells. E-UTRAN configures cqi-ReportAperiodic-v1250 only if cqi-ReportAperiodic-r10 and csi-MeasSubframeSets-r12 are configured. E-UTRAN configures cqi-ReportAperiodic-v1310 only if cqi-ReportAperiodic-r10 is configured.

cqi-ReportModeAperiodic
Parameter: reporting mode. Value rm12 corresponds to Mode 1-2, rm20 corresponds to Mode 2-0, rm22 corresponds to Mode 2-2 etc. PUSCH reporting modes are described in TS 36.213 [23, 7.2.1]. The UE shall ignore cqi-ReportModeAperiodic-r10 when transmission mode 10 is configured for the serving cell on this carrier frequency. The UE shall ignore cqi-ReportModeAperiodic-r10 configured for the PCell/ PSCell when the transmission bandwidth of the PCell/PSCell in downlink is 6 resource blocks.

CQI-ReportPeriodicProcExt
A set of periodic CQI related parameters for which E-UTRAN may configure different values for each CSI process. For a serving frequency E-UTRAN configures one or more CQI-ReportPeriodicProcExt only when transmission mode 10 is configured for the serving cell on this carrier frequency.

cri-ConfigIndex
Parameter: csi-ConfigIndex lCR, see TS 36.213 [23]. The parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet1. EUTRAN configures the field if subframe patterns for CSI (CQI/PMI/PTI/RI/CR/RI) reporting are configured (i.e. csi-SubframePatternConfig is configured).

cri-ConfigIndex2
Parameter: csi-ConfigIndex lCR, see TS 36.213 [23]. The parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet2 or corresponding to the CSI subframe set 2 indicated by csi-MeasSubframeSets. E-UTRAN configures csi-ConfigIndex2 only if csi-ConfigIndex is configured.

cri-ReportConfig
E-UTRAN configures the field only if the UE is configured with eMIMO-Type set to "beamformed" and if multiple references to RS configuration using non-zero power transmission are configured (i.e. if csi-RS-ConfigNZPIdListExt is configured).
### CQI-ReportConfig field descriptions

**csi-ConfigIndex**
E-UTRAN configures csi-ConfigIndex only for PCell and only if csi-SubframePatternConfig is configured. The UE shall release csi-ConfigIndex if csi-SubframePatternConfig is released.

**csi-IM-ConfigToAddModList**
For a serving frequency E-UTRAN configures one or more CSI-IM-Config only when transmission mode 10 is configured for the serving cell on this carrier frequency.

**csi-MeasSubframeSets**
Indicates the two CSI subframe sets. Value 0 means the subframe belongs to CSI subframe set 1 and value 1 means the subframe belongs to CSI subframe set 2. CSI subframe set 1 refers to $CCSI,0$ in TS 36.213 [23, 7.2] and CSI subframe set 2 refers to $CCSI,1$ in TS 36.213 [23, 7.2]. EUTRAN does not configure csi-MeasSubframeSet1-r10 and csi-MeasSubframeSet2-r10 if either csi-MeasSubframeSets-r12 for PCell or eimta-MainConfigPCell-r12 is configured.

**csi-MeasSubframeSet1, csi-MeasSubframeSet2**
Indicates the CSI measurement subframe sets. csi-MeasSubframeSet1 refers to $CCSI,0$ in TS 36.213 [23, 7.2] and csi-MeasSubframeSet2 refers to $CCSI,1$ in TS 36.213 [23, 7.2]. E-UTRAN only configures the two CSI measurement subframe sets for the PCell.

**csi-ProcessToAddModList**
For a serving frequency E-UTRAN configures one or more CSI-Process only when transmission mode 10 is configured for the serving cell on this carrier frequency.

**csi-ReportMode**
Parameter: PUCCH_format1-1, CSI_reporting_mode, see TS 36.213 [23, 7.2.2].

**K**
Parameter: $K$, see TS 36.213 [23, 7.2.2].

**nomPDSCH-RS-EPRE-Offset**
Parameter: $\Delta_{\text{offset}}$, see TS 36.213 [23, 7.2.3]. Actual value = field value * 2 [dB].

**periodicityFactor, periodicityFactorWB**
Parameter: $H’$, see TS 36.213 [23, 7.2.2]. EUTRAN configures field periodicityFactorWB only when the UE is configured with eMIMO-Type set to nonPrecoded and with cqi-FormatIndicatorPeriodic set to widebandCQI.

**pmi-RI-Report**
See TS 36.213 [23, 7.2]. The presence of this field means PMI/RI reporting is configured; otherwise the PMI/RI reporting is not configured. EUTRAN configures this field only when transmissionMode is set to tm8, tm9 or tm10. The UE shall ignore pmi-RI-Report-r9/ pmi-RI-Report-r10 when transmission mode 10 is configured for the serving cell on this carrier frequency.

**ri-ConfigIndex**
Parameter: RI Config Index $I_{\text{RI}}$, see TS 36.213 [23, 7.2.2-1B]. If subframe patterns for CSI (CQI/PMI/PTI/RI/CRI) reporting are configured (i.e. csi-SubframePatternConfig is configured), the parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet1.

**ri-ConfigIndex2**
Parameter: RI Config Index $I_{\text{RI}}$, see TS 36.213 [23, 7.2.2-1B]. The parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet2 or corresponding to the CSI subframe set 2 indicated by csi-MeasSubframeSets-r12. E-UTRAN configures ri-ConfigIndex2 only if ri-ConfigIndex is configured.

**ri-Ref-CSI-ProcessId**
CSI process whose RI value the UE inherits when reporting RI, in the same subframe, for CSI reporting. E-UTRAN ensures that the CSI process that inherits the RI value is configured in accordance with the conditions specified in TS 36.213 [23, 7.2.1, 7.2.2].

**simultaneousAckNackAndCQI**
Parameter: Simultaneous-AN-and-CQI, see TS 36.213 [23, 10.1]. TRUE indicates that simultaneous transmission of ACK/NACK and CQI is allowed. One value applies for all CSI processes. For SCells except for the PCell and PUCCH SCeLL this field is not applicable and the UE shall ignore the value.

**simultaneousAckNackAndCQI-Format3**
Indicates that the UE shall perform simultaneous transmission of HARQ A/N and periodic CQI report multiplexing on PUCCH format 3, see TS 36.213 [23, 7.2.10.1.1]. E-UTRAN configures this information only when pucch-Format is set to format3. One value applies for all CSI processes. For SCells except for the PCell and PUCCH SCeLL this field is not applicable and the UE shall ignore the value.

**simultaneousAckNackAndCQI-Format4-Format5**
Indicates that the UE shall perform simultaneous transmission of HARQ A/N and periodic CSI report multiplexing on PUCCH format 4 and format 5, see TS 36.213 [23, 10.1.1]. E-UTRAN configures this information only when pucch-Format is set to format4 or format5. One value applies for all CSI processes. For SCells except for the PCell and PUCCH SCeLL this field is not applicable and the UE shall ignore the value.

**trigger0**
Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 01, for a CSI request applicable for the serving cell on the same frequency as the CSI process, see TS 36.213 [23, table 7.2.1-1D and 7.2.1-1E].
### CQI-ReportConfig Field Descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>trigger10, trigger11</td>
<td>Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 10 or 11, see TS 36.213 [23, table 7.2.1-1B]. EUTRAN configures at most 5 CSI processes, across all serving frequencies within each CG, to be triggered by a CSI request field set to value 10. The same restriction applies for value 11. In case E-UTRAN simultaneously triggers CSI requests for more than 5 CSI processes some limitations apply, see TS 36.213 [23].</td>
</tr>
<tr>
<td>trigger001</td>
<td>Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 001, for a CSI request applicable for the serving cell on the same frequency as the CSI process, see TS 36.213 [23, table 7.2.1-1D and 7.2.1-E].</td>
</tr>
<tr>
<td>trigger010, trigger011, trigger100, trigger101, Trigger110, Trigger111</td>
<td>Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 010, 011, 100, 101, 110 or 111, see TS 36.213 [23, table 7.2.1-1D and 7.2.1-1E].</td>
</tr>
<tr>
<td>trigger1-SubframeSetIndicator</td>
<td>For a serving cell configured with <code>csi-MeasSubframeSets-r12</code>, indicates for which CSI subframe set the aperiodic CSI report is triggered for the serving cell if the aperiodic CSI is triggered by the CSI request field 01 or 001, see TS 36.213 [23, table 7.2.1-1C or 7.2.1-1E]. Value s1 corresponds to CSI subframe set 1 and value s2 corresponds to CSI subframe set 2.</td>
</tr>
<tr>
<td>trigger2-SubframeSetIndicator</td>
<td>If signalled in the <code>aperiodicCSI-Trigger-v1250</code>, indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 10, see TS 36.213 [23, table 7.2.1-1C] or by the CSI request field 011, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with <code>ServCellIndex=0</code> and bit 1 in the bit string corresponds to the cell with <code>ServCellIndex=1</code> etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).</td>
</tr>
<tr>
<td>trigger3-SubframeSetIndicator</td>
<td>If signalled in the <code>aperiodicCSI-Trigger-v1250</code>, indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 11, see TS 36.213 [23, table 7.2.1-1C] or by the CSI request field 011, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with <code>ServCellIndex=0</code> and bit 1 in the bit string corresponds to the cell with <code>ServCellIndex=1</code> etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).</td>
</tr>
<tr>
<td>trigger4-SubframeSetIndicator</td>
<td>Indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 100, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with <code>ServCellIndex=0</code> and bit 1 in the bit string corresponds to the cell with <code>ServCellIndex=1</code> etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).</td>
</tr>
<tr>
<td>trigger5-SubframeSetIndicator</td>
<td>Indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 101, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with <code>ServCellIndex=0</code> and bit 1 in the bit string corresponds to the cell with <code>ServCellIndex=1</code> etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).</td>
</tr>
<tr>
<td>trigger6-SubframeSetIndicator</td>
<td>Indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 110, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with <code>ServCellIndex=0</code> and bit 1 in the bit string corresponds to the cell with <code>ServCellIndex=1</code> etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).</td>
</tr>
<tr>
<td>Conditional presence</td>
<td>Explanation</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>cqi-Setup</td>
<td>This field is not present for an Scell except for the PSCell, while it is conditionally present for the PCell and the PSCell according to the following. The field is optional present, need OR, if the cqi-ReportConfig is set to setup. If the field cqi-ReportPeriodic is present and set to release, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.</td>
</tr>
<tr>
<td>PMIRI</td>
<td>The field is optional present, need OR, if cqi-ReportPeriodic is included and set to setup, or cqi-ReportModeAperiodic is included. If the field cqi-ReportPeriodic is present and set to release and cqi-ReportModeAperiodic is absent, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.</td>
</tr>
<tr>
<td>PMIRiPCell</td>
<td>The field is optional present, need OR, if cqi-ReportPeriodic is included in the CQI-ReportConfig-r10 and set to setup. If the field cqi-ReportPeriodic is present in the CQI-ReportConfig-r10 and set to release and cqi-ReportAperiodic is included in the CQI-ReportConfig-r10 and set to release, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.</td>
</tr>
<tr>
<td>PMIRiScell</td>
<td>The field is optional present, need OR, if cqi-ReportPeriodicSCell is included and set to setup, or cqi-ReportModeAperiodic-r10 is included in the CQI-ReportConfigSCell. If the field cqi-ReportPeriodicSCell is present and set to release and cqi-ReportModeAperiodic-r10 is absent in the CQI-ReportConfigSCell, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

---

**CQI-ReportPeriodicProcExtId**

The IE CQI-ReportPeriodicProcExtId is used to identify a periodic CQI reporting configuration that E-UTRAN may configure in addition to the configuration specified by the IE CQI-ReportPeriodic-r10. These additional configurations are specified by the IE CQI-ReportPeriodicProcExt-r11. The identity is unique within the scope of a carrier frequency.

**CQI-ReportPeriodicProcExtId information elements**

```asn1
-- ASN1START
CQI-ReportPeriodicProcExtId-r11 ::= INTEGER (1..maxCQI-ProcExt-r11)
-- ASN1STOP
```

---

**CrossCarrierSchedulingConfig**

The IE CrossCarrierSchedulingConfig is used to specify the configuration when the cross carrier scheduling is used in a cell.

**CrossCarrierSchedulingConfig information elements**

```asn1
-- ASN1START
CrossCarrierSchedulingConfig-r10 ::= SEQUENCE {
  schedulingCellInfo-r10
    CHOICE {
      own-r10        SEQUENCE {   -- No cross carrier
        cif-Presence-r10      BOOLEAN
      },
      other-r10        SEQUENCE {
                              -- Cross carrier
        schedulingCellId-r10    ServCellIndex-r10,
        pdsch-Start-r10      INTEGER (1..4)
      }
    }
}
CrossCarrierSchedulingConfig-r13 ::= SEQUENCE {
  schedulingCellInfo-r13
    CHOICE {
      own-r13        SEQUENCE {   -- No cross carrier
        cif-Presence-r13      BOOLEAN
      },
      other-r13       SEQUENCE {
                              -- Cross carrier scheduling
        schedulingCellId-r13    ServCellIndex-r13,
        pdsch-Start-r13      INTEGER (1..4),
        cif-InSchedulingCell-r13    INTEGER (1..7)
      }
    }
}
-- ASN1STOP
```
CrossCarrierSchedulingConfig field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>cif-Presence</td>
<td>The field is used to indicate whether carrier indicator field is present (value TRUE) or not (value FALSE) in PDCCH/EPDCCH DCI formats.</td>
<td>TS 36.212 [22, 5.3.3.1]</td>
</tr>
<tr>
<td>cif-InSchedulingCell</td>
<td>The field indicates the CIF value used in the scheduling cell to indicate this cell.</td>
<td>TS 36.212 [22, 5.3.3.1]</td>
</tr>
</tbody>
</table>

pdsch-Start

The starting OFDM symbol of PDSCH for the concerned SCell, see TS 36.213 [23, 7.1.6.4]. Values 1, 2, 3 are applicable when dl-Bandwidth for the concerned SCell is greater than 10 resource blocks, values 2, 3, 4 are applicable when dl-Bandwidth for the concerned SCell is less than or equal to 10 resource blocks, see TS 36.211 [21, Table 6.7-1].

schedulingCellId

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.

CSI-IM-Config

The IE CSI-IM-Config is the CSI Interference Measurement (IM) configuration that E-UTRAN may configure on a serving frequency, see TS 36.213 [23, 7.2.6].

CSI-IM-Config information elements

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>resourceConfig</td>
<td>Parameter: CSI reference signal configuration, see TS 36.213 [23, 7.2.6] and TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2] for 4 REs.</td>
<td></td>
</tr>
<tr>
<td>subframeConfig</td>
<td>Parameter: ( t_{CSI-RS} ), see TS 36.213 [23, 7.2.6] and TS 36.211 [21, table 6.10.5.3-1].</td>
<td></td>
</tr>
</tbody>
</table>
CSI-IM-ConfigId information elements

```asn1
CSI-IM-ConfigId-r11 ::= INTEGER (1..maxCSI-IM-r11)
CSI-IM-ConfigId-r12 ::= INTEGER (1..maxCSI-IM-r12)
CSI-IM-ConfigId-v1250 ::= INTEGER (maxCSI-IM-r12)
CSI-IM-ConfigId-v1310 ::= INTEGER (minCSI-IM-r13..maxCSI-IM-r13)
CSI-IM-ConfigId-r13 ::= INTEGER (1..maxCSI-IM-r13)
```

CSI-Process

The IE **CSI-Process** is the CSI process configuration that E-UTRAN may configure on a serving frequency.

CSI-Process information elements

```asn1
CSI-Process-r11 ::= SEQUENCE {
  csi-ProcessId-r11  CSI-ProcessId-r11,
  csi-RS-ConfigNZPId-r11  CSI-RS-ConfigNZPId-r11,
  csi-IM-ConfigId-r11  CSI-IM-ConfigId-r11,
  p-C-AndCBSRList-r11  P-C-AndCBSR-Pair-r13a,
  cqi-ReportBothProc-r11  CQI-ReportBothProc-r11 OPTIONAL, -- Need OR
  cqi-ReportPeriodicProcId-r11  INTEGER (0..maxCQI-ProcExt-r11) OPTIONAL, -- Need OR
  ...

  [alternativeCodebookEnabledFor4TXProc-r12 ENUMERATED {true} OPTIONAL, -- Need ON
    release
    SETUP
    setup
    (CSI-IM-ConfigIdList-r12 CHOICE {
      release
      NULL,
      SETUP
      (SEQUENCE (SIZE (1..2)) OF CSI-IM-ConfigId-r12)
    })]

  [cqi-ReportAperiodicProc-v1310 CHOICE {
    release
    NULL,
    SETUP
    (CQI-ReportAperiodicProc-r11)
  }]
}
```
CSI-Process field descriptions

alternativeCodebookEnabledFor4TXProc
Indicates whether code book in TS 36.213 [23] Table 7.2.4-0A to Table 7.2.4-0D is being used for deriving CSI feedback and reporting for a CSI process. EUTRAN may configure the field only if the number of CSI-RS ports for non-zero power transmission CSI-RS configuration is 4.

cqi-ReportAperiodicProc
If csi-MeasSubframeSets-r12 is configured for the same frequency as the CSI process, cqi-ReportAperiodicProc applies for CSI subframe set 1. If csi-MeasSubframeSet1-r10 or csi-MeasSubframeSet2-r10 are configured for the same frequency as the CSI process, cqi-ReportAperiodicProc applies for CSI subframe set 1 or CSI subframe set 2. Otherwise, cqi-ReportAperiodicProc applies for all subframes. E-UTRAN configures cqi-ReportAperiodicProc-v1310 only if cqi-ReportAperiodicProc-r11 is configured.

cqi-ReportAperiodicProc2

cqi-ReportBothProc
Includes CQI configuration parameters applicable for both aperiodic and periodic CSI reporting, for which CSI process specific values may be configured. E-UTRAN configures the field if and only if cqi-ReportAperiodicProcId is included and/or if cqi-ReportPeriodicProcId is included.

cqi-ReportPeriodicProcId
Refers to a periodic CQI reporting configuration that is configured for the same frequency as the CSI process. Value 0 refers to the set of parameters defined by the REL-10 CQI reporting configuration fields, while the other values refer to the additional configurations E-UTRAN assigns by CQI-ReportPeriodicProcExt-r11 (and as covered by CQI-ReportPeriodicProcExtId).

csi-IM-ConfigId
Refers to a CSI-IM configuration that is configured for the same frequency as the CSI process. If csi-IM-ConfigId-v1250 or csi-IM-ConfigId-v1310 is configured, the UE only considers this extension (and ignores csi-IM-ConfigId-r11 or csi-IM-ConfigId-r12).

csi-IM-ConfigIdList
Refers to one or two CSI-IM configurations that are configured for the same frequency as the CSI process. csi-IM-ConfigIdList can include 2 entries only if csi-MeasSubframeSets-r12 is configured for the same frequency as the CSI process.

csi-RS-ConfigNZPId
Refers to a CSI RS configuration using non-zero power transmission that is configured for the same frequency as the CSI process.

eMIMO-Type
Parameter: eMIMO-Type, see TS 36.213 [23], TS 36.211 [21]. If eMIMO-Type is set to nonPrecoded, the codebooks used for deriving CSI feedback are in TS 36.213 [23, Table 7.2.4-10 to Table 7.2.4-17]. Choice values nonPrecoded and beamformed correspond to ‘CLASS A’ and ‘CLASS B’ respectively, see TS 36.212 [22] and TS 36.213 [23].

CSI-ProcessId
The IE CSI-ProcessId is used to identify a CSI process that is configured by the IE CSI-Process. The identity is unique within the scope of a carrier frequency.

CSI-ProcessId information elements

-- ASN1START
CSI-ProcessId-r11 ::= INTEGER (1..maxCSI-Proc-r11)
-- ASN1STOP

CSI-RS-Config
The IE CSI-RS-Config is used to specify the CSI (Channel-State Information) reference signal configuration.

CSI-RS-Config information elements

-- ASN1START
CSI-RS-Config-r10 ::= SEQUENCE {
  csi-RS-r10  CHOICE {

-- ETSI
CSI-RS-Config-v1250 ::= SEQUENCE {
  zeroTxPowerCSI-RS2-r12 ZeroTxPowerCSI-RS-Conf-r12 OPTIONAL -- Need ON
}

CSI-RS-Config-v1310 ::= SEQUENCE {
  eMIMO-Type-r13 CSI-RS-ConfigEMIMO-r13 OPTIONAL -- Need ON
}

ZeroTxPowerCSI-RS-Conf-r12 ::= CHOICE {
  release NULL,
  setup ZeroTxPowerCSI-RS-r12
}

ZeroTxPowerCSI-RS-r12 ::= SEQUENCE {
  zeroTxPowerResourceConfigList-r12 BIT STRING (SIZE (16)),
  zeroTxPowerSubframeConfig-r12 INTEGER (0..154)
}

-- ASN1STOP

**CSI-RS-Config field descriptions**

**ace-For4Tx-PerResourceConfigList**
The field indicates the alternativeCodeBookEnabledFor4TX-r12 per CSI-RS resource. E-UTRAN configures the field only if csi-RS-ConfigNZPIdListExt is configured.

**antennaPortsCount**
Parameter represents the number of antenna ports used for transmission of CSI reference signals where value an1 corresponds to 1 antenna port, an2 to 2 antenna ports and so on, see TS 36.211 [21, 6.10.5].

**ds-ZeroTxPowerCSI-RS**
Parameter for additional zeroTxPowerCSI-RS for a serving cell, concerning the CSI-RS included in discovery signals.

**p-C**
Parameter: $P_c$, see TS 36.213 [23, 7.2.5]. The UE shall ignore p-C-r10 if configured with eMIMO-Type unless it is set to beamformed, alternativeCodebookEnabledBeamformed is set to FALSE and csi-RS-ConfigNZPIdListExt is not configured.

**resourceConfig**
Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2].

**subframeConfig**
Parameter: $I_{CSI-RS}$, see TS 36.211 [21, table 6.10.5.3-1].

**zeroTxPowerCSI-RS2**
Parameter for additional zeroTxPowerCSI-RS for a serving cell. E-UTRAN configures the field only if csi-MeasSubframeSets-r12 and TM 1 – 9 are configured for the serving cell.

**zeroTxPowerResourceConfigList**
Parameter: ZeroPowerCSI-RS, see TS 36.213 [23, 7.2.7].

**zeroTxPowerSubframeConfig**
Parameter: $I_{CSI-RS}$, see TS 36.211 [21, table 6.10.5.3-1].
CSI-RS-ConfigEMIMO information elements

CSI-RS-ConfigEMIMO-r13 ::= CHOICE {
  release NULL,
  setup CHOICE {
    nonPrecoded-r13 CSI-RS-ConfigNonPrecoded-r13,
    beamformed-r13 CSI-RS-ConfigBeamformed-r13
  }
}

CSI-RS-ConfigNonPrecoded-r13 ::= SEQUENCE {
  p-C-AndCBSRList-r13 P-C-AndCBSR-Pair-r13 OPTIONAL, -- Need OR
  codebookConfigN1-r13 ENUMERATED {n1, n2, n3, n4, n8},
  codebookConfigN2-r13 ENUMERATED {n1, n2, n3, n4, n8},
  codebookOverSamplingRateConfig-O1-r13 ENUMERATED {n4, n8} OPTIONAL, -- Need OR
  codebookOverSamplingRateConfig-O2-r13 ENUMERATED {n4, n8} OPTIONAL, -- Need OR
  codebookConfig-r13 INTEGER (1..4),
  csi-IM-ConfigIdList-r13 SEQUENCE (SIZE (1..2)) OF CSI-IM-ConfigId-r13 OPTIONAL, -- Need OR
  csi-RS-ConfigNZP-EMIMO-r13 CSI-RS-ConfigNZP-EMIMO-r13 OPTIONAL -- Need ON
}

CSI-RS-ConfigBeamformed-r13 ::= SEQUENCE {
  csi-RS-ConfigNZPIdListExt-r13 SEQUENCE (SIZE (1..7)) OF CSI-RS-ConfigNZPId-r13 OPTIONAL, -- Need OR
  csi-IM-ConfigIdList-r13 SEQUENCE (SIZE (1..8)) OF CSI-IM-ConfigId-r13 OPTIONAL, -- Need OR
  p-C-AndCBSR-PerResourceConfigList-r13 SEQUENCE (SIZE (1..8)) OF P-C-AndCBSR-Pair-r13 OPTIONAL, -- Need OR
  ace-For4Tx-PerResourceConfigList-r13 SEQUENCE (SIZE (1..7)) OF BOOLEAN OPTIONAL, -- Need OR
  alternativeCodebookEnabledBeamformed-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  channelMeasRestriction-r13 ENUMERATED {on} OPTIONAL -- Need OR
}

CSI-RS-ConfigEMIMO field descriptions

alternativeCodebookEnabledBeamformed
The field indicates whether code book in TS 36.213 [23, Table 7.2.4-18 to Table 7.2.4-20] is being used for deriving CSI feedback and reporting for a CSI process. E-UTRAN configures the field only for a process referring to a single RS configuration using non-zero power transmission (i.e. a process for which csi-RS-ConfigNZPIdListExt is not configured). Field alternativeCodebookEnabledBeamformed corresponds to parameter alternativeCodebookEnabledCLASSB_K1 in TS 36.212 [22] and TS 36.213 [23].

codebookConfig
Indicates a sub-set of the codebook entry, see TS 36.213 [23].
CSI-RS-ConfigEMIMO field descriptions

- **codebookConfigNx**
  Indicates the number of antenna ports per polarization in dimension x as used for transmission of CSI reference signals. Value n1 corresponds to 1, value n2 corresponds to 2 and so on, see TS 36.213 [23]. Value n1 is not used for codebookConfigN1 and value n8 is not used for codebookConfigN2.

- **codebookOverSamplingRateConfig-Ox**
  Indicates the spatial over-sampling rate in dimension x as used for transmission of CSI reference signals. Value n4 corresponds to 4 and value n8 corresponds to 8, see TS 36.213 [23].

- **csi-IM-ConfigId(List)**
  E-UTRAN configures the field csi-IM-ConfigIdList only if the IE is included in CSI-Process is configured (i.e. when TM10 is configured for the serving cell).

- **csi-RS-ConfigNZPIdListExt (in CSI-RS-ConfigBeamformed)**
  Indicates the NZP configuration(s) in addition to the original NZP configuration, as defined by csi-RS-Config-r10 (TM9) or csi-RS-ConfigNZPId-r11 (TM10). I.e. extends the size of the NZP configuration list (originally a single entry i.e. list of size 1) using the general principles specified in 5.1.2.

CSI-RS-ConfigBeamformed

If csi-RS-ConfigNZPIdListExt-r13 is configured, E-UTRAN configures the same total number of entries for NZP, csi-IM-ConfigIdList-r13 and p-C-AndCBSR-PerResourceConfigList-r13.

CSI-RS-ConfigNZP-EMIMO

The field is used to configure NZP configurations additional to the one defined by the original NZP configuration as included in CSI-RS-ConfigCSI-Process when using 12 and 16 ports CSI-RS.

p-C-AndCBSR-PerResourceConfigList

E-UTRAN does not configure the field p-C-AndCBSR-PerResourceConfigList if the UE is configured with eMIMO-Type set to beamformed, alternativeCodebookEnabledBeamformed is set to FALSE and csi-RS-ConfigNZPIdListExt is not configured.

---

CSI-RS-ConfigNZP

The IE CSI-RS-ConfigNZP is the CSI-RS resource configuration using non-zero power transmission that E-UTRAN may configure on a serving frequency.

CSI-RS-ConfigNZP information elements

```asn1
-- ASN1START
CSI-RS-ConfigNZP-r11 ::= SEQUENCE {
  csi-RS-ConfigNZPId-r11  CSI-RS-ConfigNZPId-r11,
  antennaPortsCount-r11  ENUMERATED {an1, an2, an4, an8},
  resourceConfig-r11    INTEGER (0..31),
  subframeConfig-r11    INTEGER (0..154),
  scramblingIdentity-r11 INTEGER (0..503),
  qcl-CRS-Info-r11     SEQUENCE {
    qcl-ScramblingIdentity-r11  INTEGER (0..503),
    cdm-PortsCount-r11  ENUMERATED {n1, n2, n4, spare1},
    mbsfn-SubframeConfigList-r11  CHOICE {
      release    NULL,
      setup   SEQUENCE {
        subframeConfigList  MBSFN-SubframeConfigList
      }
    }  OPTIONAL  -- Need OR
  }  OPTIONAL  -- Need OR
...
  [[ csi-RS-ConfigNZPId-v1310  CSI-RS-ConfigNZPId-v1310  OPTIONAL  -- Need OR ]]
}

CSI-RS-ConfigNZP-EMIMO-r13 ::= CHOICE {
  release    NULL,
  setup      SEQUENCE {
    nzp-resourceConfigList-r13  SEQUENCE (SIZE (1..2)) OF NZP-ResourceConfig-r13,
    cdmType-r13      ENUMERATED {cdm2, cdm4} OPTIONAL  -- Need OR
  }
}

NZP-ResourceConfig-r13 ::= SEQUENCE {
  resourceConfig-r13    ResourceConfig-r13,
  ...
}

ResourceConfig-r13 ::= INTEGER (0..31)
-- ASN1STOP
```
CSI-RS-ConfigNZP field descriptions

antennaPortsCount
Parameter represents the number of antenna ports used for transmission of CSI reference signals where an1 corresponds to 1, an2 to 2 antenna ports etc. see TS 36.211 [21, 6.10.5].

cdmType
Parameter: CDMType, see TS 36.211 [21, 6.10.5.2].

csi-RS-ConfigNZPId
Refers to a CSI RS configuration using non-zero power transmission that is configured for the same frequency as the CSI process. UE shall ignore Csi-RS-ConfigNZPId-r11 if Csi-RS-ConfigNZPId-v1310 is signalled.

nzp-resourceConfigList
Indicate a list of non-zero power transmission CSI-RS resources using parameter resourceConfig.

cqi-CRS-Info
Indicates CRS antenna ports that is quasi co-located with the CSI-RS antenna ports, see TS 36.213 [23, 7.2.5]. EUTRAN configures this field if and only if the UE is configured with qcl-Operation set to typeB.

resourceConfig
Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2].

subframeConfig
Parameter: ICSI-RS, see TS 36.211 [21, table 6.10.5.3-1].

scramblingIdentity
Parameter: Pseudo-random sequence generator parameter, IDn, see TS 36.213 [23, 7.2.5].

CSI-RS-ConfigNZPId
The IE CSI-RS-ConfigNZPId is used to identify a CSI-RS resource configuration using non-zero transmission power, as configured by the IE CSI-RS-ConfigNZP. The identity is unique within the scope of a carrier frequency.

CSI-RS-ConfigNZPId information elements

-- ASN1START

CSI-RS-ConfigNZPId-r11 ::= INTEGER (1..maxCSI-RS-NZP-r11)
CSI-RS-ConfigNZPId-v1310 ::= INTEGER (minCSI-RS-NZP-r13..maxCSI-RS-NZP-r13)
-- ASN1STOP

CSI-RS-ConfigZP
The IE CSI-RS-ConfigZP is the CSI-RS resource configuration, for which UE assumes zero transmission power, that EUTRAN may configure on a serving frequency.

CSI-RS-ConfigZP information elements

-- ASN1START

CSI-RS-ConfigZP-r11 ::= SEQUENCE {
    csi-RS-ConfigZPId-r11 Csi-RS-ConfigZPId-r11,
    resourceConfigList-r11 BIT STRING (SIZE (16)),
    subframeConfig-r11 INTEGER (0..154),
    ...
}

-- ASN1STOP

CSI-RS-ConfigZP field descriptions

resourceConfigList
Parameter: ZeroPowerCSI-RS, see TS 36.213 [23, 7.2.7].

subframeConfig
Parameter: ICSI-RS, see TS 36.211 [21, table 6.10.5.3-1].
CSI-RS-ConfigZPId

The IE CSI-RS-ConfigZPId is used to identify a CSI-RS resource configuration for which UE assumes zero transmission power, as configured by the IE CSI-RS-ConfigZP. The identity is unique within the scope of a carrier frequency.

CSI-RS-ConfigZPId information elements

---

DMRS-Config

The IE DMRS-Config is the DMRS configuration that E-UTRAN may configure on a serving frequency.

DMRS-Config information elements

---

DRB-Identity

The IE DRB-Identity is used to identify a DRB used by a UE.

DRB-Identity information elements

---

EPDCCH-Config

The IE EPDCCH-Config specifies the subframes and resource blocks for EPDCCH monitoring that E-UTRAN may configure for a serving cell.

EPDCCH-Config information element

---
subframePattern-r11 CHOICE {
  release NULL,
  setup SEQUENCE {
    subframePattern-r11 MeasSubframePattern-r10
  }
}

startSymbol-r11 INTEGER (1..4) OPTIONAL, -- Need ON
setConfigToReleaseList-r11 EPDCCH-SetConfigToReleaseList-r11 OPTIONAL, -- Need ON
setConfigToAddModList-r11 EPDCCH-SetConfigToAddModList-r11 OPTIONAL -- Need ON

...,

[[ csi-RS-Config2PId2-r12 CHOICE {
  release NULL,
  setup CSI-RS-Config2PId2-r11
}]] OPTIONAL -- Need ON

[[ numberPRB-Pairs-v1310 CHOICE {
  release NULL,
  setup ENUMERATED (n6)
}]] OPTIONAL, -- Need ON

mpdcch-config-r13 CHOICE {
  release NULL,
  setup SEQUENCE {
    csi-NumRepetitionCE-r13 ENUMERATED (sf1, sf2, sf4, sf8, sf16, sf32),
    mpdcch-pdsch-HoppingConfig-r13 ENUMERATED (on, off),
    mpdcch-StartSF-UESS-r13 CHOICE {
      fdd-r13 ENUMERATED (v1, v1dot5, v2, v2dot5, v4, v5, v8, v10),
      tdd-r13 ENUMERATED (v1, v2, v4, v5, v8, v10, v20, spare1)
    },
    mpdcch-NumRepetition-r13 ENUMERATED (r1, r2, r4, r8, r16, r32, r64, r128, r256),
    mpdcch-Narrowband-r13 INTEGER (1..maxAvailNarrowBands-r13)
  }
}]] OPTIONAL -- Need ON

...,

EPDCCH-SetConfigId-r11 := INTEGER (0..1)

-- ASN.1 STOP
**EPDCCH-Config field descriptions**

**csi-NumRepetitionCE**
Number of subframes for CSI reference resource, see TS 36.213 [23]. Value sf1 corresponds to 1 subframe, sf2 corresponds to 2 subframes and so on.

**csi-RS-ConfigZPlid2**
Indicates the rate matching parameters in addition to those indicated by re-MappingQCL-ConfigId. E-UTRAN configures this field only when tm10 is configured.

**dmrs-ScramblingSequenceInt**
The DMRS scrambling sequence initialization parameter $n_{ID}^{EPDCCH}$ or $n_{ID}^{MPDCCH}$ defined in TS 36.211 [21, 6.10.3A.1].

**EPDCCH-SetConfig**
Provides EPDCCH configuration set. See TS 36.213 [23, 9.1.4]. E-UTRAN configures at least one EPDCCH-SetConfig when EPDCCH-Config is configured. For BL UEs or UEs in CE, EUTRAN does not configure more than one EPDCCH-SetConfig.

**mpdcch-Narrowband**
Parameter: see TS 36.211 [21, 6.8B.5]. Field values (1..maxAvailNarrowBands-r13) correspond to narrowband indices (0..[maxAvailNarrowBands-r13-1]) as specified in TS 36.211 [21].

**mpdcch-NumRepetition**
Maximum numbers of repetitions for UE-SS for MPDCCH, see TS 36.211 [21].

**mpdcch-pdsch-HoppingConfig**
Frequency hopping activation/deactivation for unicast MPDCCH/PDSCH, see TS 36.211 [21]. E-UTRAN does not configure the value on if freqHoppingParametersDL is not present in SystemInformationBlockType1.

**mpdcch-StartSF-UESS**
Starting subframe configuration for an MPDCCH UE-specific search space, see TS 36.211 [21]. Value v1 corresponds to 1, value v1dot5 corresponds to 1.5, and so on.

**numberPRB-Pairs**
Indicates the number of physical resource-block pairs used for the EPDCCH set. Value n2 corresponds to 2 physical resource-block pairs; n4 corresponds to 4 physical resource-block pairs and so on. Value n8 is not supported if dl-Bandwidth is set to 6 resource blocks. EUTRAN configures value up to n6 only for BL UEs or UEs in CE. Value n6 is only applicable to BL UEs or UEs in CE.

**pucch-ResourceStartOffset**
PUCCH format 1a, 1b and 3 resource starting offset for the EPDCCH set. See TS 36.213 [21, 10.1].

**re-MappingQCL-ConfigId**
Indicates the starting OFDM symbol, the related rate matching parameters and quasi co-location assumption for EPDCCH when the UE is configured with tm10. This field provides the identity of a configured PDSCH-RE-MappingQCL-ConfigId. E-UTRAN configures this field only when tm10 is configured.

**resourceBlockAssignment**
Indicates the index to a specific combination of physical resource-block pair for EPDCCH set. See TS 36.213 [23, 9.1.4.4]. The size of resourceBlockAssignment is specified in TS 36.213 [23, 9.1.4.4] and based on numberPRB-Pairs and the signalled value of dl-Bandwidth. If numberPRB-Pairs-v1310 field is present, the total number of physical resource-block pairs is 6 and it is composed of one subset of 2 physical resource-block pairs and another subset of 4 physical resource-block pairs, and the resourceBlockAssignment field defines the subset of 2 physical resource-block pairs.

**setConfigId**
Indicates the identity of the EPDCCH configuration set.

**startSymbol**
Indicates the OFDM starting symbol for any EPDCCH and PDSCH scheduled by EPDCCH on the same cell, see TS 36.213 [23, 9.1.4.1]. If not present, the UE shall release the configuration and shall derive the starting OFDM symbol of EPDCCH and PDSCH by EPDCCH from PCFICH. Values 1, 2, and 3 are applicable for dl-Bandwidth greater than 10 resource blocks. Values 2, 3, and 4 are applicable otherwise. E-UTRAN does not configure the field for UEs configured with tm10.

**subframePatternConfig**
Configures the subframes which the UE shall monitor the UE-specific search space on EPDCCH, except for pre-defined rules in TS 36.213 [23, 9.1.4]. If the field is not configured when EPDCCH is configured, the UE shall monitor the UE-specific search space on EPDCCH in all subframes except for pre-defined rules in TS 36.213 [23, 9.1.4].

**transmissionType**
Indicates whether distributed or localized EPDCCH transmission mode is used as defined in TS 36.211 [21, 6.8A.1].

---

**EIMTA-MainConfig**

The IE EIMTA-MainConfig is used to specify the eIMTA-RNTI used for eIMTA and the subframes used for monitoring PDCCH with eIMTA-RNTI. The IE EIMTA-MainConfigServCell is used to specify the eIMTA related parameters applicable for the concerned serving cell.
**EIMTA-MainConfig information element**

```asn1
EIMTA-MainConfig-r12 ::= CHOICE {
  release       NULL,
  setup       SEQUENCE {
    eimta-RNTI-r12    C-RNTI,
    eimta-CommandPeriodicity-r12 ENUMERATED {sf10, sf20, sf40, sf80},
    eimta-CommandSubframeSet-r12 BIT STRING (SIZE(10))
  }
}

EIMTA-MainConfigServCell-r12 ::= CHOICE {
  release        NULL,
  setup        SEQUENCE {
    eimta-UL-DL-ConfigIndex-r12    INTEGER (1..5),
    eimta-HARQ-ReferenceConfig-r12  ENUMERATED {sa2,sa4,sa5},
    mbsfn-SubframeConfigList-v1250  CHOICE {
      release        NULL,
      setup        SEQUENCE {
        subframeConfigList-r12    MBSFN-SubframeConfigList
      }
    }
  }
}
```

---

**EIMTA-MainConfig field descriptions**

- **eimta-CommandPeriodicity**
  Configures the periodicity to monitor PDCCH with eIMTA-RNTI, see TS 36.213 [23, 13.1]. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.

- **eimta-CommandSubframeSet**
  Configures the subframe(s) to monitor PDCCH with eIMTA-RNTI within the periodicity configured by `eimta-CommandPeriodicity`. The 10 bits correspond to all subframes in the last radio frame within each periodicity. The left most bit is for subframe 0 and so on. Each bit can be of value 0 or 1. The value of 1 means that the corresponding subframe is configured for monitoring PDCCH with eIMTA-RNTI, and the value of 0 means otherwise. In case of TDD as PCell, only the downlink and the special subframes indicated by the UL/ DL configuration in SIB1 can be configured for monitoring PDCCH with eIMTA-RNTI. In case of FDD as PCell, any of the ten subframes can be configured for monitoring PDCCH with eIMTA-RNTI.

- **eimta-HARQ-ReferenceConfig**
  Indicates UL/ DL configuration used as the DL HARQ reference configuration for this serving cell. Value sa2 corresponds to Configuration2, sa4 to Configuration4 etc, as specified in TS 36.211 [21, table 4.2-2]. E-UTRAN configures the same value for all serving cells residing on same frequency band.

- **eimta-UL-DL-ConfigIndex**
  Index of l, see TS 36.212 [22, 5.3.3.1.4]. E-UTRAN configures the same value for all serving cells residing on same frequency band.

- **mbsfn-SubframeConfigList**
  Configure the MBSFN subframes for the UE on this serving cell. An uplink subframe indicated by the DL/UL subframe configuration in SIB1 can be configured as MBSFN subframe.

---

**LogicalChannelConfig**

The IE `LogicalChannelConfig` is used to configure the logical channel parameters.

```asn1
LogicalChannelConfig ::=   SEQUENCE {
  ul-SpecificParameters    SEQUENCE {
    priority       INTEGER (1..16),
    prioritisedBitRate     ENUMERATED {
      kBps0, kBps8, kBps16, kBps32, kBps64, kBps128,
      kBps256, infinity, kBps512-v1020, kBps1024-v1020,
      kBps2048-v1020, spare5, spare4, spare3, spare2,
      spare1},
    bucketSizeDuration     ENUMERATED {
      ms50, ms100, ms150, ms300, ms500, ms1000, spare2,
      spare1},
  }
}
```

---

**LogicalChannelConfig information element**
LogicalChannelConfig field descriptions

**bucketSizeDuration**
Bucket Size Duration for logical channel prioritization in TS 36.321 [6]. Value in milliseconds. Value ms50 corresponds to 50 ms, ms100 corresponds to 100 ms and so on.

**logicalChannelGroup**
Mapping of logical channel to logical channel group for BSR reporting in TS 36.321 [6].

**logicalChannelSR-Mask**
Controlling SR triggering on a logical channel basis when an uplink grant is configured. See TS 36.321 [6].

**logicalChannelSR-Prohibit**
Value \( \text{TRUE} \) indicates that the logicalChannelSR-ProhibitTimer is enabled for the logical channel. E-UTRAN only (optionally) configures the field (i.e. indicates value \( \text{TRUE} \)) if logicalChannelSR-ProhibitTimer is configured. See TS 36.321 [6].

**prioritisedBitRate**
Prioritized Bit Rate for logical channel prioritization in TS 36.321 [6]. Value in kilobytes/second. Value kBps0 corresponds to 0 kB/second, kBps8 corresponds to 8 kB/second, kBps16 corresponds to 16 kB/second and so on. Infinity is the only applicable value for SRB1 and SRB2

**priority**
Logical channel priority in TS 36.321 [6]. Value is an integer.

---

**Conditional presence**

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRmask</td>
<td>The field is optionally present if ul-SpecificParameters is present, need OR; otherwise it is not present.</td>
</tr>
<tr>
<td>UL</td>
<td>The field is mandatory present for UL logical channels; otherwise it is not present.</td>
</tr>
</tbody>
</table>

---

**LWA-Configuration**

The IE **LWA-Configuration** is used to setup/modify/release LTE-WLAN Aggregation.

---

**LWA-Configuration field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>lwa-MobilityConfig-r13</td>
<td>Indicates the parameters used for WLAN mobility.</td>
</tr>
<tr>
<td>lwa-WT-Counter-r13</td>
<td>Indicates the parameter used by UE for WLAN authentication.</td>
</tr>
</tbody>
</table>

---

**LWIP-Configuration**

The IE **LWIP-Configuration** is used to add, modify or release DRBs that are using LWIP Tunnel.
LWIP-Configuration field descriptions

lwip-MobilityConfig
Indicates the WLAN mobility set for LWIP.

tunnelConfigLWIP
Indicates the parameters used for establishing the LWIP tunnel.

-- MAC-MainConfig

The IE MAC-MainConfig is used to specify the MAC main configuration for signalling and data radio bearers. All MAC main configuration parameters can be configured independently per Cell Group (i.e. MCG or SCG), unless explicitly specified otherwise.
setup ::= SEQUENCE {
  phr-ModeOtherCG-r12 ENUMERATED {real, virtual}
}

logicalChannelSR-Config-r12 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    logicalChannelSR-ProhibitTimer-r12 ENUMERATED {sf20, sf40, sf64, sf128, sf512, sf1024, sf2560, spare1}
  }
}

DRX-Config ::= CHOICE {
  release NULL,
  setup DRX-Config-r13
}

MAC-MainConfigSCell-r11 ::= SEQUENCE {
  stag-ld-r11 STAG-ld-r11 OPTIONAL, -- Need OP
  ...
}

MAC-MainConfigDCell-r11 ::= SEQUENCE {
  stag-ld-r11 STAG-ld-r11 OPTIONAL, -- Need OP
  ...
}

setup ::= SEQUENCE {
  phr-ModeOtherCG-r12 ENUMERATED {real, virtual}
}

logicalChannelSR-Config-r12 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    logicalChannelSR-ProhibitTimer-r12 ENUMERATED {sf20, sf40, sf64, sf128, sf512, sf1024, sf2560, spare1}
  }
}

DRX-Config ::= CHOICE {
  release NULL,
  setup DRX-Config-r13
}

MAC-MainConfigSCell-r11 ::= SEQUENCE {
  stag-ld-r11 STAG-ld-r11 OPTIONAL, -- Need OP
  ...
}

MAC-MainConfigDCell-r11 ::= SEQUENCE {
  stag-ld-r11 STAG-ld-r11 OPTIONAL, -- Need OP
  ...
}
drxShortCycleTimer INTEGER (1..16) -- Need OR
}
}

DRX-Config-v1130 ::= SEQUENCE {
  drx-RetransmissionTimer-v1130 ENUMERATED {psf0-v1130} OPTIONAL, --Need OR
  longDRX-CycleStartOffset-v1130 CHOICE {
    sf60-v1130 INTEGER(0..59),
    sf70-v1130 INTEGER(0..69)
  } OPTIONAL, --Need OR
  shortDRX-Cycle-v1130 ENUMERATED {sf4-v1130} OPTIONAL --Need OR
}

DRX-Config-v1310 ::= SEQUENCE {
  longDRX-CycleStartOffset-v1310 SEQUENCE {
    sf60-v1310 INTEGER(0..59)
  } OPTIONAL --Need OR
}

DRX-Config-r13 ::= SEQUENCE {
  onDurationTimer-v1310 ENUMERATED {psf300, psf400, psf500, psf600, psf800, psf1000, psf1200, psf1600} OPTIONAL, --Need OR
  drx-RetransmissionTimer-v1310 ENUMERATED {psf40, psf64, psf80, psf96, psf112, psf128, psf160, psf320} OPTIONAL, --Need OR
  drx-ULRetransmissionTimer-r13 ENUMERATED {psf0, psf1, psf2, psf4, psf6, psf8, psf16, psf24, psf33, psf40, psf64, psf80, psf96, psf112, psf128, psf160, psf320} OPTIONAL --Need OR
}

PeriodicBSR-Timer-r12 ::= ENUMERATED {
  sf5, sf10, sf16, sf20, sf32, sf40, sf64, sf80, sf128, sf160, sf320, sf640, sf1280, sf2560, infinity, spare1}

RetxBSR-Timer-r12 ::= ENUMERATED {
  sf320, sf640, sf1280, sf2560, sf5120, sf10240, spare2, spare1}

STAG-ToReleaseList-r11 ::= SEQUENCE {SIZE (1..maxSTAG-r11)} OF STAG-Id-r11

STAG-ToAddModList-r11 ::= SEQUENCE {SIZE (1..maxSTAG-r11)} OF STAG-ToAddMod-r11

STAG-ToAddMod-r11 ::= SEQUENCE {
  stag-id-r11 STAG-Id-r11,
  timeAlignmentTimerSTAG-r11 TimeAlignmentTimer,
  ...
}

STAG-Id-r11 ::= INTEGER (1..maxSTAG-r11)

-- ASN1STOP
**MAC-MainConfig field descriptions**

**dl-PathlossChange**
DL Pathloss Change and the change of the required power backoff due to power management (as allowed by P-MPRc [42]) for PHR reporting in TS 36.321 [6]. Value in dB. 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).

**drx-Config**
Used to configure DRX as specified in TS 36.321 [6]. E-UTRAN configures the values in `drx-Config-v1130` only if the UE indicates support for IDC indication. E-UTRAN configures `drx-Config-v1310` and `drx-Config-r13` only if `drx-Config` (without suffix) is configured. E-UTRAN configures `drx-Config-r13` only if UE supports CE.

**drx-InactivityTimer**
Timer for DRX in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf0 corresponds to 0 PDCCH sub-frame and behaviour as specified in 7.3.2 applies, value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on.

**drx-RetransmissionTimer**
Timer for DRX in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf0 corresponds to 0 PDCCH sub-frame and behaviour as specified in 7.3.2 applies, value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on. In case `drx-RetransmissionTimer-v1130` or `drx-RetransmissionTimer-v1310` is signalled, the UE shall ignore `drx-RetransmissionTimer` (i.e. without suffix).

**drx-ULRetransmissionTimer**
Timer for DRX in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf0 corresponds to 0 PDCCH sub-frame and behaviour as specified in 7.3.2 applies, value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on.

**drx-ShortCycleTimer**

**dualConnectivityPHR**
Indicates if power headroom shall be reported using Dual Connectivity Power Headroom Report MAC Control Element defined in TS 36.321 [6] (value setup). If PHR functionality and dual connectivity are configured, E-UTRAN always configures the value setup for this field and configures `phr-Config` and `dualConnectivityPHR` for both CGs.

**e-HARQ-Pattern**
TRUE indicates that enhanced HARQ pattern for TTI bundling is enabled for FDD. E-UTRAN enables this field only when `ttiBundling` is set to TRUE.

**eDRX-Config-CycleStartOffset**
Indicates `longDRX-Cycle` and `drxStartOffset` in TS 36.321 [6]. The value of `longDRX-Cycle` is in number of sub-frames. The value of `drxStartOffset`, in number of subframes, is indicated by the value of `eDRX-Config-CycleStartOffset` multiplied by 2560 plus the offset value configured in `longDRX-CycleStartOffset`. E-UTRAN only configures value setup when the value in `longDRX-CycleStartOffset` is sf2560.

**extendedBSR-Sizes**
If value setup is configured, the BSR index indicates extended BSR size levels as defined in TS 36.321 [6, Table 6.1.3.1-2].

**extendedPHR**
Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value setup). E-UTRAN always configures the value setup if more than one and up to eight Serving Cell(s) with uplink is configured and none of the serving cells with uplink configured has a `servingCellIndex` higher than seven and if PUCCH on SCell is not configured and if dual connectivity is not configured. E-UTRAN configures `extendedPHR` only if `phr-Config` is configured. The UE shall release `extendedPHR` if `phr-Config` is released.

**extendedPHR2**
Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value setup). E-UTRAN always configures the value setup if any of the serving cells with uplink configured has a `servingCellIndex` higher than seven in case dual connectivity is not configured or if PUCCH SCell (with any number of serving cells with uplink configured) is configured. E-UTRAN configures `extendedPHR2` only if `phr-Config` is configured. The UE shall release `extendedPHR2` if `phr-Config` is released.

**logicalChannelSR-ProhibitTimer**
Timer used to delay the transmission of an SR for logical channels enabled by `logicalChannelSR-Prohibit`. Value sf20 corresponds to 20 subframes, sf40 corresponds to 40 subframes, and so on. See TS 36.321 [6].

**longDRX-CycleStartOffset**
`longDRX-Cycle` and `drxStartOffset` in TS 36.321 [6] unless `eDRX-Config-CycleStartOffset` is configured. The value of `longDRX-Cycle` is in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. If shortDRX-Cycle is configured, the value of `longDRX-Cycle` shall be a multiple of the shortDRX-Cycle value. The value of `drxStartOffset` value is in number of sub-frames. In case `longDRX-CycleStartOffset-v1130` is signalled, the UE shall ignore `longDRX-CycleStartOffset` (i.e. without suffix). In case `longDRX-CycleStartOffset-v1310` is signalled, the UE shall ignore `longDRX-CycleStartOffset` (i.e. without suffix).

**maxHARQ-Tx**
Maximum number of transmissions for UL HARQ in TS 36.321 [6].
## MAC-MainConfig field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>onDurationTimer</td>
<td>Timer for DRX in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on. In case onDurationTimer-v1310 is signalled, the UE shall ignore onDurationTimer (i.e. without suffix).</td>
</tr>
<tr>
<td>periodicBSR-Timer</td>
<td>Timer for BSR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on.</td>
</tr>
<tr>
<td>periodicPHR-Timer</td>
<td>Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 subframes and so on.</td>
</tr>
<tr>
<td>phr-ModeOtherCG</td>
<td>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.</td>
</tr>
<tr>
<td>prohibitPHR-Timer</td>
<td>Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes and behaviour as specified in 7.3.2 applies, sf100 corresponds to 100 subframes and so on.</td>
</tr>
<tr>
<td>retxBSR-Timer</td>
<td>Timer for BSR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf640 corresponds to 640 sub-frames, sf1280 corresponds to 1280 sub-frames and so on.</td>
</tr>
<tr>
<td>sCellDeactivationTimer</td>
<td>SCell deactivation timer in TS 36.321 [6]. Value in number of radio frames. Value rf4 corresponds to 4 radio frames, value rf8 corresponds to 8 radio frames and so on. E-UTRAN only configures the field if the UE is configured with one or more SCells other than the PCell and PUCCH SCell. If the field is absent, the UE shall delete any existing value for this field and assume the value to be set to infinity. The same value applies for each SCell of a Cell Group (i.e. MCG or SCG) (although the associated functionality is performed independently for each SCell). Field sCellDeactivationTimer does not apply for the PUCCH SCell.</td>
</tr>
<tr>
<td>shortDRX-Cycle</td>
<td>Short DRX cycle in TS 36.321 [6]. Value in number of sub-frames. Value sf2 corresponds to 2 sub-frames, sf5 corresponds to 5 subframes and so on. In case shortDRX-Cycle-v1130 is signalled, the UE shall ignore shortDRX-Cycle (i.e. without suffix). Short DRX cycle is not configured for UEs in CE.</td>
</tr>
<tr>
<td>sr-ProhibitTimer</td>
<td>Timer for SR transmission on PUCCH in TS 36.321 [6]. Value in number of SR period(s) of shortest SR period of any serving cell with PUCCH. Value 0 means that behaviour as specified in 7.3.2 applies. Value 1 corresponds to one SR period, Value 2 corresponds to 2*SR periods and so on. SR period is defined in TS 36.213 [23, table 10.1.5-1].</td>
</tr>
<tr>
<td>stag-id</td>
<td>Indicates the TAG of an SCell, see TS 36.321 [6]. Uniquely identifies the TAG within the scope of a Cell Group (i.e. MCG or SCG). If the field is not configured for an SCell (e.g. absent in MAC-MainConfigSCell), the SCell is part of the PTAG.</td>
</tr>
<tr>
<td>stag-ToAddModList, stag-ToReleaseList</td>
<td>Used to configure one or more STAGs. E-UTRAN ensures that a STAG contains at least one SCell with configured uplink. If, due to SCell release a reconfiguration would result in an 'empty' TAG, E-UTRAN includes release of the concerned TAG.</td>
</tr>
<tr>
<td>timeAlignmentTimerSTAG</td>
<td>Indicates the value of the time alignment timer for an STAG, see TS 36.321 [6].</td>
</tr>
<tr>
<td>ttiBundling</td>
<td>TRUE indicates that TTI bundling TS 36.321 [6] is enabled while FALSE indicates that TTI bundling is disabled. TTI bundling can be enabled for FDD and for TDD only for configurations 0, 1 and 6. The functionality is performed independently per Cell Group (i.e. MCG or SCG), but E-UTRAN does not configure TTI bundling for the SCG. For a TDD PCell, E-UTRAN does not simultaneously enable TTI bundling and semi-persistent scheduling in this release of specification. Furthermore, for a Cell Group, E-UTRAN does not simultaneously configure TTI bundling and SCells with configured uplink, and E-UTRAN does not simultaneously configure TTI bundling and eIMTA.</td>
</tr>
</tbody>
</table>

---

**P-C-AndCBSR**

The IE P-C-AndCBSR is used to specify the power control and codebook subset restriction configuration.

---

**P-C-AndCBSR information elements**

```asn1
-- ASN1START
P-C-AndCBSR-r11 ::= SEQUENCE {
  p-c-r11       INTEGER (-8..15),
  codebookSubsetRestriction-r11 BIT STRING
}

P-C-AndCBSR-r13 ::= SEQUENCE {
  p-c-r13       INTEGER (-8..15),

-- ASN1END
```
cbsr-Selection-r13 = CHOICE{
  nonPrecoded-r13 = SEQUENCE {
    codebookSubsetRestriction1-r13 = BIT STRING,
    codebookSubsetRestriction2-r13 = BIT STRING
  },
  beamformedK1a-r13 = SEQUENCE {
    codebookSubsetRestriction3-r13 = BIT STRING
  },
  beamformedKN-r13 = SEQUENCE {
    codebookSubsetRestriction-r13 = BIT STRING
  }
},
...
}

P-C-AndCBSR-Pair-r13a ::= SEQUENCE (SIZE (1..2)) OF P-C-AndCBSR-r11

P-C-AndCBSR-Pair-r13 ::= SEQUENCE (SIZE (1..2)) OF P-C-AndCBSR-r13

---

**P-C-AndCBSR field descriptions**

**cbsr-Selection**
Indicates which codebook subset restriction parameter(s) are to be used. E-UTRAN applies values _nonPrecoded_ when eMIMO-Type is set to _nonPrecoded_. E-UTRAN applies value _beamformedK1a_ when eMIMO-Type is set to _beamformed_, alternativeCodebookEnabledBeamformed is set to TRUE and csi-RS-ConfigNZPIdListExt is not configured. E-UTRAN applies value _beamformedKN_ when eMIMO-Type is set to _beamformed_, csi-RS-ConfigNZPIdListExt is not configured and alternativeCodebookEnabledBeamformed is set to FALSE.

**codebookSubsetRestriction**
Parameter: codebookSubsetRestriction, see TS 36.213 [23] and TS 36.211 [21]. The number of bits in the codebookSubsetRestriction for applicable transmission modes is defined in TS 36.213 [23].

**codebookSubsetRestriction1**
Parameter: codebookSubsetRestriction1, see TS 36.213 [23, Table 7.2-1d]. The number of bits in the codebookSubsetRestriction1 for applicable transmission modes is defined in TS 36.213 [23].

**codebookSubsetRestriction2**
Parameter: codebookSubsetRestriction2, see TS 36.213 [23, Table 7.2-1e]. The number of bits in the codebookSubsetRestriction2 for applicable transmission modes is defined in TS 36.213 [23].

**codebookSubsetRestriction3**
Parameter: codebookSubsetRestriction3, see TS 36.213 [23, Table 7.2-1f]. The UE shall ignore codebookSubsetRestriction-r11 or codebookSubsetRestriction-r10 if codebookSubsetRestriction3-r13 is configured. The number of bits in the codebookSubsetRestriction3 for applicable transmission modes is defined in TS 36.213 [23].

**P-C**
Parameter: _P_ , see TS 36.213 [23, 7.2.5].

**P-C-AndCBSR-Pair**
E-UTRAN includes a single entry if the UE is configured with TM9. If the UE is configured with TM10 and E-UTRAN includes 2 entries, this indicates that the subframe patterns configured for CSI (CQI/PMI/PTI/RI/CRI) reporting (i.e. as defined by field csi-MeasSubframeSet1 and csi-MeasSubframeSet2, or as defined by csi-MeasSubframeSets-r12) are to be used for this CSI process, while including a single entry indicates that the subframe patterns are not to be used for this CSI process. For a UE configured with TM10, E-UTRAN does not include 2 entries with csi-MeasSubframeSet1 and csi-MeasSubframeSet2 for CSI processes concerning a secondary frequency. Furthermore, E-UTRAN includes 2 entries when configuring both cqi-pmi-ConfigIndex and cqi-pmi-ConfigIndex2.

---

**PDCCH-ConfigSCell**
The IE _PDCCH-ConfigSCell_ specifies PDCCH monitoring parameters that E-UTRAN may configure for a serving cell.

**PDCCH-ConfigSCell information element**

---

---

---
setup SEQUENCE {
   pdcch-candidateReductionAL1-r13 PDCCH-CandidateReductionValue-r13,
   pdcch-candidateReductionAL2-r13 PDCCH-CandidateReductionValue-r13,
   pdcch-candidateReductionAL3-r13 PDCCH-CandidateReductionValue-r13,
   pdcch-candidateReductionAL4-r13 PDCCH-CandidateReductionValue-r13,
   pdcch-candidateReductionAL5-r13 PDCCH-CandidateReductionValue-r13
}
-- ASN1STOP

**PDCCH-ConfigScell** field descriptions

- **skipMonitoringDCI-format0/1A**
  Indicates whether the UE is configured to omit monitoring DCI format 0/1A, see TS 36.213 [23, 9.1.1].

- **pdcch-candidateReductionALx**
  Indicates reduced (E)PDCCH monitoring requirements on UE specific search space of the x-th aggregation level, see TS 36.213 [23, 9.1.1]. Value n0 corresponds to 0%, value n33 corresponds to 33% and so on.

---

**PDCP-Config**

The IE **PDCP-Config** is used to set the configurable PDCP parameters for data radio bearers.

**PDCP-Config information element**

-- ASN1START

```asn1
PDCP-Config ::= SEQUENCE {
   discardTimer ENUMERATED {
      ms50, ms100, ms150, ms300, ms500,
      ms750, ms1500, infinity
   } OPTIONAL, -- Cond Setup
   rlc-AM SEQUENCE {
      statusReportRequired BOOLEAN OPTIONAL, -- Cond Rlc-AM
   }
   rlc-UM SEQUENCE {
      pdcp-SN-Size ENUMERATED {len7bits, len12bits} OPTIONAL, -- Cond Rlc-UM
   }
   headerCompression CHOICE {
      notUsed NULL,
      rohc SEQUENCE {
         maxCID INTEGER (1..16383) DEFAULT 15,
         profiles CHOICE {
            profile0x0001 BOOLEAN,
            profile0x0002 BOOLEAN,
            profile0x0003 BOOLEAN,
            profile0x0004 BOOLEAN,
            profile0x0006 BOOLEAN,
            profile0x0101 BOOLEAN,
            profile0x0102 BOOLEAN,
            profile0x0103 BOOLEAN,
            profile0x0104 BOOLEAN
         },
         ...,
      },
      ...,
      [ [ rn-IntegrityProtection-r10 ENUMERATED {enabled} OPTIONAL -- Cond RN ]],
      [ [ pdcp-SN-Size-v1130 ENUMERATED {len15bits} OPTIONAL -- Cond Rlc-AM2 ]],
      [ [ ul-DataSplitDRB-ViaSCG-r12 t-Reordering-r12 ENUMERATED {
         ms0, ms20, ms40, ms60, ms80, ms100, ms120, ms140,
         ms160, ms180, ms200, ms220, ms240, ms260, ms280, ms300,
         ms500, ms750, spare14, spare13, spare12, spare11, spare10,
         spare9, spare8, spare7, spare6, spare5, spare4, spare3,
         spare2, spare1}
      ]],
      [ [ ul-DataSplitThreshold-r13 release setup ENUMERATED {
         b0, b100, b200, b400, b800, b1600, b3200, b6400, b12800,
         b25600, b51200, b102400, b204800, b409600, b819200, spare1}
      ]]
}
-- ASN1END
```
pdcp-SN-Size-v1310  ENUMERATED {len18bits} OPTIONAL, -- Cond Rlc-AM3
statusFeedback-r13  CHOICE {
  release        NULL,
  setup          SEQUENCE {
    statusPDU-TypeForPolling-r13  ENUMERATED {typel, type2} OPTIONAL, -- Need ON

    statusPDU-Periodicity-Type1-r13  ENUMERATED {
      ms5, ms10, ms20, ms30, ms40, ms50, ms60, ms70, ms80, ms90,
      ms100, ms150, ms200, ms300, ms500, ms1000, ms2000, ms5000,
      ms10000, ms20000, ms50000} OPTIONAL, -- Need ON
    statusPDU-Periodicity-Type2-r13  ENUMERATED {
      ms5, ms10, ms20, ms30, ms40, ms50, ms60, ms70, ms80, ms90,
      ms100, ms150, ms200, ms300, ms500, ms1000, ms2000, ms5000,
      ms10000, ms20000, ms50000} OPTIONAL, -- Need ON
    statusPDU-Periodicity-Offset-r13 ENUMERATED {
      ms1, ms2, ms5, ms10, ms25, ms50, ms100, ms250, ms500,
      ms2500, ms5000, ms25000} OPTIONAL -- Need ON
  }
}

]]}  OPTIONAL -- Need ON

-- ASN1STOP
### PDCP-Config field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>discardTimer</td>
<td>Indicates the discard timer value specified in TS 36.323 [8]. Value in milliseconds. Value ms50 means 50 ms, ms100 means 100 ms and so on.</td>
</tr>
<tr>
<td>headerCompression</td>
<td>E-UTRAN does not reconfigure header compression for an MCG DRB except for upon handover and upon the first reconfiguration after RRC connection re-establishment. E-UTRAN does not reconfigure header compression for a SCG DRB except for upon SCG change involving PDCP re-establishment. For split and LWA DRBs E-UTRAN configures only notUsed.</td>
</tr>
<tr>
<td>maxCID</td>
<td>Indicates the value of the MAX_CID parameter as specified in TS 36.323 [8]. 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.</td>
</tr>
<tr>
<td>pdcp-SN-Size</td>
<td>Indicates the PDCP Sequence Number length in bits. For RLC UM: value len7bits means that the 7-bit PDCP SN format is used and len12bits means that the 12-bit PDCP SN format is used. For RLC AM: value len15bits means that the 15-bit PDCP SN format is used, value len18bits means that the 18-bit PDCP SN format is used, otherwise if the field is not included upon setup of the PCDP entity 12-bit PDCP SN format is used, as specified in TS 36.323 [8].</td>
</tr>
<tr>
<td>profiles</td>
<td>The profiles used by both compressor and decompressor in both UE and E-UTRAN. The field indicates which of the ROHC profiles specified in TS 36.323 [8] are supported, i.e. value true indicates that the profile is supported. Profile 0x0000 shall always be supported when the use of ROHC is configured. If support of two ROHC profile identifiers with the same 8 LSB’s is signalled, only the profile corresponding to the highest value shall be applied. E-UTRAN does not configure ROHC while t-Reordering is configured (i.e. for split DRBs, for LWA bearers or upon reconfiguration from split or LWA to MCG DRB).</td>
</tr>
<tr>
<td>statusFeedback</td>
<td>Indicates whether the UE shall send PDCP Status Report periodically or by E-UTRAN polling as specified in TS 36.323 [8]. E-UTRAN configures this field only for LWA DRB.</td>
</tr>
<tr>
<td>statusPDU-TypeForPolling</td>
<td>Indicates the PDCP Control PDU option when it is triggered by E-UTRAN polling. Value type1 indicates using the legacy PDCP Control PDU for PDCP status reporting and value type2 indicates using the LWA specific PDCP Control PDU for LWA status reporting as specified in TS 36.323 [8].</td>
</tr>
<tr>
<td>statusPDU-Periodicity-Type1</td>
<td>Indicates the value of the PDCP Status reporting periodicity for type1 Status PDU, as specified in TS 36.323 [8]. Value in milliseconds. Value ms5 means 5 ms, ms10 means 10 ms and so on.</td>
</tr>
<tr>
<td>statusPDU-Periodicity-Type2</td>
<td>Indicates the value of the PDCP Status reporting periodicity for type2 Status PDU, as specified in TS 36.323 [8]. Value in milliseconds. Value ms5 means 5 ms, ms10 means 10 ms and so on.</td>
</tr>
<tr>
<td>statusPDU-Periodicity-Offset</td>
<td>Indicates the value of the offset for type2 Status PDU periodicity, as specified in TS 36.323 [8]. Value in milliseconds. Value ms1 means 1 ms, ms2 means 2 ms and so on.</td>
</tr>
<tr>
<td>t-Reordering</td>
<td>Indicates the value of the reordering timer, as specified in TS 36.323 [8]. Value in milliseconds. Value ms0 means 0 ms and behaviour as specified in 7.3.2 applies, ms20 means 20 ms and so on.</td>
</tr>
<tr>
<td>rn-IntegrityProtection</td>
<td>Indicates that integrity protection or verification shall be applied for all subsequent packets received and sent by the RN on the DRB.</td>
</tr>
<tr>
<td>statusReportRequired</td>
<td>Indicates whether or not the UE shall send a PDCP Status Report upon re-establishment of the PDCP entity and upon PDCP data recovery as specified in TS 36.323 [8].</td>
</tr>
<tr>
<td>ul-DataSplitDRB-ViaSCG</td>
<td>Indicates whether the UE shall send PDCP PDUs via SCG as specified in TS 36.323 [8]. E-UTRAN only configures the field (i.e. indicates value TRUE) for split DRBs.</td>
</tr>
<tr>
<td>ul-DataSplitThreshold</td>
<td>Indicates the threshold value for uplink data split operation specified in TS 36.323 [8]. Value b100 means 100 Bytes, b200 means 200 Bytes and so on. E-UTRAN only configures this field for split DRBs.</td>
</tr>
</tbody>
</table>
### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rlc-AM</td>
<td>The field is mandatory present upon setup of a PDCP entity for a radio bearer configured with RLC AM. The field is optional, need ON, in case of reconfiguration of a PDCP entity at handover, at the first reconfiguration after RRC re-establishment or at SCG change involving PDCP re-establishment or PDCP data recovery for a radio bearer configured with RLC AM. Otherwise the field is not present.</td>
</tr>
<tr>
<td>Rlc-AM2</td>
<td>The field is optionally present, need OP, upon setup of a PDCP entity for a radio bearer configured with RLC AM. Otherwise the field is not present.</td>
</tr>
<tr>
<td>Rlc-AM3</td>
<td>The field is optionally present, need OP, upon setup of a PDCP entity for a radio bearer configured with RLC AM, if pdcp-SN-Size-v1130 is absent. Otherwise the field is not present.</td>
</tr>
<tr>
<td>Rlc-UM</td>
<td>The field is mandatory present upon setup of a PDCP entity for a radio bearer configured with RLC UM. It is optionally present, need ON, upon handover within E-UTRA, upon the first reconfiguration after re-establishment and upon SCG change involving PDCP re-establishment. Otherwise the field is not present.</td>
</tr>
<tr>
<td>RN</td>
<td>The field is optionally present when signalled to the RN, need OR. Otherwise the field is not present.</td>
</tr>
<tr>
<td>Setup</td>
<td>The field is mandatory present in case of radio bearer setup. Otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td>SetupS</td>
<td>The field is mandatory present in case of setup of or reconfiguration to a split DRB or LWA DRB. The field is optionally present upon reconfiguration of a split DRB or LWA DRB or upon DRB type change from split to MCG DRB or from LWA to LTE only, need ON. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

### PDSCH-Config

The IE PDSCH-ConfigCommon and the IE PDSCH-ConfigDedicated are used to specify the common and the UE specific PDSCH configuration respectively.

#### PDSCH-Config information element

```
-- ASN1START

PDSCH-ConfigCommon ::= SEQUENCE {
  referenceSignalPower    INTEGER (-60..50),
p-b         INTEGER (0..3)
}

PDSCH-ConfigCommon-v1310 ::= SEQUENCE {
pdsch-maxNumRepetitionCEmodeA-r13 ENUMERATED {
  r16, r32 } OPTIONAL, -- Need OR
pdsch-maxNumRepetitionCEmodeB-r13 ENUMERATED {
  r192, r256, r384, r512, r768, r1024,
  r1536, r2048} OPTIONAL -- Need OR
}

PDSCH-ConfigDedicated ::= SEQUENCE {
p-a         ENUMERATED {
  dB-6, dB-4dot77, dB-3, dB-1dot77,
  dB0, dB1, dB2, dB3}
}

PDSCH-ConfigDedicated-v1130 ::= SEQUENCE {
dmrs-ConfigPDSCH-r11    DMRS-Config-r11 OPTIONAL, -- Need ON
gcl-Operation      ENUMERATED {typeA, typeB} OPTIONAL, -- Need OR
re-MappingQCLConfigToReleaseList-r11 RE-MappingQCLConfigToReleaseList-r11 OPTIONAL, -- Need ON
re-MappingQCLConfigToAddModList-r11  RE-MappingQCLConfigToAddModList-r11 OPTIONAL -- Need ON
}

PDSCH-ConfigDedicated-v1280 ::= SEQUENCE {
tbsIndexAlt-r12      ENUMERATED {a26, a33} OPTIONAL -- Need OR
}

PDSCH-ConfigDedicated-v1310 ::= SEQUENCE {
dmrs-ConfigPDSCH-v1310    DMRS-Config-v1310 OPTIONAL -- Need ON
}

RE-MappingQCLConfigToAddModList-r11 ::= SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF PDSCH-RE-MappingQCL-Config-r11

-- ASN1END
```
```asn1
RE-MappingQCLConfigToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF PDSCH-RE-MappingQCL-ConfigId-r11

PDSCH-RE-MappingQCL-Config-r11 ::= SEQUENCE {
pdsch-RE-MappingQCL-ConfigId-r11 PDSCH-RE-MappingQCL-ConfigId-r11,
  optionalSetOfFields-r11 SEQUENCE {
    crs-PortsCount-r11     ENUMERATED {n1, n2, n4, spare1},
    crs-FreqShift-r11     INTEGER (0..5),
    mbsfn-SubframeConfigList-r11 release setup
    CSI-RS-ConfigZPId-r11 CSI-RS-ConfigZPId-r11,
    qcl-CSI-RS-ConfigNZPId-r11 CSI-RS-ConfigNZPId-r11 OPTIONAL,
    ... OPTINAL, -- Need OR
  }
  pdsch-Start-r11 ENUMERATED {reserved, n1, n2, n3, n4, assigned},
  OPTIONAL, -- Need ON
  csi-RS-ConfigZPId-r11 CSI-RS-ConfigZPId-r11,
  qcl-CSI-RS-ConfigNZPId-r11 CSI-RS-ConfigNZPId-r11 OPTIONAL, -- Need OR
}
```

---

**PDSCH-Config field descriptions**

**optionalSetOfFields**

If absent, the UE releases the configuration provided previously, if any, and applies the values from the serving cell configured on the same frequency.

**p-a**

Parameter: $P_A$, see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4dot77 corresponds to -4.77 dB etc.

**p-b**

Parameter: $P_B$, see TS 36.213 [23, Table 5.2-1].

**pdsch-maxNumRepetitionCEmodeA**

Maximum value to indicate the set of PDSCH repetition numbers for CE mode A, see TS 36.211 [21] and TS 36.213 [23].

**pdsch-maxNumRepetitionCEmodeB**

Maximum value to indicate the set of PDSCH repetition numbers for CE mode B, see TS 36.211 [21] and TS 36.213 [23].

**pdsch-Start**

The starting OFDM symbol of PDSCH for the concerned serving cell, see TS 36.213 [23. 7.1.6.4]. Values 1, 2, 3 are applicable when dl-Bandwidth for the concerned serving cell is greater than 10 resource blocks, values 2, 3, 4 are applicable when dl-Bandwidth for the concerned serving cell is less than or equal to 10 resource blocks, see TS 36.211 [21, Table 6.7-1]. Value $n_1$ corresponds to 1, value $n_2$ corresponds to 2 and so on.

**qcl-CSI-RS-ConfigNZPId**

Indicates the CSI-RS resource that is quasi co-located with the PDSCH antenna ports, see TS 36.213 [23, 7.1.9]. E-UTRAN configures this field if and only if the UE is configured with qcl-Operation set to typeB.

**qcl-Operation**

Indicates the quasi co-location behaviour to be used by the UE, type A and type B, as described in TS 36.213 [23, 7.1.10].

**referenceSignalPower**

Parameter: Reference-signal power, which provides the downlink reference-signal EPRE, see TS 36.213 [23, 7.1.10]. The actual value in dBm.

**re-MappingQCLConfigToAddModList, re-MappingQCLConfigToReleaseList**

For a serving frequency E-UTRAN configures at least one PDSCH-RE-MappingQCL-Config when transmission mode 10 is configured for the serving cell on this carrier frequency. Otherwise it does not configure this field.

**tbsIndexAlt**

Indicates the applicability of the alternative TBS index for the $h$es 26 and 33 (see TS 36.213 [23, Table 7.1.7.2.1-1]) to all subframes scheduled by DCI format 2C or 2D. Value $a_{26}$ refers to the alternative TBS index $h_{26}$, and value $a_{33}$ refers to the alternative TBS index $h_{33}$. If this field is not configured, the UE shall use $h_{26}$ and 33 specified in Table 7.1.7.2.1-1 in TS 36.213 [23] for all subframes instead.

---

**PDSCH-RE-MappingQCL-ConfigId**

The IE PDSCH-RE-MappingQCL-ConfigId is used to identify a set of PDSCH parameters related to resource element mapping and quasi co-location, as configured by the IE PDSCH-RE-MappingQCL-Config. The identity is unique within the scope of a carrier frequency.
PDSCH-RE-MappingQCL-Configld information elements

```asn1
PDSCH-RE-MappingQCL-Configld-r11 ::= INTEGER (1..maxRE-MapQCL-r11)
```

PHICH-Config

The IE PHICH-Config is used to specify the PHICH configuration.

**PHICH-Config information element**

```asn1
PHICH-Config ::= SEQUENCE {
  phich-Duration      ENUMERATED {normal, extended},
  phich-Resource      ENUMERATED {oneSixth, half, one, two}
}
```

**PHICH-Config field descriptions**

- **phich-Duration**
  Parameter: PHICH-Duration, see TS 36.211 [21, Table 6.9.3-1].

- **phich-Resource**
  Parameter: Ng, see TS 36.211 [21, 6.9]. Value oneSixth corresponds to 1/6, half corresponds to 1/2 and so on.

PhysicalConfigDedicated

The IE PhysicalConfigDedicated is used to specify the UE specific physical channel configuration.

**PhysicalConfigDedicated information element**

```asn1
PhysicalConfigDedicated ::=  SEQUENCE {
  pdsch-ConfigDedicated    PDSCH-ConfigDedicated   OPTIONAL,  -- Need ON
  pucch-ConfigDedicated    PUCCH-ConfigDedicated   OPTIONAL,  -- Need ON
  pusch-ConfigDedicated    PUSCH-ConfigDedicated   OPTIONAL,  -- Need ON
  uplinkPowerControlDedicated   UplinkPowerControlDedicated  OPTIONAL,  -- Need ON
  tpc-PDCCH-ConfigPUCCH    TPC-PDCCH-Config    OPTIONAL,  -- Need ON
  tpc-PDCCH-ConfigPUSCH    TPC-PDCCH-Config    OPTIONAL,  -- Need ON
  cqi-ReportConfig     CQI-ReportConfig    OPTIONAL,  -- Cond CQI-
  soundingRS-UL-ConfigDedicated  SoundingRS-UL-ConfigDedicated OPTIONAL,  -- Need ON
  antennaInfo       CHOICE {
    explicitValue      AntennaInfoDedicated,
    defaultValue      NULL
  }                 OPTIONAL, -- Cond AI-r8
  schedulingRequestConfig    SchedulingRequestConfig   OPTIONAL,  -- Need ON
  cqi-ReportConfig-v920    CQI-ReportConfig-v920  OPTIONAL, -- Cond CQI-
  antennaInfo-v920 AntennaInfoDedicated-v920 OPTIONAL  -- Cond AI-
  cqi-ReportConfig-r10   CQI-ReportConfig-r10   OPTIONAL, -- Cond CQI-r10
  csi-RS-Config-r10    CSI-RS-Config-r10    OPTIONAL,  -- Need ON
  pucch-ConfigDedicated-v1020  PUCCH-ConfigDedicated-v1020  OPTIONAL,  -- Need ON
  pusch-ConfigDedicated-v1020  PUSCH-ConfigDedicated-v1020  OPTIONAL,  -- Need ON
  schedulingRequestConfig-v1020 SchedulingRequestConfig-v1020 OPTIONAL,  -- Need ON
  soundingRS-UL-ConfigDedicated-v1020 SoundingRS-UL-ConfigDedicated-v1020 OPTIONAL,  -- Need ON
  cif-Presence-r10    BOOLEAN       OPTIONAL,  -- Need ON
  cqi-ReportConfig-r10    CQI-ReportConfig-r10   OPTIONAL, -- Cond CQI-r10
}
```

---

**References**

- TS 36.211 [21, Table 6.9.3-1].
soundingRS-UL-ConfigDedicatedAperiodic-r10
  SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL, -- Need ON
  uplinkPowerControlDedicated-v1020
  UplinkPowerControlDedicated-v1020 OPTIONAL -- Need ON
}
],
[[
  additionalSpectrumEmissionCA-r10
  CHOICE {
    release
    NULL,
    setup
    SEQUENCE {
      additionalSpectrumEmissionPCell-r10
      AdditionalSpectrumEmission
    }
  }
  OPTIONAL -- Need ON
]
]
},
[[
  -- DL configuration as well as configuration applicable for DL and UL
  csi-RS-ConfigNZPToRelease-list-r11
  CSI-RR-ConfigNZPToReleaseList-r11 OPTIONAL, -- Need ON
  csi-RR-ConfigNZPToAddModList-r11
  CSI-RR-ConfigNZPToAddModList-r11 OPTIONAL, -- Need ON
  csi-RR-ConfigNZPToReleaseList-r11
  CSI-RR-ConfigNZPToReleaseList-r11 OPTIONAL, -- Need ON
  epdcch-Config-r11
  EPDCCH-Config-r11 OPTIONAL, -- Need ON
  pdcsch-ConfigDedicated-v1130
  PDSCH-ConfigDedicated-v1130 OPTIONAL, -- Need ON
  -- UL configuration
  cqi-ReportConfig-v1130
  CQI-ReportConfig-v1130 OPTIONAL, -- Need ON
  pucch-ConfigDedicated-v1130
  PUCCH-ConfigDedicated-v1130 OPTIONAL, -- Need ON
  pusch-ConfigDedicated-v1130
  PUSCH-ConfigDedicated-v1130 OPTIONAL, -- Need ON
  uplinkPowerControlDedicated-v1130
  UplinkPowerControlDedicated-v1130 OPTIONAL -- Need ON
]
],
[[
  antennaInfo-v1250
  AntennaInfoDedicated-v1250 OPTIONAL, -- Cond AI-r10
  eimta-MainConfig-r12
  EIMTA-MainConfig-r12 OPTIONAL, -- Need ON
  eimta-MainConfigPCell-r12
  EIMTA-MainConfigServCell-r12 OPTIONAL, -- Need ON
  pucch-ConfigDedicated-v1250
  PUCCH-ConfigDedicated-v1250 OPTIONAL, -- Need ON
  pusch-ConfigDedicated-v1250
  PUSCH-ConfigDedicated-v1250 OPTIONAL, -- Need ON
  uplinkPowerControlDedicated-v1250
  UplinkPowerControlDedicated-v1250 OPTIONAL, -- Need ON
]
],
[[
  pucch-ConfigDedicated-v1280
  PUCCH-ConfigDedicated-v1280 OPTIONAL, -- Need ON
]
],
[[
  pdcsch-ConfigDedicated-v1310
  PDSCH-ConfigDedicated-v1310 OPTIONAL, -- Need ON
  pucch-ConfigDedicated-r13
  PUCCH-ConfigDedicated-r13 OPTIONAL, -- Need ON
  pusch-ConfigDedicated-r13
  PUSCH-ConfigDedicated-r13 OPTIONAL, -- Need ON
  pdcssch-CandidateReductions-r13
  PDCSSCH-CandidateReductions-r13 OPTIONAL, -- Need ON
  cqi-ReportConfig-v1310
  CQI-ReportConfig-v1310 OPTIONAL, -- Need ON
  soundingRS-UL-ConfigDedicated-v1310
  SoundingRS-UL-ConfigDedicated-v1310 OPTIONAL, -- Need ON
  soundingRS-UL-ConfigDedicatedAperiodic-v1310
  SoundingRS-UL-ConfigDedicatedAperiodic-v1310 OPTIONAL, -- Need ON
  csi-RR-Config-v1310
  CSI-RR-Config-v1310 OPTIONAL, -- Need ON
  ce-Mode-r13
  CHOICE {
    release
    NULL,
    setup
    ENUMERATED {ce-ModeA,ce-ModeB}
  }
  OPTIONAL, -- Need ON
  csi-RR-ConfigNZPToReleaseListExt-r13
  CSI-RR-ConfigNZPToReleaseListExt-r13 OPTIONAL, -- Need ON
  csi-RR-ConfigNZPToAddModListExt-r13
  CSI-RR-ConfigNZPToAddModListExt-r13 OPTIONAL, -- Need ON
  csi-RR-ConfigNZPToReleaseListExt-r13
  CSI-RR-ConfigNZPToReleaseListExt-r13 OPTIONAL -- Need ON
]
],
[[
  cqi-ReportConfig-v1320
  CQI-ReportConfig-v1320 OPTIONAL, -- Need ON
]
]
}
PhysicalConfigDedicated-v1370 ::= SEQUENCE {
  pucch-ConfigDedicated-v1370
  PUCCH-ConfigDedicated-v1370 OPTIONAL, -- Cond
  PUCCH-Format4or5
}
PhysicalConfigDedicated-v13c0 ::= SEQUENCE {
  pucch-ConfigDedicated-v13c0
  PUCCH-ConfigDedicated-v13c0
}
PhysicalConfigDedicatedSCell-r10 ::= SEQUENCE {
  -- DL configuration as well as configuration applicable for DL and UL
  nonUL-Configuration-r10  SEQUENCE {
    antennaInfo-r10  
    AntennaInfoDedicated-r10 OPTIONAL, -- Need ON
    crossCarrierSchedulingConfig-r10  
    CrossCarrierSchedulingConfig-r10 OPTIONAL, -- Need ON
    csi-RS-Config-r10  
    CSI-RS-Config-r10 OPTIONAL, -- Need ON
    pduSch-ConfigDedicated-r10  
    PDSCH-ConfigDedicated OPTIONAL, -- Need ON
  } OPTIONAL, -- Cond SCellAdd
  -- UL configuration
  ul-Configuration-r10  SEQUENCE {
    antennaInfoUL-r10  
    AntennaInfoUL-r10 OPTIONAL, -- Need ON
    pusch-ConfigDedicatedSCell-r10  
    PUSCH-ConfigDedicatedSCell-r10 OPTIONAL, -- Cond PUSCH-SCell
    uplinkPowerControlDedicatedSCell-r10  
    UplinkPowerControlDedicatedSCell-r10 OPTIONAL, -- Cond PUSCH-SCell
    cqi-ReportConfigSCell-r10  
    CQI-ReportConfigSCell-r10 OPTIONAL, -- Need ON
    soundingRS-UL-ConfigDedicated-r10  
    SoundingRS-UL-ConfigDedicated OPTIONAL, -- Need ON
    soundingRS-UL-ConfigDedicatedAperiodic-r10  
    SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL -- Need ON
  } OPTIONAL, -- Cond CommonUL
  
  ...,

  -- DL configuration as well as configuration applicable for DL and UL
  csi-RS-ConfigNZPToReleaseList-r11  
  CSI-RS-ConfigNZPToReleaseList-r11 OPTIONAL, -- Need ON
  csi-RS-ConfigNZPToAddModList-r11  
  CSI-RS-ConfigNZPToAddModList-r11 OPTIONAL, -- Need ON
  csi-RS-ConfigNZPToReleaseList-r11  
  CSI-RS-ConfigNZPToReleaseList-r11 OPTIONAL, -- Need ON
  csi-RS-ConfigNZPToAddModList-r11  
  CSI-RS-ConfigNZPToAddModList-r11 OPTIONAL, -- Need ON
  epdcch-Config-r11  
  EPDCCH-Config-r11 OPTIONAL, -- Need ON
  pduSch-ConfigDedicated-v1130  
  PDSCH-ConfigDedicated-v1130 OPTIONAL, -- Cond PUSCH-SCell
  uplinkPowerControlDedicatedSCell-v1130  
  UplinkPowerControlDedicatedSCell-v1130 OPTIONAL, -- Need ON
  cqi-ReportConfig-v1130  
  CQI-ReportConfig-v1130 OPTIONAL, -- Need ON
  soundingRS-UL-ConfigDedicatedAperiodic-r11  
  SoundingRS-UL-ConfigDedicatedAperiodic-r11 OPTIONAL -- Need ON
  
  -- UL configuration
  cqi-ReportConfig-v1250  
  CQI-ReportConfig-v1250 OPTIONAL, -- Need ON
  uplinkPowerControlDedicated-v1250  
  UplinkPowerControlDedicated-v1250 OPTIONAL, -- Need ON
  cqi-ReportConfig-v1250  
  CQI-ReportConfig-v1250 OPTIONAL, -- Need ON
  pduSch-ConfigDedicated-v1250  
  PDSCH-ConfigDedicated-v1250 OPTIONAL, -- Need ON
  cqi-ReportConfig-v1250  
  CQI-ReportConfig-v1250 OPTIONAL, -- Need ON
  uplinkPowerControlDedicated-v1250  
  UplinkPowerControlDedicated-v1250 OPTIONAL, -- Need ON
  cqi-ReportConfig-v1310  
  CQI-ReportConfig-v1310 OPTIONAL, -- Need ON
  uplinkPowerControlDedicated-v1310  
  UplinkPowerControlDedicated-v1310 OPTIONAL, -- Need ON
  
  -- DL configuration as well as configuration applicable for DL and UL
  cqi-ReportConfig-v1310  
  CQI-ReportConfig-v1310 OPTIONAL, -- Need ON
  uplinkPowerControlDedicated-v1310  
  UplinkPowerControlDedicated-v1310 OPTIONAL, -- Need ON
  crossCarrierSchedulingConfig-r13  
  CrossCarrierSchedulingConfig-r13 OPTIONAL, -- Cond Cross-Carrier-Config
  pduSch-ConfigCell-r13  
  PDSCH-ConfigCell-r13 OPTIONAL, -- Need ON
  cqi-ReportConfig-r13  
  CQI-ReportConfig-r13 OPTIONAL, -- Need ON
  uplinkPowerControlDedicated-r13  
  UplinkPowerControlDedicated-r13 OPTIONAL, -- Need ON
  
  }
SoundingRS-UL-ConfigDedicatedUpPTsExt-r13 OPTIONAL, -- Need ON
SoundingRS-UL-ConfigDedicatedAperiodic-v1310
SoundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13
SoundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13 OPTIONAL, -- Need ON
csi-RS-Config-v1310
CSI-RS-Config-v1310 OPTIONAL, -- Need ON
laa-SCellConfiguration-r13
LAA-SCellConfiguration-r13 OPTIONAL, -- Need ON
csi-RS-ConfigNZPToAddModListExt-r13
CSI-RS-ConfigNZPToAddModListExt-r13 OPTIONAL, -- Need ON
csi-RS-ConfigNZPToReleaseListExt-r13
CSI-RS-ConfigNZPToReleaseListExt-r13 OPTIONAL -- Need ON

PhysicalConfigDedicatedSCell-v1370 ::= SEQUENCE {
pucch-SCell-v1370  CHOICE{
release   NULL,
setup     SEQUENCE {
pucch-ConfigDedicated-v1370  PUCCH-ConfigDedicated-v1370 OPTIONAL -- Cond PUCCH-Format4or5
}
}
}

PhysicalConfigDedicatedSCell-v13c0 ::= SEQUENCE {
pucch-SCell-v13c0  CHOICE{
release   NULL,
setup     SEQUENCE {
pucch-ConfigDedicated-v13c0  PUCCH-ConfigDedicated-v13c0
}
}
}

LAA-SCellConfiguration-r13 ::=   SEQUENCE {
subframeStartPosition-r13    ENUMERATED {s0, s07},
laa-SCellSubframeConfig-r13    BIT STRING (SIZE(8))
}

CSI-RS-ConfigNZPToAddModList-r11 ::= SEQUENCE {SIZE (1..maxCSI-RS-NZP-r11)) OF CSI-RS-ConfigNZP-
r11

CSI-RS-ConfigNZPToAddModListExt-r13 ::= SEQUENCE {SIZE (1..maxCSI-RS-NZP-v1310)) OF CSI-RS-ConfigNZP-
r11

CSI-RS-ConfigNZPToReleaseList-r11 ::= SEQUENCE {SIZE (1..maxCSI-RS-NZP-r11)) OF CSI-RS-ConfigNZP-
Id-r11

CSI-RS-ConfigNZPToReleaseListExt-r13 ::= SEQUENCE {SIZE (1..maxCSI-RS-NZP-v1310)) OF CSI-RS-ConfigNZP-
Id-v1310

CSI-RS-ConfigZPToAddModList-r11 ::= SEQUENCE {SIZE (1..maxCSI-RS-ZP-r11)) OF CSI-RS-ConfigZP-r11

CSI-RS-ConfigZPToReleaseList-r11 ::= SEQUENCE {SIZE (1..maxCSI-RS-ZP-r11)) OF CSI-RS-ConfigZPId-
r11

-- ASN1STOP
PhysicalConfigDedicated field descriptions

additionalSpectrumEmissionPCell
E-UTRAN does not configure this field in this release of the specification.

antennaInfo
A choice is used to indicate whether the antennaInfo is signalled explicitly or set to the default antenna configuration as specified in section 9.2.4.

ci-Mode
Indicates the CE mode as specified in TS 36.213 [23].

csi-RS-Config
For a serving frequency E-UTRAN does not configure csi-RS-Config (includes zeroTxPowerCSI-RS) when transmission mode 10 is configured for the serving cell on this carrier frequency.

E-UTRAN does not configure this field in this release of the specification.

csi-RS-ConfigNZPToAddModList
For a serving frequency E-UTRAN configures one or more CSI-RS-ConfigNZP only when transmission mode 9 or 10 is configured for the serving cell on this carrier frequency. For a serving frequency, EUTRAN configures a maximum number of CSI-RS-ConfigNZP in accordance with transmission mode (including CSI processes), eMIMO (including class) and associated UE capabilities (e.g. k-Max, n-MaxList).

csi-RS-ConfigZPToAddModList
For a serving frequency E-UTRAN configures one or more CSI-RS-ConfigZP only when transmission mode 10 is configured for the serving cell on this carrier frequency.

eimta-MainConfigPCell, eimta-MainConfigSCell
If E-UTRAN configures eimta-MainConfigPCell or eimta-MainConfigSCell for one serving cell in a frequency band, E-UTRAN configures eimta-MainConfigPCell or eimta-MainConfigSCell for all serving cells residing on the frequency band. E-UTRAN configures eimta-MainConfigPCell or eimta-MainConfigSCell only if eimta-MainConfig is configured.

epdcch-Config
indicates the EPDCCH-Config for the cell. E-UTRAN does not configure EPDCCH-Config for an SCell that is configured with value other for schedulingCellInfo in CrossCarrierSchedulingConfig.

laa-SCellSubframeConfig
A bit-map indicating LAA SCell subframe configuration, "1" denotes that the corresponding subframe is allocated as MBSFN subframe. The bitmap is interpreted as follows:
Starting from the first/leastmost bit in the bitmap, the allocation applies to subframes #1, #2, #3, #4, #6, #7, #8, and #9.

pdsch-ConfigDedicated-v1130
For a serving frequency E-UTRAN configures pdsch-ConfigDedicated-v1130 only when transmission mode 10 is configured for the serving cell on this carrier frequency.

pdsch-ConfigDedicated-v1280
For a serving frequency E-UTRAN configures pdsch-ConfigDedicated-v1280 only when transmission mode 9 or 10 is configured for the serving cell on this carrier frequency.

pucch-Cell
If present, PUCCH feedback of this SCell is sent on the PUCCH SCell. If absent, PUCCH feedback of this SCell is sent on PCell or PSCell, or if the cell concerns the PUCCH SCell, the UE shall always send the PUCCH feedback of the concerned SCell using the configured PUCCH SCell.

pucch-ConfigDedicated-r13
E-UTRAN configures pucch-ConfigDedicated-r13 only if pucch-ConfigDedicated (i.e., without suffix) is not configured. UE shall ignore pucch-ConfigDedicated-v1020 when pucch-ConfigDedicated-r13 is configured.

pucch-SCell
If present, the concerned SCell is the PUCCH SCell. E-UTRAN only configures this field upon SCell addition i.e. this field is only released when the SCell is released.

pucch-ConfigDedicated-v1250
E-UTRAN configures pucch-ConfigDedicated-v1250 only if tpc-SubframeSet is configured.

subframeStartPosition
Indicates possible starting positions of transmission in the first subframe of the DL transmission burst, see TS 36.211 [21]. Value s0 means the starting position is subframe boundary, s07 means the starting position is either subframe boundary or slot boundary.

tpc-PDCCH-ConfigPUCCH
PDCCH configuration for power control of PUCCH using format 3/3A, see TS 36.212 [22].

tpc-PDCCH-ConfigPUSCH
PDCCH configuration for power control of PUSCH using format 3/3A, see TS 36.212 [22].

uplinkPowerControlDedicated
E-UTRAN configures uplinkPowerControlDedicated-v1130 only if uplinkPowerControlDedicated (without suffix) is configured.

uplinkPowerControlDedicatedSCell
E-UTRAN configures uplinkPowerControlDedicatedSCell-v1130 only if uplinkPowerControlDedicatedSCell-r10 is configured for this serving cell.
<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI-r8</td>
<td>The field is optionally present, need ON, if <code>antennaInfoDedicated-r10</code> is absent. Otherwise the field is not present</td>
</tr>
<tr>
<td>AI-r10</td>
<td>The field is optionally present, need ON, if <code>antennaInfoDedicated</code> is absent. Otherwise the field is not present</td>
</tr>
<tr>
<td>CommonUL</td>
<td>The field is mandatory present if <code>ul-Configuration of RadioResourceConfigCommonSCell-r10</code> is present; otherwise it is optional, need ON.</td>
</tr>
<tr>
<td>CQI-r8</td>
<td>The field is optionally present, need ON, if <code>cqi-ReportConfig-r10</code> is absent. Otherwise the field is not present</td>
</tr>
<tr>
<td>CQI-r10</td>
<td>The field is optionally present, need ON, if <code>cqi-ReportConfig</code> is absent. Otherwise the field is not present</td>
</tr>
<tr>
<td>Cross-Carrier-Config</td>
<td>The field is optionally present, need ON, if <code>crossCarrierSchedulingConfig-r10</code> is absent. Otherwise the field is not present</td>
</tr>
<tr>
<td>PUCCH-Format4or5</td>
<td>The field is mandatory present with <code>pucch-Format-v1370</code> set to setup if <code>pucch-ConfigDedicated-r13</code> is configured and <code>pucch-ConfigDedicated-r13</code> indicates PUCCH format 4 or PUCCH format 5; otherwise it is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>PUCCH-SCell1</td>
<td>The field is optionally present, need OR, for SCell not configured with <code>pucch-configDedicated-r13</code>. Otherwise it is not present.</td>
</tr>
<tr>
<td>PUSCH-SCell</td>
<td>The field is optionally present, need ON, if <code>pusch-ConfigDedicatedSCell-r10</code> and <code>pusch-ConfigDedicated-v1130</code> are absent. Otherwise the field is not present</td>
</tr>
<tr>
<td>PUSCH-SCell1</td>
<td>The field is optionally present, need ON, for SCell not configured with <code>pucch-configDedicated-r13</code>. Otherwise it is not present.</td>
</tr>
<tr>
<td>SCellAdd</td>
<td>The field is mandatory present if <code>cellIdentification</code> is present; otherwise it is optional, need ON.</td>
</tr>
</tbody>
</table>

NOTE 1: During handover, the UE performs a MAC reset, which involves reverting to the default CQI/ SRS/ SR configuration in accordance with subclause 5.3.13 and TS 36.321 [6, 5.9 & 5.2]. Hence, for these parts of the dedicated radio resource configuration, the default configuration (rather than the configuration used in the source PCell) is used as the basis for the delta signalling that is included in the message used to perform handover.

NOTE 2: Since delta signalling is not supported for the common SCell configuration, E-UTRAN can only add or release the uplink of an SCell by releasing and adding the concerned SCell.

**P-Max**

The IE `P-Max` is used to limit the UE's uplink transmission power on a carrier frequency and is used to calculate the parameter `Pcompensation` defined in TS 36.304 [4]. Corresponds to parameter `P_{MAX}` or `P_{MAX,c}` in TS 36.101 [42]. The UE transmit power on one serving cell shall not exceed the configured maximum UE output power of the serving cell determined by this value as specified in TS 36.101 [42, 6.2.5 or 6.2.5A] or, when transmitting sidelink discovery announcements within the coverage of the concerned cell, as specified in TS 36.101 [42, 6.2.5D].

**P-Max information element**

```asn1
-- ASN1START

P-Max ::=
  INTEGER (-30..33)

-- ASN1STOP
```

**PRACH-Config**

The IE `PRACH-ConfigSIB` and IE `PRACH-Config` are used to specify the PRACH configuration in the system information and in the mobility control information, respectively.

**PRACH-Config information elements**

```asn1
-- ASN1START

PRACH-ConfigSIB ::= SEQUENCE {
  rootSequenceIndex INTEGER (0..837),
  prach-ConfigInfo   PRACH-ConfigInfo
}

PRACH-ConfigSIB-v1310 ::= SEQUENCE {
  rsrp-ThresholdsPrachInfoList-r13   RSRP-ThresholdsPrachInfoList-r13,

-- ASN1STOP
```
mpdcch-startSF-CSS-RA-r13  
  fdd-r13  
  tdd-r13  
}  
prach-HoppingOffset-r13  
prach-ParametersListCE-r13  
}  
PRACH-Config ::=  
  SEQUENCE {  
    rootSequenceIndex  
    prach-ConfigInfo  
}  
PRACH-Config-v1310 ::=  
  SEQUENCE {  
    rsrp-ThresholdsPrachInfoList-r13  
    mpdcch-startSF-CSS-RA-r13  
}  
PRACH-ConfigInfo ::=  
  SEQUENCE {  
    prach-ConfigIndex  
    highSpeedFlag  
    zeroCorrelationZoneConfig  
    prach-FreqOffset  
}  
PRACH-ParametersListCE-r13 ::=  
  SEQUENCE (SIZE(1..maxCE-Level-r13)) OF PRACH-ParametersCE-r13  
PRACH-ParametersCE-r13 ::=  
  SEQUENCE {  
    prach-ConfigIndex-r13  
    prach-FreqOffset-r13  
    prach-StartingSubframe-r13  
    maxNumPreambleAttemptCE-r13  
    numRepetitionPerPreambleAttempt-r13  
    mpdcch-NarrowbandsToMonitor-r13  
    mpdcch-NumRepetition-RA-r13  
    prach-HoppingConfig-r13  
}  
RSRP-ThresholdsPrachInfoList-r13 ::=  
  SEQUENCE (SIZE(1..3)) OF RSRP-Range

-- ASN1STOP
## PRACH-Config field descriptions

### initial-CE-level
Indicates initial PRACH CE level at random access, see TS 36.321 [6]. If not configured, UE selects PRACH CE level based on measured RSRP level, see TS 36.321 [6].

### highSpeedFlag
Parameter: High-speed-flag, see TS 36.211 [21, 5.7.2]. TRUE corresponds to Restricted set and FALSE to Unrestricted set.

### maxNumPreambleAttemptCE
Maximum number of preamble transmission attempts per CE level. See TS 36.321 [6]. If the field is absent, the UE shall use the default value n3.

### mpdcch-NarrowbandsToMonitor
Narrowbands to monitor for MPDCCH for RAR, see TS 36.213 [23, 6.2]. Field values (1..maxAvailNarrowBands-r13) correspond to narrowband indices (0..[maxAvailNarrowBands-r13-1]) as specified in TS 36.211 [21].

### mpdcch-NumRepetition-RA
Maximum number of repetitions for MPDCCH common search space (CSS) for RAR, Msg3 and Msg4, see TS 36.211 [21].

### mpdcch-startSF-CSS-RA
Starting subframe configuration for MPDCCH common search space (CSS), including RAR, Msg3 retransmission, PDSCH with contention resolution and PDCCH with CCCH MAC SDU, see TS 36.211 [21] and TS 36.213 [23]. Value v1 corresponds to 1, value v1dot5 corresponds to 1.5, and so on.

### numRepetitionPerPreambleAttempt
Number of PRACH repetitions per attempt for each CE level. See TS 36.211 [21].

### prach-ConfigIndex
Parameter: prach-ConfigurationIndex, see TS 36.211 [21, 5.7.1].

### prach-FreqOffset
Parameter: prach-FrequencyOffset, see TS 36.211 [21, 5.7.1]. For TDD the value range is dependent on the value of prach-ConfigIndex.

### prach-HoppingConfig
Coverage level specific frequency hopping configuration for PRACH.

### prach-HoppingOffset
Parameter: PRACH frequency hopping offset, expressed as a number of resource blocks, see TS 36.211 [21, 5.7.1] prach-ParametersListCE
Configures PRACH parameters for each CE level. The first entry in the list is the PRACH parameters of CE level 0, the second entry in the list is the PRACH parameters of CE level 1, and so on.

### prach-StartingSubframe
PRACH starting subframe periodicity, expressed in number of subframes available for preamble transmission (PRACH opportunities), see TS 36.211 [21]. Value sf2 corresponds to 2 subframes, sf4 corresponds to 4 subframes and so on. EUTRAN configures the PRACH starting subframe periodicity larger than or equal to the number of PRACH repetitions per attempt for each CE level (numRepetitionPerPreambleAttempt).
If the field is absent, the value is determined implicitly in TS 36.211 [21, 5.7.1].

### rootSequenceIndex
Parameter: RACH_ROOT_SEQUENCE, see TS 36.211 [21, 5.7.1].

### rsrp-ThresholdsPrachInfoList
The criterion for BL UEs and UEs in CE to select PRACH resource set. Up to 3 RSRP threshold values are signalled to determine the CE level for PRACH, see TS 36.213 [23]. The first element corresponds to RSRP threshold 1, the second element corresponds to RSRP threshold 2 and so on, see TS 36.321 [6]. The UE shall ignore this field if only one CE level, i.e. CE level 0, is configured in prach-ParametersListCE. The number of RSRP thresholds present in rsrp-ThresholdsPrachInfoList is equal to the number of CE levels configured in prach-ParametersListCE minus one.

### zeroCorrelationZoneConfig
Parameter: N0CS configuration, see TS 36.211 [21, 5.7.2: table 5.7.2-2] for preamble format 0..3 and TS 36.211 [21, 5.7.2: table 5.7.2-3] for preamble format 4.

### Conditional presence

<table>
<thead>
<tr>
<th>MP</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The field is mandatory present.</td>
<td></td>
</tr>
</tbody>
</table>

---

### PresenceAntennaPort1

The IE 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.

### PresenceAntennaPort1 information element
The IE PUCCH-ConfigCommon and IE PUCCH-ConfigDedicated are used to specify the common and the UE specific PUCCH configuration respectively.

**PUCCH-Config information elements**

---

PresenceAntennaPort1 ::= BOOLEAN
-- ASN1STOP

---

PUCCH-Config

---

-- ASN1START

PUCCH-ConfigCommon ::= SEQUENCE {
    deltaPUCCH-Shift ENUMERATED {ds1, ds2, ds3},
    nRB-CQI INTEGER (0..98),
    nCS-AN INTEGER (0..7),
    n1PUCCH-AN INTEGER (0..2047)
}

PUCCH-ConfigCommon-v1310 ::= SEQUENCE {
    n1PUCCH-AN-InfoList-r13 N1PUCCH-AN-InfoList-r13 OPTIONAL, -- Need OR
    pucch-NumRepetitionCE-Msg4-Level0-r13 ENUMERATED {n1, n2, n4, n8} OPTIONAL, -- Need OR
    pucch-NumRepetitionCE-Msg4-Level1-r13 ENUMERATED {n1, n2, n4, n8} OPTIONAL, -- Need OR
    pucch-NumRepetitionCE-Msg4-Level2-r13 ENUMERATED {n4, n8, n16, n32} OPTIONAL, -- Need OR
    pucch-NumRepetitionCE-Msg4-Level3-r13 ENUMERATED {n4, n8, n16, n32} OPTIONAL -- Need OR
}

PUCCH-ConfigDedicated ::= SEQUENCE {
    ackNackRepetition CHOICE {
        release NULL,
        setup SEQUENCE {
            repetitionFactor ENUMERATED {n2, n4, n6, spare1},
            n1PUCCH-AN-Rep INTEGER (0..2047)
        }
    },
    tdd-AckNackFeedbackMode ENUMERATED {bundling, multiplexing} OPTIONAL -- Cond TDD
}

PUCCH-ConfigDedicated-v1020 ::= SEQUENCE {
    pucch-Format-r10 CHOICE {
        format3-r10 PUCCH-Format3-Conf-r13,
        channelSelection-r10 SEQUENCE {
            n1PUCCH-AN-CS-r10 CHOICE {
                release NULL,
                setup SEQUENCE {
                    n1PUCCH-AN-CS-List-r10 SEQUENCE (SIZE (1..2)) OF n1PUCCH-AN-CS-r10
                }
            }
        }
    }
}

PUCCH-ConfigDedicated-v1130 ::= SEQUENCE {
    n1PUCCH-AN-CS-v1130 CHOICE {
        release NULL,
        setup SEQUENCE {
            n1PUCCH-AN-CS-ListP1-r11 SEQUENCE (SIZE (2..4)) OF INTEGER (0..2047)
        }
    }
}

PUCCH-ConfigDedicated-v1250 ::= SEQUENCE {
    nkaPUCCH-Param-r12 CHOICE {
        release NULL,
        setup SEQUENCE {
            nPUCCH-Identity-r11 INTEGER (0..503),
            n1PUCCH-AN-r11 INTEGER (0..2047)
        }
    }
}

---

**-- ASN1STOP**
PUCCH-ConfigDedicated-r13 ::= SEQUENCE {
    -- Release 8
    ackNackRepetition-r13 CHOICE{
        release NULL,
        setup SEQUENCE {
            repetitionFactor-r13 ENUMERATED {n2, n4, n6, spare1},
            n1PUCCH-AN-Rep-r13 INTEGER (0..2047)
        }
    },
    -- Release 10
    tdd-AckNackFeedbackMode-r13 ENUMERATED {bundling, multiplexing} OPTIONAL, -- Cond TDD
    -- Release 11
    channelSelection-r13 SEQUENCE {
        n1PUCCH-AN-CS-r13 CHOICE {
            release NULL,
            setup SEQUENCE {
                n1PUCCH-AN-CS-List-r13 SEQUENCE (SIZE (1..2)) OF N1PUCCH-AN-CS-r10,
                dummy SEQUENCE (SIZE (2..4)) OF INTEGER (0..2047)
            }
        }
    },
    -- Release 12
    nkaPUCCH-Param-r13 CHOICE {
        release NULL,
        setup SEQUENCE {
            nkaPUCCH-AN-r13 INTEGER (0..2047)
        }
    }
}

-- Release 13
spatialBundlingPUCCH-r13 BOOLEAN,
spatialBundlingPUSCH-r13 BOOLEAN,
harq-TimingTDD-r13 BOOLEAN,
codebooksizeDetermination-r13 ENUMERATED {dai,cc} OPTIONAL, -- Need OR
maximumPayloadCoderate-r13 INTEGER (0..7) OPTIONAL, -- Need OR
pucch-NumRepetitionCE-r13 CHOICE {
    release NULL,
    setup CHOICE {
        modeA SEQUENCE {
            pucch-NumRepetitionCE-format1-r13 ENUMERATED {r1, r2, r4, r8},
            pucch-NumRepetitionCE-format2-r13 ENUMERATED {r1, r2, r4, r8}
        },
        modeB SEQUENCE {
            pucch-NumRepetitionCE-format1-r13 ENUMERATED {r4, r8, r16, r32},
        }
    }
}
pucch-NumRepetitionCE-format2-r13  
  ENUMERATED {r4, r8, r16, r32}  
  OPTIONAL  -- Need ON

PUCCH-ConfigDedicated-v1370 ::= SEQUENCE {  
  pucch-Format-v1370  CHOICE {  
    release NULL,  
    setup PUCCH-Format3-Conf-r13  
  }  
}

PUCCH-ConfigDedicated-v13c0 ::= SEQUENCE {  
  channelSelection-v13c0  SEQUENCE {  
    n1PUCCH-AN-CS-v13c0  CHOICE {  
      release NULL,  
      setup  SEQUENCE {  
        n1PUCCH-AN-CS-ListP1-v13c0  SEQUENCE (SIZE (2..4)) OF INTEGER (0..2047)  
      }  
    }  
  }  
}

PUCCH-Format3-Conf-r13 ::= SEQUENCE {  
  n3PUCCH-AN-List-r13  SEQUENCE (SIZE (1..4)) OF INTEGER (0..549)  
    OPTIONAL,  -- Need ON  
  twoAntennaPortActivatedPUCCH-Format3-r13  CHOICE {  
    release NULL,  
    setup  SEQUENCE {  
      n3PUCCH-AN-ListP1-r13  SEQUENCE (SIZE (1..4)) OF INTEGER (0..549)  
    }  
  }  
    OPTIONAL  -- Need ON
}

Format4-resource-r13 ::= SEQUENCE {  
  startingPRB-format4-r13  INTEGER (0..109),  
  numberOfPRB-format4-r13  INTEGER (0..7)  
}

Format5-resource-r13 ::= SEQUENCE {  
  startingPRB-format5-r13  INTEGER (0..109),  
  cdm-index-format5-r13  INTEGER (0..1)  
}

N1PUCCH-AN-CS-r10 ::= SEQUENCE (SIZE (1..4)) OF INTEGER (0..2047)

N1PUCCH-AN-InfoList-r13 ::= SEQUENCE (SIZE(1..maxCE-Level-r13)) OF INTEGER (0..2047)
-- ASN1STOP
ackNackRepetition
Parameter indicates whether ACK/NACK repetition is configured, see TS 36.213 [23, 10.1].

cdm-index-format5
Parameter $n_{xc}$ see TS 36.211 [21, 5.4.2c] for determining PUCCH resource(s) of PUCCH format 5.

codebooksizeDetermination
Parameter indicates whether HARQ codebook size is determined with downlink assignment indicator based solution or number of configured CCs, see TS 36.212 [22, 5.2.2.6, 5.2.3.1 and 5.3.3.1.2] and TS 36.213 [23, 10.1.2.2.3, 10.1.3.2.3.1, 10.1.3.2.3.2 and 10.1.3.2.4].

deltaPUCCH-Shift
Parameter: $\Delta^{PUCCH}_{shift}$, see TS 36.211 [21, 5.4.1], where $ds_1$ corresponds to value 1, $ds_2$ corresponds to value 2 etc.

dummy
This field is not used in the specification. If received it shall be ignored by the UE.

harq-TimingTDD
Parameter indicates for a TDD SCell when aggregated with a TDD PCell of different UL/DL configurations whether deriving the HARQ timing for such a cell is done in the same way as the DL HARQ timing of an FDD SCell with a TDD PCell, see TS 36.213 [23, 10.2].

maximumPayloadCoderate
Maximum payload or code rate for multi P-CSI on each PUCCH resource, see TS 36.213 [23,10.1.1].

n1PUCCH-AN
Parameter: $N_{PUCCH}^{(1)}$, see TS 36.213 [23, 10.1].

n1PUCCH-AN-r11
indicates UE-specific PUCCH AN resource offset, see TS 36.213 [23, 10.1].

n1PUCCH-AN-CS-List
Parameter: $n_{PUCCH,N}^{(1)}$ for antenna port $p_0$ for PUCCH format 1b with channel selection, see TS 36.213 [23, 10.1.2.2.1, 10.1.3.2.1].

n1PUCCH-AN-CS-ListP1
Parameter: $n_{PUCCH,ANRep}^{(1)}$ for antenna port $p_1$ for PUCCH format 1b with channel selection, see TS 36.213 [23, 10.1]. E-UTRAN configures this field only when pucch-Format is set to channelSelection.

n1PUCCH-AN-Rep, n1PUCCH-AN-RepP1
Parameter: $K_{PUCCH,ANRep}^{(1)}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1].

n3PUCCH-AN-List, n3PUCCH-AN-ListP1
Parameter: $n_{PUCCH}^{(1)}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1].

nCS-An
Parameter: $N_{cs}^{(1)}$ see TS 36.211 [21, 5.4].

nkaPUCCH-AN
Parameter: $N_{K_{PUCCH}}^{(1)}$, see TS 36.213 [23, 10.1.3].

nkaPUCCH-AN-r12
indicates PUCCH format 1a/1b starting offset for the subframe set $K_A$, see TS 36.213 [23, 10.1.3]. E-UTRAN configures nkaPUCCH-AN only if eimta-MainConfig is configured.

nPUCCH-Identity
Parameter: $n_{ID}^{PUCCH}$, see TS 36.211 [21, 5.5.1.5].

nRB-CQI
Parameter: $N_{RB}^{(2)}$, see TS 36.211 [21, 5.4].

numberOfPRB-format4
Parameter $n_{PUCCH}^{(1)}$ see TS 36.213 [23, Table 10.1.1-2] for determining PUCCH resource(s) of PUCCH format 4.

n1PUCCH-AN-InfoList
Starting offsets of the PUCCH resource(s) indicated by SIB1-BR. The first entry in the list is the starting offset of the PUCCH resource(s) of CE level 0, the second entry in the list is the starting offset of the PUCCH resource(s) of CE level 1, and so on. If E-UTRAN includes n1PUCCH-AN-InfoList, it includes the same number of entries as in prach-ParametersListCE. See TS 36.213 [23].

pucch-Format
Parameter indicates one of the PUCCH formats for transmission of HARQ-ACK, see TS 36.213 [23, 10.1]. For TDD, if the UE is configured with PCell only, the channelSelection indicates the transmission of HARQ-ACK multiplexing as defined in Tables 10.1.3-5, 10.1.3-6, and 10.1.3-7 in TS 36.213 [23] for PUCCH, and in 7.3 in TS 36.213 [23] for PUSCH. E-UTRAN only configures pucch-Format-v1370 when pucch-Format-r13 is configured and set to format4 or format5.
**PUCCH-Config field descriptions**

- **pucch-NumRepetitionCE**
  Number of PUCCH repetitions for PUCCH format 1/1a and for PUCCH format 2/2a/2b for CE modes A and B, see TS 36.211 [21] and TS 36.213 [23]. The UE shall ignore `pucch-NumRepetitionCE-format2-r13`, if received, for CE mode B in this release of specification.

- **pucch-NumRepetitionCE-Msg4-Level0, pucch-NumRepetitionCE-Msg4-Level1, pucch-NumRepetitionCE-Msg4-Level2, pucch-NumRepetitionCE-Msg4-Level3**
  Number of repetitions for PUCCH carrying HARQ response to PDSCH containing Msg4 for PRACH CE levels 0, 1, 2 and 3, see TS 36.211 [21] and TS 36.213 [23]. Value n1 corresponds to 1 repetition, value n2 corresponds to 2 repetitions, and so on.

- **repetitionFactor**
  Parameter $N_{ANRep}$ see TS 36.213 [23, 10.1] where n2 corresponds to repetition factor 2, n4 to 4.

- **simultaneousPUCCH-PUSCH**
  Parameter indicates whether simultaneous PUCCH and PUSCH transmissions is configured, see TS 36.213 [23, 10.1 and 5.1.1]. E-UTRAN configures this field for the PCell, only when the `nonContiguousUL-RA-WithinCC-Info` is set to `supported` in the band on which PCell is configured. Likewise, E-UTRAN configures this field for the PSCell, only when the `nonContiguousUL-RA-WithinCC-Info` is set to `supported` in the band on which PSCell is configured. Likewise, E-UTRAN configures this field for the PUCCH SCell, only when the `nonContiguousUL-RA-WithinCC-Info` is set to `supported` in the band on which PUCCH SCell is configured.

- **spatialBundlingPUCCH**
  Parameter indicates whether spatial bundling is enabled or not for PUCCH, see TS 36.212 [22, 5.2.3.1].

- **spatialBundlingPUSCH**
  Parameter indicates whether spatial bundling is enabled or not for PUSCH, see TS 36.212 [22, 5.2.2.6].

- **startingPRB-format4**
  Parameter $n_{PUCCH}^{(4)}$ see TS 36.211 [21, 5.4.3] for determining PUCCH resource(s) of PUCCH format 4.

- **startingPRB-format5**
  Parameter $n_{PUCCH}^{(5)}$ see TS 36.211 [21, 5.4.3] for determining PUCCH resource(s) of PUCCH format 5.

- **tdd-AckNackFeedbackMode**
  Parameter indicates one of the TDD ACK/NACK feedback modes used, see TS 36.213 [23, 7.3 and 10.1.3]. The value bundling corresponds to use of ACK/NACK bundling whereas, the value multiplexing corresponds to ACK/NACK multiplexing as defined in Tables 10.1.3-2, 10.1.3-3, and 10.1.3-4 in TS 36.213 [23]. The same value applies to both ACK/NACK feedback modes on PUCCH as well as on PUSCH.

- **twoAntennaPortActivatedPUCCH-Format1a1b**
  Indicates whether two antenna ports are configured for PUCCH format 1a/1b for HARQ-ACK, see TS 36.213 [23, 10.1]. The field also applies for PUCCH format 1a/1b transmission when `format3` is configured, see TS 36.213 [23, 10.1.2.2.2, 10.1.3.2.2].

- **twoAntennaPortActivatedPUCCH-Format3**
  Indicates whether two antenna ports are configured for PUCCH format 3 for HARQ-ACK, see TS 36.213 [23, 10.1].

---

**PUSCH-Config**

The IE `PUSCH-ConfigCommon` is used to specify the common PUSCH configuration and the reference signal configuration for PUSCH and PUCCH. The IE `PUSCH-ConfigDedicated` is used to specify the UE specific PUSCH configuration.

---

**PUSCH-Config information element**

```asn1
-- ASN1START
PUSCH-ConfigCommon ::= SEQUENCE {
  pusch-ConfigBasic SEQUENCE {
    n-SB INTEGER {1..4},
    hoppingMode ENUMERATED {interSubFrame, intraAndInterSubFrame},
    pusch-HoppingOffset INTEGER {0..98},
    enable64QAM BOOLEAN
  },
  ul-ReferenceSignalsPUSCH UL-ReferenceSignalsPUSCH
}

PUSCH-ConfigCommon-v1270 ::= SEQUENCE {

-- ASN1END
```
enable64QAM-v1270

PUSCH-ConfigCommon-v1310 ::= SEQUENCE {
pusch-maxNumRepetitionCEmodeA-r13 ENUMERATED {
r8, r16, r32 } OPTIONAL, -- Need OR
pusch-maxNumRepetitionCEmodeB-r13 ENUMERATED {
r192, r256, r384, r512, r768, r1024,
r1536, r2048 } OPTIONAL, -- Need OR
pusch-HoppingOffset-v1310 INTEGER (1..maxAvailNarrowBands-r13) OPTIONAL -- Need OR
}

PUSCH-ConfigDedicated ::= SEQUENCE {
  betaOffset-ACK-Index INTEGER (0..15),
  betaOffset-RI-Index INTEGER (0..15),
  betaOffset-CQI-Index INTEGER (0..15)
}

PUSCH-ConfigDedicated-v1020 ::= SEQUENCE {
  betaOffsetMC-r10 SEQUENCE {
    betaOffset-ACK-Index-MC-r10 INTEGER (0..15),
    betaOffset-RI-Index-MC-r10 INTEGER (0..15),
    betaOffset-CQI-Index-MC-r10 INTEGER (0..15)
  } OPTIONAL, -- Need OR
groupHoppingDisabled-r10 ENUMERATED {true} OPTIONAL, -- Need OR
dmrs-WithOCC-Activated-r10 ENUMERATED {true} OPTIONAL -- Need OR
}

PUSCH-ConfigDedicated-v1130 ::= SEQUENCE {
  pusch-DMRS-r11 CHOICE {
    release NULL,
    setup SEQUENCE {
      nPUSCH-Identity-r11 INTEGER (0..509),
      nDMRS-CSH-Identity-r11 INTEGER (0..509)
    }
  }
}

PUSCH-ConfigDedicated-v1250 ::= SEQUENCE {
  uciOnPUSCH CHOICE {
    release NULL,
    setup SEQUENCE {
      betaOffset-ACK-Index-SubframeSet2-r12 INTEGER (0..15),
      betaOffset-RI-Index-SubframeSet2-r12 INTEGER (0..15),
      betaOffset-CQI-Index-SubframeSet2-r12 INTEGER (0..15),
      betaOffsetMC-r12 SEQUENCE {
        betaOffset-ACK-Index-MC-SubframeSet2-r12 INTEGER (0..15),
        betaOffset-RI-Index-MC-SubframeSet2-r12 INTEGER (0..15),
        betaOffset-CQI-Index-MC-SubframeSet2-r12 INTEGER (0..15)
      } OPTIONAL -- Need OR
    }
  }
}

PUSCH-ConfigDedicated-r13 ::= SEQUENCE {
  betaOffset-ACK-Index-r13 INTEGER (0..15),
  betaOffset2-ACK-Index-r13 INTEGER (0..15), OPTIONAL, -- Need OR
  betaOffset-RI-Index-r13 INTEGER (0..15),
  betaOffset-CQI-Index-r13 INTEGER (0..15),
  betaOffsetMC-r13 SEQUENCE {
    betaOffset-ACK-Index-MC-r13 INTEGER (0..15),
    betaOffset2-ACK-Index-MC-r13 INTEGER (0..15), OPTIONAL, -- Need OR
    betaOffset-RI-Index-MC-r13 INTEGER (0..15),
    betaOffset-CQI-Index-MC-r13 INTEGER (0..15)
  } OPTIONAL, -- Need OR
groupHoppingDisabled-r13 ENUMERATED {true} OPTIONAL, -- Need OR
dmrs-WithOCC-Activated-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  pusch-DMRS-r11 CHOICE {
    release NULL,
    setup SEQUENCE {
      nPUSCH-Identity-r13 INTEGER (0..509),
      nDMRS-CSH-Identity-r13 INTEGER (0..509)
    }
  } OPTIONAL, -- Need OR
  uciOnPUSCH CHOICE {
    release NULL,
    setup SEQUENCE {
      betaOffset-ACK-Index-SubframeSet2-r13 INTEGER (0..15),
    }
  }
betaOffset2-ACK-Index-SubframeSet2-r13 INTEGER (0..15) OPTIONAL, -- Need OR
betaOffset2-RI-Index-SubframeSet2-r13 INTEGER (0..15),
betaOffset2-CQI-Index-SubframeSet2-r13 INTEGER (0..15),
betaOffsetMC-r12 SEQUENCE {
betaOffset-ACK-Index-MC-SubframeSet2-r13 INTEGER (0..15),
betaOffset2-ACK-Index-MC-SubframeSet2-r13 INTEGER (0..15) OPTIONAL, -- Need OR
betaOffset-RI-Index-MC-SubframeSet2-r13 INTEGER (0..15),
betaOffset-CQI-Index-MC-SubframeSet2-r13 INTEGER (0..15)
} OPTIONAL -- Need OR
pusch-HoppingConfig-r13 ENUMERATED {on} OPTIONAL -- Need OR
}
PUSCH-ConfigDedicatedSCell-r10 ::= SEQUENCE {
groupHoppingDisabled-r10 ENUMERATED {true} OPTIONAL, -- Need OR
dmrs-WithOCC-Activated-r10 ENUMERATED {true} OPTIONAL -- Need OR
}
UL-ReferenceSignalsPUSCH ::= SEQUENCE {
groupHoppingEnabled BOOLEAN,
groupAssignmentPUSCH INTEGER (0..29),
sequenceHoppingEnabled BOOLEAN,
cyclicShift INTEGER (0..7)
}

-- ASN1STOP
sets). The same value also applies for subframe set 1 of all serving cells with an uplink in that cell group and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell).

**betaOffset-ACK-Index-SubframeSet2, betaOffset2-ACK-Index-SubframeSet2, betaOffset-ACK-Index-MC-SubframeSet2, betaOffset2-ACK-Index-MC-SubframeSet2**

Parameter: $I_{\text{HARQ-ACK offset, set2}}$, $I_{\text{HARQ-ACK offset, set2, X}}$, $I_{\text{HARQ-ACK offset, MC, set2}}$, and $I_{\text{HARQ-ACK offset, MC, set2, X}}$ respectively, see TS 36.213 [23, Table 8.6.3-1]. betaOffset-ACK-Index-SubframeSet2 and betaOffset2-ACK-Index-SubframeSet2 are used for single-codeword, betaOffset-ACK-Index-MC-SubframeSet2 and betaOffset2-ACK-Index-MC-SubframeSet2 are used for multiple-codeword. If betaOffset2-ACK-Index-SubframeSet2 is configured; betaOffset-ACK-Index-SubframeSet2 is used when up to 22 HARQ-ACK bits are transmitted otherwise betaOffset2-ACK-Index-MC-SubframeSet2 is used. If betaOffset2-ACK-Index-MC-SubframeSet2 is configured; betaOffset-ACK-Index-MC-SubframeSet2 is used when up to 22 HARQ-ACK bits are transmitted otherwise betaOffset2-ACK-Index-MC is used when up to 22 HARQ-ACK bits are transmitted otherwise betaOffset2-ACK-Index-MC is used. One value applies for all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and configured with uplink power control subframe sets. The same value also applies for subframe set 1 of all serving cells with an uplink in that cell group and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell).

**betaOffset-RI-index, betaOffset2-RI-index-MC**

Parameter: $I_{\text{RI offset}}$, for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-2]. One value applies for all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell).

**betaOffset-RI-index-SubframeSet2, betaOffset2-RI-index-MC-SubframeSet2**

Parameter: $I_{\text{RI offset, set2}}$, for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-2]. One value applies for subframe set 2 of all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell).

**cyclicShift**

Parameters: cyclicShift, see TS 36.211 [21, Table 5.5.2.1.1-2].

**dmrs-WithOCC-Activated**

Parameter: Activate-DMRS-with OCC, see TS 36.211 [21, 5.5.2.1].
**PUSCH-Config field descriptions**

**enable64QAM**  
See TS 36.213 [23, 8.6.1]. If `enable64QAM` (without suffix) is set to TRUE, it indicates that 64QAM is allowed for UE categories 5 and 8 indicated in `ue-Category` and UL categories indicated in `ue-CategoryUL` which support UL 64QAM and can fallback to category 5 or 8, see TS 36.306 [5, Table 4.1A-2 and Table 4.1A-6], while FALSE indicates that 64QAM is not allowed. If `enable64QAM-v1270` is set to TRUE, it indicates that 64QAM is allowed for UL categories indicated in `ue-CategoryUL` which support UL 64QAM but cannot fallback category 5 or 8, see TS 36.306 [5, Table 4.1A-2 and Table 4.1A-6]. E-UTRAN configures `enable64QAM-v1270` only when `enable64QAM` (without suffix) is set to TRUE.

**groupAssignmentPUSCH**  
Parameter: ΔSS See TS 36.211 [21, 5.5.1.3].

**groupHoppingDisabled**  
Parameter: Disable-sequence-group-hopping, see TS 36.211 [21, 5.5.1.3].

**groupHoppingEnabled**  
Parameter: Group-hopping-enabled, see TS 36.211 [21, 5.5.1.3].

**hoppingMode**  
Parameter: Hopping-mode, see TS 36.211 [21, 5.3.4].

**nDMRS-CSH-Identity**  
Parameter: $N_{\text{ID}}^{\text{csh}, \text{DMRS}}$, see TS 36.211 [21, 5.5.2.1.1].

**nPUSCH-Identity**  
Parameter: $N_{\text{ID}}^{\text{PUSCH}}$, see TS 36.211 [21, 5.5.1.5].

**n-SB**  
Parameter: $N_{\text{sb}}$, see TS 36.211 [21, 5.3.4].

**pusch-HoppingConfig**  
For BL UEs and UEs in CE, frequency hopping activation/deactivation for unicast PUSCH, see TS 36.211 [21]

**pusch-hoppingOffset**  
Except for BL UEs and UEs in CE, parameter: $N_{\text{HO}}^{\text{PUSCH}}$, see TS 36.211 [21, 5.3.4]. For BL UEs and UEs in CE, the `pusch-hoppingOffset-v1310` indicates the parameter $J_{N_{\text{ho}}, \text{hop}}^{\text{PUSCH}}$, see TS 36.211 [21, 5.3.4]. In case `pusch-hoppingOffset-v1310` is signalled, the BL UEs and UEs in CE shall ignore `pusch-hoppingOffset` (i.e. without suffix).

**pusch-maxNumRepetitionCEmodeA**  
Maximum value to indicate the set of PUSCH repetition numbers for CE mode A, see TS 36.211 [21] and TS 36.213 [23]. E-UTRAN does not configure value r8. If the field is not configured, the UE shall apply the default value as defined in TS 36.213 [23, 8.0].

**pusch-maxNumRepetitionCEmodeB**  
Maximum value to indicate the set of PUSCH repetition numbers for CE mode B, see TS 36.211 [21] and TS 36.213 [23].

**sequenceHoppingEnabled**  
Parameter: Sequence-hopping-enabled, see TS 36.211 [21, 5.5.1.4].

**ul-ReferenceSignalsPUSCH**  
Used to specify parameters needed for the transmission on PUSCH (or PUCCH).

---

**RACH-ConfigCommon**

The IE `RACH-ConfigCommon` is used to specify the generic random access parameters.

**RACH-ConfigCommon information element**

```asn1
-- ASN1START  
RACH-ConfigCommon ::= SEQUENCE {
  preambleInfo SEQUENCE {
    numberOfRA-Preambles ENUMERATED {
      n4, n8, n12, n16, n20, n24, n28,
      n32, n36, n40, n44, n48, n52, n56,
      n60, n64},
    preamblesGroupAConfig SEQUENCE {
      sizeOfRA-PreamblesGroupA ENUMERATED {
        n4, n8, n12, n16, n20, n24, n28,
        n32, n36, n40, n44, n48, n52, n56,
        n60},
    messageSizeGroupA ENUMERATED {b56, b144, b208, b256},
    messagePowerOffsetGroupB ENUMERATED {minusinfinity, dB0, dB5, dB8, dB10, dB12,
      dB15, dB18},
    ... } OPTIONAL -- Need OP
  }
-- ASN1END
```
RACH-ConfigCommon-v1250 ::= SEQUENCE {
  txFailParams-r12    SEQUENCE {
    connEstFailCount-r12     ENUMERATED {n1, n2, n3, n4},
    connEstFailOffsetValidity-r12   ENUMERATED {s30, s60, s120, s240, s300, s420, s600, s900},
    connEstFailOffset-r12     INTEGER (0..15)  OPTIONAL -- Need OP
  }
}

RACH-ConfigCommonSCell-r11 ::= SEQUENCE {
  ra-SupervisionInfo-r11    PowerRampingParameters,
  preambleTransMax-r11     PreambleTransMax
}

RACH-CE-LevelInfoList-r13 ::= SEQUENCE (SIZE (1..maxCE-Level-r13)) OF RACH-CE-LevelInfo-r13

RACH-CE-LevelInfo-r13 ::= SEQUENCE {
  preambleMappingInfo-r13    SEQUENCE {
    firstPreamble-r13     INTEGER(0..63),
    lastPreamble-r13     INTEGER(0..63)
  },
  ra-ResponseWindowSize-r13   ENUMERATED {sf20, sf50, sf80, sf120, sf180, sf240, sf320, sf400},
  mac-ContentionResolutionTimer-r13 ENUMERATED {sf80, sf100, sf120, sf160, sf200, sf240, sf480, sf960},
  rar-HoppingConfig-r13    ENUMERATED {on,off},
  ...
}

PowerRampingParameters ::= SEQUENCE {
  powerRampingStep     ENUMERATED {dB0, dB2,dB4, dB6},
  preambleInitialReceivedTargetPower ENUMERATED {
    dBm-120, dBm-118, dBm-116, dBm-114, dBm-112, dBm-110, dBm-108, dBm-106, dBm-104, dBm-102, dBm-100, dBm-98, dBm-96, dBm-94, dBm-92, dBm-90}
}

PreambleTransMax ::= ENUMERATED {
  n3, n4, n5, n6, n7, n8, n10, n20, n50, n100, n200}

-- ASN1STOP
### RACH-ConfigCommon field descriptions

<table>
<thead>
<tr>
<th>Fielddescription</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>connEstFailCount</td>
<td>Number of times that the UE detects T300 expiry on the same cell before applying connEstFailOffset.</td>
</tr>
<tr>
<td>connEstFailOffset</td>
<td>Parameter &quot;Qoffsettemp&quot; in TS 36.304 [4]. If the field is not present the value of infinity shall be used for &quot;Qoffsettemp&quot;.</td>
</tr>
<tr>
<td>connEstFailOffsetValidity</td>
<td>Amount of time that the UE applies connEstFailOffset before removing the offset from evaluation of the cell. Value s30 corresponds to 30 seconds, s60 corresponds to 60 seconds, and so on.</td>
</tr>
<tr>
<td>mac-ContentionResolutionTimer</td>
<td>Timer for contention resolution in TS 36.321 [6]. Value in subframes. Value sf8 corresponds to 8 subframes, sf16 corresponds to 16 subframes and so on.</td>
</tr>
<tr>
<td>maxHARQ-Msg3Tx</td>
<td>Maximum number of Msg3 HARQ transmissions in TS 36.321 [6], used for contention based random access. Value is an integer.</td>
</tr>
<tr>
<td>messagePowerOffsetGroupB</td>
<td>Threshold for preamble selection in TS 36.321 [6]. Value in dB. Value minusinfinity corresponds to –infinity. Value dB0 corresponds to 0 dB, dB5 corresponds to 5 dB and so on.</td>
</tr>
<tr>
<td>messageSizeGroupA</td>
<td>Threshold for preamble selection in TS 36.321 [6]. Value in bits. Value b56 corresponds to 56 bits, b144 corresponds to 144 bits and so on.</td>
</tr>
<tr>
<td>numberOfRA-Preambles</td>
<td>Number of non-dedicated random access preambles in TS 36.321 [6]. Value is an integer. Value n4 corresponds to 4, n8 corresponds to 8 and so on.</td>
</tr>
<tr>
<td>powerRampingStep</td>
<td>Power ramping factor in TS 36.321 [6]. Value in dB. Value dB0 corresponds to 0 dB, dB2 corresponds to 2 dB and so on.</td>
</tr>
<tr>
<td>preambleInitialReceivedTargetPower</td>
<td>Initial preamble power in TS 36.321 [6]. Value in dBm. Value dBm-120 corresponds to -120 dBm, dBm-118 corresponds to -118 dBm and so on.</td>
</tr>
<tr>
<td>preambleMappingInfo</td>
<td>Provides the mapping of preambles to groups for each CE level, as specified in TS 36.321 [6]. When random access preambles group B is used, firstPreamble-r13 is set to 0 and lastPreamble-r13 is set to numberOfRA-Preambles-1.</td>
</tr>
<tr>
<td>preamblesGroupAConfig</td>
<td>Provides the configuration for preamble grouping in TS 36.321 [6]. If the field is not signalled, the size of the random access preambles group A [6] is equal to numberOfRA-Preambles.</td>
</tr>
<tr>
<td>preambleTransMax, preambleTransMax-CE</td>
<td>Maximum number of preamble transmission in TS 36.321 [6]. Value is an integer. Value n3 corresponds to 3, n4 corresponds to 4 and so on.</td>
</tr>
<tr>
<td>rach-CE-LevelInfoList</td>
<td>Provides RACH information each coverage level. The first entry in the list contains RACH information of CE level 0, the second entry in the list contains RACH information of CE level 1, and so on. If E-UTRAN includes rach-CE-LevelInfoList, it includes the same number of entries as in prach-ParametersListCE.</td>
</tr>
<tr>
<td>ra-ResponseWindowSize</td>
<td>Duration of the RA response window in TS 36.321 [6]. Value in subframes. Value sf2 corresponds to 2 subframes, sf3 corresponds to 3 subframes and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).</td>
</tr>
<tr>
<td>rar-HoppingConfig</td>
<td>Frequency hopping activation/deactivation for RAR/Msg3/Msg4 for a CE level, see TS 36.211 [21].</td>
</tr>
<tr>
<td>sizeOfRA-PreamblesGroupA</td>
<td>Size of the random access preambles group A in TS 36.321 [6]. Value is an integer. Value n4 corresponds to 4, n8 corresponds to 8 and so on.</td>
</tr>
</tbody>
</table>

---

**RACH-ConfigDedicated**

The IE RACH-ConfigDedicated is used to specify the dedicated random access parameters.

---

**RACH-ConfigDedicated information element**

```asn1
-- ASN1START
RACH-ConfigDedicated ::= SEQUENCE {
  ra-PreambleIndex INTEGER (0..63),
  ra-PRACH-MaskIndex INTEGER (0..15)
}
-- ASN1STOP
```

---

ETSI
**RACH-ConfigDedicated field descriptions**

- **ra-PRACH-MaskIndex**
  Explicitly signalled PRACH Mask Index for RA Resource selection in TS 36.321 [6].

- **ra-PreambleIndex**

---

**RadioResourceConfigCommon**

The IE **RadioResourceConfigCommonSIB** and IE **RadioResourceConfigCommon** are used to specify common radio resource configurations in the system information and in the mobility control information, respectively, e.g., the random access parameters and the static physical layer parameters.

**RadioResourceConfigCommon information element**

```asn1
RadioResourceConfigCommonSIB ::= SEQUENCE {
   rach-ConfigCommon     RACH-ConfigCommon,
   bcch-Config           BCCH-Config,
   pch-Config            PCCH-Config,
   prach-Config          PRACH-ConfigSIB,
   pdsch-ConfigCommon     PDSCH-ConfigCommon,
   pusch-ConfigCommon     PUSCH-ConfigCommon,
   pucch-ConfigCommon     PUCCH-ConfigCommon,
   soundingRS-UL-ConfigCommon   SoundingRS-UL-ConfigCommon,
   uplinkPowerControlCommon UplinkPowerControlCommon,
   ul-CyclicPrefixLength   UL-CyclicPrefixLength,
   ...,
   [ [ uplinkPowerControlCommon-v1020 UplinkPowerControlCommon-v1020 OPTIONAL -- Need OR ]],
   [ [ rach-ConfigCommon-v1250 RACH-ConfigCommon-v1250 OPTIONAL -- Need OR ]],
   [ [ pusch-ConfigCommon-v1270 PUSCH-ConfigCommon-v1270 OPTIONAL -- Need OR ]],
   [ [ bcch-Config-v1310 BCCH-Config-v1310 OPTIONAL, -- Need OR pch-Config-v1310 PCCH-Config-v1310 OPTIONAL, -- Need OR freqHoppingParameters-r13 FreqHoppingParameters-r13 OPTIONAL, -- Need OR pdsch-ConfigCommon-v1310 PDSCH-ConfigCommon-v1310 OPTIONAL, -- Need OR pusch-ConfigCommon-v1310 PUSCH-ConfigCommon-v1310 OPTIONAL, -- Need OR prach-ConfigCommon-v1310 PRACH-ConfigSIB-v1310 OPTIONAL, -- Need OR ]]
}

RadioResourceConfigCommon ::=  SEQUENCE {
   rach-ConfigCommon     RACH-ConfigCommon     OPTIONAL, -- Need ON
   prach-Config          PRACH-Config,
   pdsch-ConfigCommon     PDSCH-ConfigCommon     OPTIONAL, -- Need ON
   pusch-ConfigCommon     PUSCH-ConfigCommon,
   phich-Config          PHICH-Config,
   pucch-ConfigCommon     PUCCH-ConfigCommon,
   soundingRS-UL-ConfigCommon   SoundingRS-UL-ConfigCommon,
   uplinkPowerControlCommon UplinkPowerControlCommon,
   antennainfoCommon     AntennainfoCommon,
   p-Max                  P-Max                  OPTIONAL, -- Need OP
   tdd-Config            TDD-Config            OPTIONAL, -- Cond TDD
   ul-CyclicPrefixLength   UL-CyclicPrefixLength,
   ...,
   [ [ uplinkPowerControlCommon-v1020 UplinkPowerControlCommon-v1020 OPTIONAL -- Need ON ]],
   [ [ tdd-Config-v1130 TDD-Config-v1130 OPTIONAL -- Cond TDD3 ]],
   [ [ pusch-ConfigCommon-v1270 PUSCH-ConfigCommon-v1270 OPTIONAL -- Need OR ]],
   [ [ prach-Config-v1310 PRACH-Config-v1310 OPTIONAL, -- Need ON freqHoppingParameters-r13 FreqHoppingParameters-r13 OPTIONAL, -- Need ON pdsch-ConfigCommon-v1310 PDSCH-ConfigCommon-v1310 OPTIONAL, -- Need ON pusch-ConfigCommon-v1310 PUSCH-ConfigCommon-v1310 OPTIONAL, -- Need ON ]]
}

RadioResourceConfigCommonPSCell-r12 ::= SEQUENCE {
   ...}
```
RadioResourceConfigCommonPSCell-v12f0 ::= SEQUENCE {
  basicFields-v12f0  RadioResourceConfigCommonSCell-v10l0
}

RadioResourceConfigCommonSCell-r10 ::= SEQUENCE {
  nonUL-Configuration-r10  SEQUENCE {
    -- 1: Cell characteristics
    dl-Bandwidth-r10  ENUMERATED {n6, n15, n25, n50, n75, n100},
    -- 2: Physical configuration, general
    antennaInfoCommon-r10  AntennaInfoCommon,
    mbsfn-SubframeConfigList-r10  MBSFN-SubframeConfigList OPTIONAL, -- Need OR
    -- 3: Physical configuration, control
    phich-Config-r10  PHICH-Config,
    -- 4: Physical configuration, physical channels
    pdsch-ConfigCommon-r10  PDSCH-ConfigCommon,
    tdd-Config-r10  TDD-Config OPTIONAL -- Cond TDD-OR-NoR11,
  },
  -- UL configuration
  ul-Configuration-r10  SEQUENCE {
    ul-FreqInfo-r10  SEQUENCE {
      ul-CarrierFreq-r10  ARFCN-ValueEUTRA OPTIONAL, -- Need OP
      ul-Bandwidth-r10  ENUMERATED {n6, n15, n25, n50, n75, n100} OPTIONAL, -- Need OP
      additionalSpectrumEmissionSCell-r10  AdditionalSpectrumEmission, p-Max-r10  P-Max OPTIONAL, -- Need OP
      uplinkPowerControlCommonSCell-r10  UplinkPowerControlCommonSCell-r10,
      -- A special version of IE UplinkPowerControlCommon may be introduced
      -- 3: Physical configuration, control
      soundingRS-UL-ConfigCommon-r10  SoundingRS-UL-ConfigCommon,
      ul-CyclicPrefixLength-r10  UL-CyclicPrefixLength,
      -- 4: Physical configuration, physical channels
      prach-ConfigSCell-r10  PRACH-ConfigSCell-r10 OPTIONAL, -- Cond TDD-OR-NoR11
      pusch-ConfigCommon-r10  PUSCH-ConfigCommon OPTIONAL, -- Need OR
    },
    ...[[ ul-CarrierFreq-v1090  ARFCN-ValueEUTRA-v9e0 OPTIONAL, -- Need OP
    ]],
    [[ rach-ConfigCommonSCell-r11  RACH-ConfigCommonSCell-r11 OPTIONAL, -- Cond UL
    ]]},
  tdd-Config-v1130  TDD-Config-v1130 OPTIONAL, -- Cond TDD-OR-NoR11
  uplinkPowerControlCommonSCell-v1130  UplinkPowerControlCommonSCell-v1130 OPTIONAL -- Cond UL
},
[[ pusch-ConfigCommon-v1270  PUSCH-ConfigCommon-v1270 OPTIONAL -- Need OR
  ]],
[[ pusch-ConfigCommon-r13  PUSCH-ConfigCommon-r13 OPTIONAL, -- Cond UL
  uplinkPowerControlCommonSCell-v1310  UplinkPowerControlCommonSCell-v1310 OPTIONAL -- Cond UL
  ]]
}

RadioResourceConfigCommonSCell-v10l0 ::= SEQUENCE {
  ul-Configuration-v10l0  SEQUENCE {
    additionalSpectrumEmissionSCell-v10l0  AdditionalSpectrumEmission-v10l0
  }
}

BCCH-Config ::= SEQUENCE {
  modificationPeriodCoeff  ENUMERATED {n2, n4, n8, n16}
}

BCCH-Config-v1310 ::= SEQUENCE {

modificationPeriodCoeff-v1310 ENUMERATED {n64}

FreqHoppingParameters-r13 ::= SEQUENCE {
dummy ENUMERATED {nb2, nb4} OPTIONAL,
dummy2 CHOICE {
id-interval-FDD-r13 ENUMERATED {int1, int2, int4, int8},
id-interval-TDD-r13 ENUMERATED {int1, int5, int10, int20}
} OPTIONAL,
dummy3 CHOICE {
id-interval-FDD-r13 ENUMERATED {int2, int4, int8, int16},
id-interval-TDD-r13 ENUMERATED {int5, int10, int20, int40}
} OPTIONAL,
dummy4 INTEGER (1..maxAvailNarrowBands-r13)
} OPTIONAL

PCCH-Config ::= SEQUENCE {
defaultPagingCycle ENUMERATED {
rf32, rf64, rf128, rf256,
nB ENUMERATED {
fourT, twoT, oneT, halfT, quarterT, oneEightT, oneSixteenthT, oneThirtySecondT
}
}

PCCH-Config-v1310 ::= SEQUENCE {
paging-narrowBands-r13 INTEGER (1..maxAvailNarrowBands-r13),
mpdch-NumRepetition-Paging-r13 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128, r256},
nB-v1310 ENUMERATED {one64thT, one128thT, one256thT}
OPTIONAL -- Need OR
}

UL-CyclicPrefixLength ::= ENUMERATED {len1, len2}

-- ASN1STOP
### RadioResourceConfigCommon field descriptions

**additionalSpectrumEmissionSCell**
The UE requirements related to `additionalSpectrumEmissionSCell` are defined in TS 36.101 [42]. E-UTRAN configures the same value in `additionalSpectrumEmissionSCell` for all SCell(s) of the same band with UL configured. The `additionalSpectrumEmissionSCell` is applicable for all serving cells (including PCell) of the same band with UL configured.

**defaultPagingCycle**
Default paging cycle, used to derive ‘T’ in TS 36.304 [4]. Value rf32 corresponds to 32 radio frames, rf64 corresponds to 64 radio frames and so on.

**dummy**
This field is not used in the specification. If received it shall be ignored by the UE.

**interval-DLHoppingConfigCommonModeX**
Number of consecutive absolute subframes over which MPDCCH or PDSCH for CE mode X stays at the same narrowband before hopping to another narrowband. For interval-FDD, int1 corresponds to 1 subframe, int2 corresponds to 2 subframes, and so on. For interval-TDD, int1 corresponds to 1 subframe, int5 corresponds to 5 subframes, and so on.

**interval-ULHoppingConfigCommonModeX**
Number of consecutive absolute subframes over which PUCCH or PUSCH for CE mode X stays at the same narrowband before hopping to another narrowband. For interval-FDD, int1 corresponds to 1 subframe, int2 corresponds to 2 subframes, and so on. For interval-TDD, int1 corresponds to 1 subframe, int5 corresponds to 5 subframes, and so on.

**modificationPeriodCoeff**
Actual modification period, expressed in number of radio frames = `modificationPeriodCoeff` * `defaultPagingCycle`. `n2` corresponds to value 2, `n4` corresponds to value 4, `n8` corresponds to value 8, `n16` corresponds to value 16, and `n64` corresponds to value 64.

**mpdcch-NumRepetition-Paging**
Maximum number of repetitions for MPDCCH common search space (CSS) for paging, see TS 36.211 [21].

**mpdcch-pdsch-HoppingOffset**
Parameter: `f_{DL, hop}^nB`, see TS 36.211 [21, 6.4.1].

**mpdcch-pdsch-HoppingNB**
The number of narrowbands for MPDCCH/PDSCH frequency hopping. Value `nb2` corresponds to 2 narrowbands and value `nb4` corresponds to 4 narrowbands.

**nB**
Parameter: `nB` is used as one of parameters to derive the Paging Frame and Paging Occasion according to TS 36.304 [4]. Value in multiples of ‘T’ as defined in TS 36.304 [4]. A value of fourT corresponds to 4 * T, a value of twoT corresponds to 2 * T and so on. In case `nB-v1310` is signalled, the UE shall ignore `nB` (i.e. without suffix). EUTRAN configures `nB-v1310` only in the BR version of SI message.

**paging-narrowBands**
Number of narrowbands used for paging, see TS 36.304 [4], TS 36.212 [22] and TS 36.213 [23].

**p-Max**
Pmax to be used in the target cell. If absent, for the band used in the target cell, the UE applies the maximum power according to its capability as specified in 36.101 [42], 6.2.2. In case the UE is configured with uplink intra-band contiguous CA and the UE indicates `ue-CA-PowerClass-N` in that band combination, then the `p-Max` in `RadioResourceConfigCommonSCell` for that SCell, if present, also applies for that band combination whenever that SCell is activated.

**ul-Bandwidth**
Parameter: transmission bandwidth configuration, NRB, in uplink, see TS 36.101 [42, table 5.6-1]. Value `n6` corresponds to 6 resource blocks, `n15` to 15 resource blocks and so on. If for FDD this parameter is absent, the uplink bandwidth is equal to the downlink bandwidth. For TDD this parameter is absent and it is equal to the downlink bandwidth.

**ul-CarrierFreq**
For FDD: If absent, the (default) value determined from the default TX-RX frequency separation defined in TS 36.101 [42, table 5.7.3-1] applies.
For TDD: This parameter is absent and it is equal to the downlink frequency.

**ul-CyclicPrefixLength**
Parameter: Uplink cyclic prefix length see TS 36.211 [21, 5.2.1] where `len1` corresponds to normal cyclic prefix and `len2` corresponds to extended cyclic prefix.
<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP-A</td>
<td>The field is mandatory present for CE mode A. Otherwise the field is optional. Need OR.</td>
</tr>
<tr>
<td>MP-B</td>
<td>The field is mandatory present for CE mode B. Otherwise the field is optional. Need OR.</td>
</tr>
<tr>
<td>TDD</td>
<td>The field is optional for TDD, Need ON; it is not present for FDD and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>TDD2</td>
<td>If tdd-Config-r10 is present, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>TDD3</td>
<td>If tdd-Config is present, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>TDD-OR-NoR11</td>
<td>If prach-ConfigSCell-r11 is absent, the field is optional for TDD, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>TDDSCell</td>
<td>This field is mandatory present for TDD; it is not present for FDD and LAA SCell, and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>TDD-OR-NoR11</td>
<td>If the SCell is part of the STAG or concerns the PSCell or PUCCH SCell and if ul-Configuration is included, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>UL</td>
<td>If the SCell is part of the STAG or concerns the PSCell or PUCCH SCell and if ul-Configuration is included, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>ULSCell</td>
<td>For the PSCell (IE is included in RadioResourceConfigCommonPSCell) the field is absent. Otherwise, if the SCell is part of the STAG and if ul-Configuration is included, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

---

**RadioResourceConfigDedicated**

The IE *RadioResourceConfigDedicated* is used to setup/modify/release RBs, to modify the MAC main configuration, to modify the SPS configuration and to modify dedicated physical configuration.

### RadioResourceConfigDedicated information element

```
-- ASN1START

RadioResourceConfigDedicated ::= SEQUENCE {
    srb-ToAddModList     SRB-ToAddModList   OPTIONAL,  -- Cond HO-Conn
drb-ToAddModList     DRB-ToAddModList   OPTIONAL,  -- Cond HO-
toEUTRA
    drb-ToReleaseList     DRB-ToReleaseList   OPTIONAL,  -- Need ON
mac-MainConfig      CHOICE {
    explicitValue     MAC-MainConfig,
    defaultValue     NULL
}  OPTIONAL,                -- Cond HO-
toEUTRA2
    sps-Config     SPS-Config     OPTIONAL,  -- Need ON
physicalConfigDedicated PhysicalConfigDedicated OPTIONAL,  -- Need ON
    \[[ rlf-TimersAndConstants-r9  RLF-TimersAndConstants-r9   OPTIONAL -- Need ON
],
    \[[ measSubframePatternPCell-r10 MeasSubframePatternPCell-r10  OPTIONAL -- Need ON
],
    \[[ neighCellsCRS-Info-r11    NeighCellsCRS-Info-r11    OPTIONAL -- Need ON
],
    \[[ naics-Info-r12    NAICS-AssistanceInfo-r12   OPTIONAL -- Need ON
],
    \[[ neighCellsCRS-Info-r13   NeighCellsCRS-Info-r13    OPTIONAL, -- Cond
    CRSIM
    rlf-TimersAndConstants-r13  RLF-TimersAndConstants-r13   OPTIONAL -- Need ON
}]

RadioResourceConfigDedicated-v1370 ::= SEQUENCE {
    physicalConfigDedicated-v1370  PhysicalConfigDedicated-v1370  OPTIONAL -- Need ON
}

RadioResourceConfigDedicated-v13c0 ::= SEQUENCE {
    physicalConfigDedicated-v13c0  PhysicalConfigDedicated-v13c0
}

RadioResourceConfigDedicatedPSCell-r12 ::= SEQUENCE {
    -- UE specific configuration extensions applicable for an PSCell
    physicalConfigDedicatedPSCell-r12 PhysicalConfigDedicated OPTIONAL,  -- Need ON
    sps-Config-r12     SPS-Config     OPTIONAL,  -- Need ON
    naics-Info-r12     NAICS-AssistanceInfo-r12 OPTIONAL,  -- Need ON
    ...,
    \[[ neighCellsCRS-InfoPSCell-r13  NeighCellsCRS-Info-r13  OPTIONAL -- Need ON
}

-- ASN1END
```
RadioResourceConfigDedicatedPSCell-v1370 ::= SEQUENCE {
  physicalConfigDedicatedPSCell-v1370 PhysicalConfigDedicated-v1370 OPTIONAL -- Need ON
}

RadioResourceConfigDedicatedPSCell-v13c0 ::= SEQUENCE {
  physicalConfigDedicatedPSCell-v13c0 PhysicalConfigDedicated-v13c0
}

RadioResourceConfigDedicatedSCG-r12 ::= SEQUENCE {
  drb-ToAddModListSCG-r12 DRB-ToAddModListSCG-r12 OPTIONAL, -- Need ON
  mac-MainConfigSCG-r12 MAC-MainConfig OPTIONAL, -- Need ON
  rlf-TimersAndConstantsSCG-r12 RLF-TimersAndConstantsSCG-r12 OPTIONAL, -- Need ON
  ...
}

RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {
  -- UE specific configuration extensions applicable for an SCell
  physicalConfigDedicatedSCell-r10 PhysicalConfigDedicatedSCell-v1370 OPTIONAL, -- Need ON
  ...
}

RadioResourceConfigDedicatedSCell-v13c0 ::= SEQUENCE {
  physicalConfigDedicatedSCell-v13c0 PhysicalConfigDedicatedSCell-v13c0
}

SRB-ToAddModList ::= SEQUENCE (SIZE (1..2)) OF SRB-ToAddMod

SRB-ToAddMod ::= SEQUENCE {
  srb-Identity      INTEGER (1..2),
  rlc-Config       CHOICE {
    explicitValue      RLC-Config,
    defaultValue      NULL
  }  OPTIONAL,                -- Cond Setup
  logicalChannelConfig    CHOICE {
    explicitValue      LogicalChannelConfig,
    defaultValue      NULL
  }  OPTIONAL,                -- Cond Setup
  ...
}

DRB-ToAddModList ::= SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddMod

DRB-ToAddMod ::= SEQUENCE {
  eps-BearerIdentity     INTEGER (0..15)   OPTIONAL,  -- Cond DRB-Setup
  db-Identity             DRB-Identity,
  pdcp-Config             PDCP-Config    OPTIONAL,  -- Cond PDCP
  rlc-Config              RLC-Config    OPTIONAL,  -- Cond SetupM
  logicalChannelIdentity    INTEGER (3..10)   OPTIONAL,  -- Cond DRB-SetupM
  logicalChannelConfig    LogicalChannelConfig OPTIONAL, -- Cond SetupM
  ...
}

DRB-ToAddMod ::= SEQUENCE {
  drb-TypeLWA-r13      BOOLEAN     OPTIONAL,  -- Need ON
  drb-TypeLWIP-r13     ENUMERATED {lwip, lwip-DL-only, lwip-UL-only, eutran}  OPTIONAL  -- Need ON
}

DRB-ToAddModListSCG-r12 ::= SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddModSCG-r12

DRB-ToAddModSCG-r12 ::= SEQUENCE {
  drb-Identity-r12     DRB-Identity,
  drb-Type-r12      CHOICE {
    ENUMERATED {toMCG}  OPTIONAL,  -- Need OP
    RLC-Config-v1250 RLC-Config-v1250  OPTIONAL  -- Need ON
  },
  ...
}

DRB-ToAddModList ::= SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddMod
split-r12
scg-r12  NULL,
  eps-BearerIdentity-r12  INTEGER (0..15) OPTIONAL, -- Cond DRB-Setup
  pdcp-Config-r12  PDCP-Config OPTIONAL, -- Cond PDCP-S
  }
rc-configSCG-r12  RLC-Config OPTIONAL, -- Cond SetupS2
rc-config-v1250  RLC-Config-v1250 OPTIONAL, -- Need ON
logicalChannelIdentitySCG-r12  INTEGER (3..10) OPTIONAL, -- Cond DRB-SetupS
logicalChannelConfigSCG-r12  LogicalChannelConfig OPTIONAL, -- Cond SetupS

DRB-ToReleaseList ::=  SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity
MeasSubframePatternPCell-r10 ::=  CHOICE {
  release  NULL,
  setup  MeasSubframePattern-r10
}
NeighCellsCRS-Info-r11 ::=  CHOICE {
  release  NULL,
  setup  CRS-AssistanceInfoList-r11
}
CRS-AssistanceInfoList-r11 ::=  SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11
CRS-AssistanceInfo-r11 ::=  SEQUENCE {
  physCellId-r11  PhysCellId,
  antennaPortsCount-r11  ENUMERATED {an1, an2, an4, spare1},
  mbsfn-SubframeConfigList-r11  MBSFN-SubframeConfigList,
  ...
}
NeighCellsCRS-Info-r13 ::=  CHOICE {
  release  NULL,
  setup  CRS-AssistanceInfoList-r13
}
CRS-AssistanceInfoList-r13 ::=  SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r13
CRS-AssistanceInfo-r13 ::=  SEQUENCE {
  physCellId-r13  PhysCellId,
  antennaPortsCount-r13  ENUMERATED {an1, an2, an4, spare1},
  mbsfn-SubframeConfigList-r13  MBSFN-SubframeConfigList OPTIONAL, -- Need ON
  ...
}
NAICS-AssistanceInfo-r12 ::=  CHOICE {
  release  NULL,
  setup  SEQUENCE {
    neighCellsToReleaseList-r12  NeighCellsToReleaseList-r12 OPTIONAL, -- Need ON
    neighCellsToAddModList-r12  NeighCellsToAddModList-r12 OPTIONAL, -- Need ON
    servCellp-a-r12  P-a OPTIONAL -- Need ON
  }
}
NeighCellsToReleaseList-r12 ::=  SEQUENCE (SIZE (1..maxNeighCell-r12)) OF PhysCellId
NeighCellsToAddModList-r12 ::=  SEQUENCE (SIZE (1..maxNeighCell-r12)) OF NeighCellsInfo-r12
NeighCellsInfo-r12 ::=  SEQUENCE {
  physCellId-r12  PhysCellId,
  P-b-r12  INTEGER (0..3),
  crs-PortsCount-r12  ENUMERATED {n1, n2, n4, spare},
  mbsfn-SubframeConfigList-r12  MBSFN-SubframeConfigList OPTIONAL, -- Need ON
  p-alist-r12  SEQUENCE (SIZE (1..maxP-a-PerNeighCell-r12)) OF P-a,
  transmissionModeList-r12  BIT STRING (SIZE(8)),
  resAllocGranularity-r12  INTEGER (1..4),
  ...
  P-a ::= ENUMERATED { dB-6, dB-4dot77, dB-3, dB-1dot77,
    dB0, dB1, dB2, dB3}
  -- ASN1STOP
### RadioResourceConfigDedicated field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>crs-PortsCount</td>
<td>Parameter represents the number of antenna ports for cell-specific reference signal used by the signaled neighboring cell where n1 corresponds to 1 antenna port, n2 to 2 antenna ports etc. see TS 36.211 [21, 6.10.1].</td>
</tr>
<tr>
<td>drb-Identity</td>
<td>In case of DC, the DRB identity is unique within the scope of the UE i.e. an SCG DRB cannot use the same value as used for an MCG or split DRB. For a split DRB the same identity is used for the MCG- and SCG parts of the configuration.</td>
</tr>
<tr>
<td>drb-ToAddModListSCG</td>
<td>When an SCG is configured, E-UTRAN configures at least one SCG or split DRB.</td>
</tr>
<tr>
<td>drb-Type</td>
<td>This field indicates whether the DRB is split or SCG DRB. E-UTRAN does not configure split and SCG DRBs simultaneously for the UE.</td>
</tr>
<tr>
<td>drb-TypeChange</td>
<td>Indicates that a split/SCG DRB is reconfigured to an MCG DRB (i.e. E-UTRAN only signals the field in case the DRB type changes).</td>
</tr>
<tr>
<td>drb-TypeLWA</td>
<td>Indicates whether a DRB is (re)configured as an LWA DRB or an LWA DRB is reconfigured not to use WLAN resources. NOTE 1</td>
</tr>
<tr>
<td>drb-TypeLWIP</td>
<td>Indicates whether a DRB is (re)configured to use LWIP Tunnel in UL and DL (value lwip), DL only (value lwip-DL-only), UL only (value lwip-UL-only) or not to use LWIP Tunnel (value eutran).</td>
</tr>
<tr>
<td>logicalChannelConfig</td>
<td>For SRBs a choice is used to indicate whether the logical channel configuration is signalled explicitly or set to the default logical channel configuration for SRB1 as specified in 9.2.1.1 or for SRB2 as specified in 9.2.1.2.</td>
</tr>
<tr>
<td>logicalChannelIdentity</td>
<td>The logical channel identity for both UL and DL.</td>
</tr>
<tr>
<td>mac-MainConfig</td>
<td>Although the ASN.1 includes a choice that is used to indicate whether the mac-MainConfig is signalled explicitly or set to the default MAC main configuration as specified in 9.2.2, EUTRAN does not apply &quot;defaultValue&quot;.</td>
</tr>
<tr>
<td>mbsfn-SubframeConfig</td>
<td>Defines the MBSFN subframe configuration used by the signaled neighboring cell. If absent, UE assumes no MBSFN configuration for the neighboring cell.</td>
</tr>
<tr>
<td>measSubframePatternPCell</td>
<td>Time domain measurement resource restriction pattern for the PCell measurements (RSRP, RSRQ and the radio link monitoring).</td>
</tr>
<tr>
<td>neighCellsCRS-Info, neighCellsCRS-InfoSCell, neighCellsCRS-InfoPSCell</td>
<td>This field contains assistance information used by the UE to mitigate interference from CRS while performing RRM/RLM/CSI measurement or data demodulation or DL control channel demodulation. When the received CRS assistance information is for a cell with CRS non-colliding with that of the CRS of the cell to measure, the UE may use the CRS assistance information to mitigate CRS interference. When the received CRS assistance information is for a cell with CRS colliding with that of the CRS of the cell to measure, the UE may use the CRS assistance information to mitigate CRS interference RRM/RLM (as specified in TS 36.133 [16]) and for CSI (as specified in TS 36.101 [42]) on the subframes indicated by measSubframePatternPCell, measSubframePatternConfigNeigh, csi-MeasSubframeSet1 if configured, and the CSI subframe set 1 if csi-MeasSubframeSets-r12 is configured. The UE may use CRS assistance information to mitigate CRS interference from the cells in the CRS-AssistanceInfoList for the demodulation purpose or DL control channel demodulation as specified in TS 36.101 [42]. EUTRAN does not configure neighCellsCRS-Info-r11 or neighCellsCRS-Info-r13 if eimta-MainConfigPCell-r12 is configured.</td>
</tr>
<tr>
<td>neighCellsToAddModList</td>
<td>This field contains assistance information used by the UE to cancel and suppress interference of a neighbouring cell.</td>
</tr>
<tr>
<td>p-aList</td>
<td>Indicates the restricted subset of power offset for QPSK, 16QAM, and 64QAM PDSCH transmissions for the neighbouring cell by using the parameter $P_A$, see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4dot77 corresponds to -4.77 dB etc.</td>
</tr>
<tr>
<td>p-b</td>
<td>Parameter: $P_P$, indicates the cell-specific ratio used by the signaled neighboring cell, see TS 36.213 [23, Table 5.2-1].</td>
</tr>
<tr>
<td>physicalConfigDedicated</td>
<td>The default dedicated physical configuration is specified in 9.2.4.</td>
</tr>
<tr>
<td>resAllocGranularity</td>
<td>Indicates the resource allocation and precoding granularity in PRB pair level of the signaled neighboring cell, see TS 36.213 [23, 7.1.6].</td>
</tr>
</tbody>
</table>
### RadioResourceConfigDedicated field descriptions

**rlc-Config**
For SRBs a choice is used to indicate whether the RLC configuration is signalled explicitly or set to the values defined in the default RLC configuration for SRB1 in 9.2.1.1 or for SRB2 in 9.2.1.2. RLC AM is the only applicable RLC mode for SRB1 and SRB2. E-UTRAN does not reconfigure the RLC mode of DRBs except when a full configuration option is used, and may reconfigure the RLC SN field size and the AM RLC LI field size only upon handover within E-UTRA or upon the first reconfiguration after RRC connection re-establishment or upon SCG Change for SCG and split DRBs.

**servCellp-a**
Indicates the power offset for QPSK C-RNTI based PDSCH transmissions used by the serving cell, see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4dot77 corresponds to -4.77 dB etc.

**sps-Config**
The default SPS configuration is specified in 9.2.3. Except for handover or releasing SPS for MCG, E-UTRAN does not reconfigure sps-Config for MCG when there is a configured downlink assignment or a configured uplink grant for MCG (see TS 36.321 [6]). Except for SCG change or releasing SPS for SCG, E-UTRAN does not reconfigure sps-Config for SCG when there is a configured downlink assignment or a configured uplink grant for SCG (see TS 36.321 [6]).

**srb-Identity**
Value 1 is applicable for SRB1 only.
Value 2 is applicable for SRB2 only.

**transmissionModeList**
Indicates a subset of transmission mode 1, 2, 3, 4, 6, 8, 9, 10, for the signaled neighboring cell for which NeighCellsInfo applies. When TM10 is signaled, other signaled transmission parameters in NeighCellsInfo are not applicable to up to 8 layer transmission scheme of TM10. E-UTRAN may indicate TM9 when TM10 with QCL type A and DMRS scrambling with $\beta_{\text{cell}} = N_{\beta_{\text{cell}}}$ in TS 36.211 [21, 6.10.3.1] is used in the signalled neighbour cell and TM9 or TM10 with QCL type A and DMRS scrambling with $\beta_{\text{cell}} = N_{\beta_{\text{cell}}}$ in TS 36.211 [21, 6.10.3.1] is used in the serving cell. UE behaviour with NAICS when TM10 is used is only defined when QCL type A and DMRS scrambling with $\beta_{\text{cell}} = N_{\beta_{\text{cell}}}$ in TS 36.211 [21, 6.10.3.1] is used for the serving cell and all signalled neighbour cells. The first/ leftmost bit is for transmission mode 1, the second bit is for transmission mode 2, and so on.
### Conditional presence

<table>
<thead>
<tr>
<th>Presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CRSIM</strong></td>
<td>The field is optionally present, need ON, if <code>neighCellsCRS-Info-r11</code> is not present; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>DRB-Setup</strong></td>
<td>The field is mandatory present if the corresponding DRB is being set up; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>DRB-SetupM</strong></td>
<td>The field is mandatory present upon setup of MCG or split DRB; The field is optionally present, Need ON, upon change from SCG to MCG DRB; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>DRB-SetupS</strong></td>
<td>The field is mandatory present upon setup of SCG or split DRB, or upon change from MCG to split DRB; The field is optionally present, Need ON, upon change from MCG to SCG DRB; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>HO-Conn</strong></td>
<td>The field is mandatory present in case of handover to E-UTRA or when the <code>fullConfig</code> is included in the <code>RRCConnectionReconfiguration</code> message or in case of RRC connection establishment (excluding <code>RRCConnectionResume</code>); otherwise the field is optionally present, need ON. Upon connection establishment/ re-establishment only SRB1 is applicable (excluding <code>RRCConnectionResume</code>).</td>
</tr>
<tr>
<td><strong>HO-toEUTRA</strong></td>
<td>The field is mandatory present in case of handover to E-UTRA or when the <code>fullConfig</code> is included in the <code>RRCConnectionReconfiguration</code> message; In case of RRC connection establishment (excluding <code>RRCConnectionResume</code>); and RRC connection re-establishment the field is not present; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td><strong>HO-toEUTRA2</strong></td>
<td>The field is mandatory present in case of handover to E-UTRA or when the <code>fullConfig</code> is included in the <code>RRCConnectionReconfiguration</code> message; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td><strong>PDCP</strong></td>
<td>The field is mandatory present if the corresponding DRB is being setup; the field is optionally present, need ON, upon reconfiguration of the corresponding split DRB or LWA DRB, upon the corresponding DRB type change from split to MCG bearer, upon the corresponding DRB type change from MCG to split bearer or LWA bearer, upon the corresponding DRB type change from LWA to LTE only bearer, upon handover within E-UTRA and upon the first reconfiguration after re-establishment but in all these cases only when <code>fullConfig</code> is not included in the <code>RRCConnectionReconfiguration</code> message; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>PDCP-S</strong></td>
<td>The field is mandatory present if the corresponding DRB is being setup; the field is optionally present, need ON, upon SCG change; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>RLC-Setup</strong></td>
<td>This field is optionally present if the corresponding DRB is being setup, need ON; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>SCellAdd</strong></td>
<td>The field is optionally present, need ON, upon SCell addition; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>Setup</strong></td>
<td>The field is mandatory present if the corresponding SRB/DRB is being setup; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td><strong>SetupM</strong></td>
<td>The field is mandatory present upon setup of an MCG or split DRB; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td><strong>SetupS</strong></td>
<td>The field is mandatory present upon setup of an SCG or split DRB, as well as upon change from MCG to split DRB; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td><strong>SetupS2</strong></td>
<td>The field is mandatory present upon setup of an SCG or split DRB, as well as upon change from MCG to split or SCG DRB. For an SCG DRB the field is optionally present, need ON. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

**NOTE 1:** It is up to eNB to ensure that the field indicating LWA bearer type is set to FALSE when LWA bearer is no longer used (e.g. during handover or re-establishment where LWA configuration is released).

### RCLWI-Configuration

The IE `RCLWI-Configuration` is used to add, modify or release the RCLWI configuration.

```asn1
RCLWI-Configuration-r13 ::=   CHOICE {
    release        NULL,
    setup        SEQUENCE {
        rclwi-Config-r13     RCLWI-Config-r13
    }
}

RCLWI-Config-r13 ::=    SEQUENCE {
    command        CHOICE {
        steerToWLAN-r13      SEQUENCE {
            mobilityConfig-r13     WLAN-Id-List-r12
        } redirectToWLAN-r13
    }
}"
```
-- RLC-Config

The IE RLC-Config is used to specify the RLC configuration of SRBs and DRBs.

RLC-Config information element

```asn1
RLC-Config ::= CHOICE {
  am         SEQUENCE {
    ul-AM-RLC       UL-AM-RLC,
    dl-AM-RLC       DL-AM-RLC
  },
  um-Bi-Directional  SEQUENCE {
    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
  },
  ...
}

RLC-Config-v1250 ::= SEQUENCE {
  ul-extended-RLC-L1-Field-r12   BOOLEAN,
  dl-extended-RLC-L1-Field-r12   BOOLEAN
}

RLC-Config-v1310 ::= SEQUENCE {
  ul-extended-RLC-AM-SN-r13     BOOLEAN,
  dl-extended-RLC-AM-SN-r13     BOOLEAN,
  pollPDU-v1310        PollPDU-v1310  OPTIONAL -- Need OR
}

UL-AM-RLC ::= SEQUENCE {
  t-PollRetransmit     T-PollRetransmit,
  pollPDU        PollPDU,
  pollByte       PollByte,
  maxRetxThreshold     ENUMERATED {
    t1, t2, t3, t4, t6, t8, t16, t32
  }
}

DL-AM-RLC ::= SEQUENCE {
  t-Reordering      T-Reordering,
  t-StatusProhibit     T-StatusProhibit
}

UL-UM-RLC ::= SEQUENCE {
  sn-FieldLength      SN-FieldLength
}

DL-UM-RLC ::= SEQUENCE {
  sn-FieldLength      SN-FieldLength,
  t-Reordering      T-Reordering
}

SN-FieldLength ::= ENUMERATED {size5, size10}

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,
  ...}
```


### RLC-Config field descriptions

**dl-extended-RLC-LI-Field, ul-extended-RLC-LI-Field**
Indicates the RLC LI field size. Value `TRUE` means that 15 bit LI length shall be used, otherwise 11 bit LI length shall be used; see TS 36.322 [7]. E-UTRAN enables this field only when `RLC-Config` (without suffix) is set to `am`.

**maxRetxThreshold**
Parameter for RLC AM in TS 36.322 [7]. Value t1 corresponds to 1 retransmission, t2 to 2 retransmissions and so on.

**pollByte**
Parameter for RLC AM in TS 36.322 [7]. Value kB25 corresponds to 25 kBytes, kB50 to 50 kBytes and so on. kBInfinity corresponds to an infinite amount of kBytes.

**pollPDU**
Parameter for RLC AM in TS 36.322 [7]. Value p4 corresponds to 4 PDUs, p8 to 8 PDUs and so on. pInfinity corresponds to an infinite number of PDUs. In case `pollPDU-v1310` is signalled, the UE shall ignore `pollPDU` (i.e. without suffix). E-UTRAN enables `pollPDU-v1310` field only when `RLC-Config` (without suffix) is set to `am`.

**sn-FieldLength**
Indicates the UM RLC SN field size, see TS 36.322 [7], in bits. Value size5 means 5 bits, size10 means 10 bits.

**t-PollRetransmit**
Timer for RLC AM in TS 36.322 [7], in milliseconds. Value ms5 means 5ms, ms10 means 10ms and so on. EUTRAN configures values msX-v1310 (with suffix) only if UE supports CE.

**t-Reordering**
Timer for reordering in TS 36.322 [7], in milliseconds. Value ms0 means 0ms and behaviour as specified in 7.3.2 applies, ms5 means 5ms and so on.

**t-StatusProhibit**
Timer for status reporting in TS 36.322 [7], in milliseconds. Value ms0 means 0ms and behaviour as specified in 7.3.2 applies, ms5 means 5ms and so on. EUTRAN configures values msX-v1310 (with suffix) only if UE supports operation in CE.

**ul-extended-RLC-AM-SN, dl-extended-RLC-AM-SN**
Indicates whether or not the UE shall use the extended SN and SO length for AM bearer. Value `TRUE` means that 16 bit SN length and 16 bit SO length shall be used, otherwise 10 bit SN length and 15 bit SO length shall be used; see TS 36.322 [7].

---

**ETSI**
**– RLF-TimersAndConstants**

The IE *RLF-TimersAndConstants* contains UE specific timers and constants applicable for UEs in RRC_CONNECTED.

**RLF-TimersAndConstants information element**

```asn1
-- ASN1START
RLF-TimersAndConstants-r9 ::=  CHOICE {
  release         NULL,
  setup         SEQUENCE {
    t301-r9        ENUMERATED {
      ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000},
    t310-r9        ENUMERATED {
      ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
    n310-r9        ENUMERATED {
      n1, n2, n3, n4, n6, n8, n10, n20},
    t311-r9        ENUMERATED {
      ms1000, ms3000, ms5000, ms10000, ms15000, ms20000, ms30000},
    n311-r9        ENUMERATED {
      n1, n2, n3, n4, n5, n6, n8, n10},
    ...,
  }
}
RLF-TimersAndConstants-r13 ::=  CHOICE {
  release         NULL,
  setup         SEQUENCE {
    t301-v1310       ENUMERATED {
      ms2500, ms3000, ms3500, ms4000, ms5000, ms6000, ms8000, ms10000},
    ...,
    t310-v1330       ENUMERATED {ms4000, ms6000} OPTIONAL -- Need ON
  }
}
RLF-TimersAndConstantsSCG-r12 ::=  CHOICE {
  release        NULL,
  setup        SEQUENCE {
    t313-r12       ENUMERATED {
      ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
    n313-r12       ENUMERATED {
      n1, n2, n3, n4, n6, n8, n10, n20},
    n314-r12       ENUMERATED {
      n1, n2, n3, n4, n5, n6, n8, n10},
    ...,
  }
}
-- ASN1STOP
```

**RLF-TimersAndConstants field descriptions**

- **n3xy**
  Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on.

- **t3xy**
  Timers are described in section 7.3. Value ms0 corresponds with 0 ms, ms50 corresponds with 50 ms and so on. E-UTRAN configures *RLF-TimersAndConstants-r13* only if UE supports ce-ModeB. UE shall use the extended values t3xy-v1310 and t3xy-v1330, if present, and ignore the values signaled by t3xy-r9.

**– RN-SubframeConfig**

The IE *RN-SubframeConfig* is used to specify the subframe configuration for an RN.

**RN-SubframeConfig information element**

```asn1
-- ASN1START
RN-SubframeConfig-r10 ::=  SEQUENCE {
```

---

**ETSI**
subframeConfigPattern-r10  CHOICE {
  subframeConfigPatternFDD-r10  BIT STRING (SIZE(8)),
  subframeConfigPatternTDD-r10  INTEGER (0..31)
}                 OPTIONAL, -- Need ON
rpdcch-Config-r10  SEQUENCE {
  resourceAllocationType-r10  ENUMERATED {type0, type1, type2Localized, type2Distributed, spare4, spare3, spare2, spare1},
  resourceBlockAssignment-r10  CHOICE {
    type01-r10  CHOICE {
      nrb6-r10  BIT STRING (SIZE(6)),
      nrb15-r10  BIT STRING (SIZE(8)),
      nrb25-r10  BIT STRING (SIZE(13)),
      nrb50-r10  BIT STRING (SIZE(17)),
      nrb75-r10  BIT STRING (SIZE(19)),
      nrb100-r10  BIT STRING (SIZE(25))
    },
    type2-r10  CHOICE {
      nrb6-r10  BIT STRING (SIZE(5)),
      nrb15-r10  BIT STRING (SIZE(7)),
      nrb25-r10  BIT STRING (SIZE(9)),
      nrb50-r10  BIT STRING (SIZE(11)),
      nrb75-r10  BIT STRING (SIZE(12)),
      nrb100-r10  BIT STRING (SIZE(13))
    },
    ...
  },
  demodulationRS-r10  CHOICE {
    interleaving-r10  ENUMERATED {crs},
    noInterleaving-r10  ENUMERATED {crs, dmrs}
  },
  pdsch-Start-r10  INTEGER (1..3),
  pucch-Config-r10  CHOICE {
    tdd  CHOICE {
      n1PUCCH-AN-List-r10  SEQUENCE (SIZE (1..4)) OF INTEGER (0..2047)
    },
    fallbackForFormat3  SEQUENCE {
      n1PUCCH-AN-P0-r10  INTEGER (0..2047),
      n1PUCCH-AN-P1-r10  INTEGER (0..2047)  OPTIONAL -- Need OR
    },
    fdd  SEQUENCE {
      n1PUCCH-AN-P0-r10  INTEGER (0..2047),
      n1PUCCH-AN-P1-r10  INTEGER (0..2047)  OPTIONAL -- Need OR
    },
    ...
  }                 OPTIONAL, -- Need ON
-- ASN1STOP
**RN-SubframeConfig** field descriptions

**demodulationRS**
Indicates which reference signals are used for R-PDCCH demodulation according to TS 36.216 [55, 7.4.1]. Value interleave corresponds to cross-interleaving and value noInterleave corresponds to no cross-interleaving according to TS 36.216 [55, 7.4.2 and 7.4.3].

**n1PUCCH-AN-List**
Parameter: $n_{PUCCH}^{(1)}$, see TS 36.216, [55, 7.5.1]. This parameter is only applicable for TDD. Configures PUCCH HARQ-ACK resources if the RN is configured to use HARQ-ACK channel selection, HARQ-ACK multiplexing or HARQ-ACK bundling.

**n1PUCCH-AN-P0, n1PUCCH-AN-P1**
Parameter: $n_{PUCCH}^{(1)}$, for antenna port P0 and for antenna port P1 respectively, see TS 36.216, [55, 7.5.1] for FDD and [55, 7.5.2] for TDD.

**pdsch-Start**
Parameter: DL-StartSymbol, see TS 36.216 [55, Table 5.4-1].

**resourceAllocationType**
Represents the resource allocation used: type 0, type 1 or type 2 according to TS 36.213 [23, 7.1.6]. Value type0 corresponds to type 0, value type1 corresponds to type 1, value type2Localized corresponds to type 2 with localized virtual resource blocks and type2Distributed corresponds to type 2 with distributed virtual resource blocks.

**resourceBlockAssignment**
Indicates the resource block assignment bits according to TS 36.213 [23, 7.1.6]. Value type01 corresponds to type 0 and type 1, and the value type2 corresponds to type 2. Value nrb6 corresponds to a downlink system bandwidth of 6 resource blocks, value nrb15 corresponds to a downlink system bandwidth of 15 resource blocks, and so on.

**subframeConfigPatternFDD**
Parameter: SubframeConfigurationFDD, see TS 36.216 [55, Table 5.2-1]. Defines the DL subframe configuration for eNB-to-RN transmission, i.e. those subframes in which the eNB may indicate downlink assignments for the RN. The radio frame in which the pattern starts (i.e. the radio frame in which the first bit of the subframeConfigPatternFDD corresponds to subframe #0) occurs when SFN mod 4 = 0.

**subframeConfigPatternTDD**
Parameter: SubframeConfigurationTDD, see TS 36.216 [55, Table 5.2-2]. Defines the DL and UL subframe configuration for eNB-RN transmission.

---

**SchedulingRequestConfig**

The IE SchedulingRequestConfig is used to specify the Scheduling Request related parameters

**SchedulingRequestConfig information element**

```
-- ASN1START
SchedulingRequestConfig ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    sr-PUCCH-ResourceIdex INDEX (0..2047),
    sr-ConfigIndex INDEX (0..157),
    dsr-TransMax ENUMERATED {
      n4, n8, n16, n32, n64, spare3, spare2, spare1
    }
  }
}
SchedulingRequestConfig-v1020 ::= SEQUENCE {
  sr-PUCCH-ResourceIdexP1-r10 INDEX (0..2047) OPTIONAL -- Need OR
}
SchedulingRequestConfigSCell-r13 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    sr-PUCCH-ResourceIdex-r13 INDEX (0..2047),
    sr-PUCCH-ResourceIdexP1-r13 INDEX (0..2047) OPTIONAL, -- Need OR
    sr-ConfigIndex-r13 INDEX (0..157),
    dsr-TransMax-r13 ENUMERATED {
      n4, n8, n16, n32, n64, spare3, spare2, spare1
    }
  }
}
-- ASN1STOP
```
SchedulingRequestConfig field descriptions

ds-TransMax
Parameter for SR transmission in TS 36.321 [6, 5.4.4]. The value n4 corresponds to 4 transmissions, n8 corresponds to 8 transmissions and so on. EUTRAN configures the same value for all serving cells for which this field is configured.

sr-ConfigIndex
Parameter $I_{SR}$. See TS 36.213 [23,10.1]. The values 156 and 157 are not applicable for Release 8.

sr-PUCCH-ResourceIndex, sr-PUCCH-ResourceIndexP1
Parameter: $n^{(L,P)}_{PUCCHSR}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1]. EUTRAN configures sr-PUCCH-ResourceIndexP1 only if sr-PUCCHResourceIndex is configured.

—

SoundingRS-UL-Config

The IE SoundingRS-UL-Config is used to specify the uplink Sounding RS configuration for periodic and aperiodic sounding.

SoundingRS-UL-Config information element

```asn1
-- ASN1START
SoundingRS-UL-ConfigCommon ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    srs-BandwidthConfig ENUMERATED (bw0, bw1, bw2, bw3, bw4, bw5, bw6, bw7),
    srs-SubframeConfig ENUMERATED (sc0, sc1, sc2, sc3, sc4, sc5, sc6, sc7, sc8, sc9, sc10, sc11, sc12, sc13, sc14, sc15),
    ackNackSRS-SimultaneousTransmission BOOLEAN,
    srs-MaxUpPts ENUMERATED (true) OPTIONAL -- Cond TDD
  }
}
SoundingRS-UL-ConfigDedicated ::= CHOICE{
  release NULL,
  setup SEQUENCE {
    srs-Bandwidth ENUMERATED (bw0, bw1, bw2, bw3),
    srs-HoppingBandwidth ENUMERATED (hbw0, hbw1, hbw2, hbw3),
    freqDomainPosition INTEGER (0..23),
    duration BOOLEAN,
    srs-ConfigIndex INTEGER (0..1023),
    transmissionComb INTEGER (0..1),
    cyclicShift ENUMERATED (cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7)
  }
}
SoundingRS-UL-ConfigDedicated-v1020 ::= SEQUENCE {
  srs-AntennaPort-r10 SRS-AntennaPort
}
SoundingRS-UL-ConfigDedicated-v1310 ::= CHOICE{
  release NULL,
  setup SEQUENCE {
    transmissionComb-v1310 INTEGER (2..3) OPTIONAL, -- Need OR
    cyclicShift-v1310 ENUMERATED (cs8, cs9, cs10, cs11) OPTIONAL, -- Need OR
    transmissionCombNum-r13 ENUMERATED (n2, n4) OPTIONAL -- Need OR
  }
}
SoundingRS-UL-ConfigDedicatedUpPtsExt-r13 ::= CHOICE{
  release NULL,
  setup SEQUENCE {
    srs-UpPtsAdd-r13 ENUMERATED (sym2, sym4),
    srs-Bandwidth-r13 ENUMERATED (bw0, bw1, bw2, bw3),
    srs-HoppingBandwidth-r13 ENUMERATED (hbw0, hbw1, hbw2, hbw3),
    freqDomainPosition-r13 INTEGER (0..23),
    duration-r13 BOOLEAN,
    srs-ConfigIndex-r13 INTEGER (0..1023),
    transmissionComb-r13 INTEGER (0..3),
    cyclicShift-r13 ENUMERATED (cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, cs8, cs9, cs10, cs11),
    srs-AntennaPort-r13 SRS-AntennaPort,
    transmissionCombNum-r13 ENUMERATED (n2, n4)
}
-- ASN1END
```
SoundingRS-UL-ConfigDedicatedAperiodic-r10 ::= CHOICE{
  release        NULL,
  setup        SEQUENCE {
    srs-ConfigIndexAp-r10    INTEGER (0..31),
    srs-ConfigApDCI-Format4-r10   SEQUENCE (SIZE (1..3)) OF SRS-ConfigAp-r10 OPTIONAL,--
  }                 OPTIONAL -- Need ON
}

SoundingRS-UL-ConfigDedicatedAperiodic-v1310 ::= CHOICE{
  release        NULL,
  setup        SEQUENCE {
    srs-ConfigApDCI-Format4-v1310  SEQUENCE (SIZE (1..3)) OF SRS-ConfigAp-v1310
    srs-ActivateAp-v1310    CHOICE {
       release       NULL,
       setup       SEQUENCE {
          srs-ConfigApDCI-Format0-v1310  SRS-ConfigAp-v1310 OPTIONAL, -- Need ON
          srs-ConfigApDCI-Format1a2b2c-v1310 SRS-ConfigAp-v1310 OPTIONAL -- Need ON
       }                 OPTIONAL -- Need ON
  }                 OPTIONAL -- Need ON
}

SoundingRS-UL-ConfigDedicatedAperiodicUpPtsExt-r13 ::= CHOICE{
  release        NULL,
  setup        SEQUENCE {
    srs-UpPtsAdd-r13     ENUMERATED {sym2, sym4},
    srs-ConfigIndexAp-r13    INTEGER (0..31),
    srs-ConfigApDCI-Format4-r13   SEQUENCE (SIZE (1..3)) OF SRS-ConfigAp-r13 OPTIONAL,--
  }                 OPTIONAL -- Need ON
}

SRS-ConfigAp-r10 ::= SEQUENCE {
  srs-AntennaPortAp-r10    SRS-AntennaPort,
  srs-BandwidthAp-r10     ENUMERATED {bw0, bw1, bw2, bw3},
  freqDomainPositionAp-r10   INTEGER (0..23),
  transmissionCombAp-r10    INTEGER (0..1),
  cyclicShiftAp-r10   ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7}
}

SRS-ConfigAp-v1310 ::= SEQUENCE {
  transmissionCombAp-v1310   INTEGER (2..3)      OPTIONAL, -- Need OR
  cyclicShiftAp-v1310   ENUMERATED {cs8, cs9, cs10, cs11} OPTIONAL, -- Need OR
  transmissionCombNum-r13   ENUMERATED {n2, n4}   OPTIONAL -- Need OR
}

SRS-ConfigAp-r13 ::= SEQUENCE {
  srs-AntennaPortAp-r13    SRS-AntennaPort,
  srs-BandwidthAp-r13     ENUMERATED {bw0, bw1, bw2, bw3},
  freqDomainPositionAp-r13   INTEGER (0..23),
  transmissionCombAp-r13    INTEGER (0..3),
  cyclicShiftAp-r13   ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, cs8, cs9, cs10, cs11},
  transmissionCombNum-r13   ENUMERATED {n2, n4}
}

SRS-AntennaPort ::=     ENUMERATED {an1, an2, an4, spare1}
### SoundingRS-UL-Config field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ackNackSRS-SimultaneousTransmission</strong></td>
<td>Parameter: Simultaneous-AN-and-SRS, see TS 36.213 [23, 8.2]. For SCells without PUCCH configured, this field is not applicable and the UE shall ignore the value.</td>
<td></td>
</tr>
<tr>
<td><strong>cyclicShift, cyclicShiftAp</strong></td>
<td>Parameter: n, SRS for periodic and aperiodic sounding reference signal transmission respectively. See TS 36.211 [21, 5.5.3.1], where cs0 corresponds to 0 etc.</td>
<td></td>
</tr>
<tr>
<td><strong>duration</strong></td>
<td>Parameter: Duration for periodic sounding reference signal transmission. See TS 36.213 [21, 8.2]. FALSE corresponds to &quot;single&quot; and value TRUE to &quot;indefinite&quot;.</td>
<td></td>
</tr>
<tr>
<td><strong>freqDomainPosition, freqDomainPositionAp</strong></td>
<td>Parameter: nRRC for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3.2].</td>
<td></td>
</tr>
<tr>
<td><strong>srs-AntennaPort, srs-AntennaPortAp</strong></td>
<td>Indicates the number of antenna ports used for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3], UE shall release srs-AntennaPort if SoundingRS-UL-ConfigDedicated is released.</td>
<td></td>
</tr>
<tr>
<td><strong>srs-Bandwidth, srs-BandwidthAp</strong></td>
<td>Parameter: B, SRS for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, tables 5.5.3.2-1, 5.5.3.2-2, 5.5.3.2-3 and 5.5.3.2-4].</td>
<td></td>
</tr>
<tr>
<td><strong>srs-BandwidthConfig</strong></td>
<td>Parameter: SRS Bandwidth Configuration. See TS 36.211, [21, table 5.5.3.2-1, 5.5.3.2-2, 5.5.3.2-3 and 5.5.3.2-4]. Actual configuration depends on UL bandwidth. bw0 corresponds to value 0, bw1 to value 1 and so on.</td>
<td></td>
</tr>
<tr>
<td><strong>srs-ConfigApDCI-Format0 / srs-ConfigApDCI-Format1a2b2c / srs-ConfigApDCI-Format4</strong></td>
<td>Parameters indicate the resource configurations for aperiodic sounding reference signal transmissions triggered by DCI formats 0, 1A, 2B, 2C, 4. See TS 36.213 [23, 8.2].</td>
<td></td>
</tr>
<tr>
<td><strong>srs-HoppingBandwidth</strong></td>
<td>Parameter: SRS hopping bandwidth ( b_{\text{hop}} \in {0,1,2,3} ) for periodic sounding reference signal transmission, see TS 36.211 [21, 5.5.3.2] where hw0 corresponds to value 0, hw1 to value 1 and so on.</td>
<td></td>
</tr>
<tr>
<td><strong>srs-MaxUpPts</strong></td>
<td>Parameter: srsMaxUpPts, see TS 36.211 [21, 5.5.3.2]. If this field is present, reconfiguration of ( m_{\text{SRS,0}} ) applies for UpPts, otherwise reconfiguration does not apply.</td>
<td></td>
</tr>
<tr>
<td><strong>srs-SubframeConfig</strong></td>
<td>Parameter: SRS SubframeConfiguration. See TS 36.211, [21, table 5.5.3.3-1] applies for FDD whereas TS 36.211 [21, table 5.5.3.3-2] applies for TDD. sc0 corresponds to value 0, sc1 corresponds to value 1 and so on.</td>
<td></td>
</tr>
<tr>
<td><strong>srs-UpPtsAdd</strong></td>
<td>The field only applies for TDD. If E-UTRAN configures both SoundingRS-UL-ConfigDedicatedUpPtsExt and SoundingRS-UL-ConfigDedicatedAperiodicUpPtsExt srs-UpPtsAdd in both fields is set to the same value.</td>
<td></td>
</tr>
<tr>
<td><strong>transmissionComb, transmissionCombAp</strong></td>
<td>Parameter: ( k_{\text{TC}} \in {0..3} ) for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3.2].</td>
<td></td>
</tr>
</tbody>
</table>

### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Presence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TDD</strong></td>
<td>This field is optional present for TDD, need OR; it is not present for FDD and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

## SPS-Config

The IE SPS-Config is used to specify the semi-persistent scheduling configuration.

### SPS-Config information element

```asn1
SPS-Config ::= SEQUENCE {
  ...
}
```
semiPersistSchedC-RNTI ::= C-RNTI OPTIONAL, -- Need OR
sps-ConfigDL ::= SPS-ConfigDL OPTIONAL, -- Need ON
sps-ConfigUL ::= SPS-ConfigUL OPTIONAL -- Need ON
}

SPS-ConfigDL ::= CHOICE{
  release NULL,
  setup SEQUENCE {
    semiPersistSchedIntervalDL ENUMERATED {
      sf10, sf20, sf32, sf40, sf64, sf80, sf128, sf160, sf320, sf640, spare6, spare5, spare4, spare3, spare2, spare1},
    numberOfConfSPS-Processes INTEGER (1..8),
    n1PUCCH-AN-PersistentList N1PUCCH-AN-PersistentList,
    
    [[[ twoAntennaPortActivated-r10 CHOICE {
        release NULL,
        setup SEQUENCE {
          n1PUCCH-AN-PersistentListP1-r10 N1PUCCH-AN-PersistentList
        }
      }]]]
    }
  }
}

SPS-ConfigUL ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    semiPersistSchedIntervalUL ENUMERATED {
      sf10, sf20, sf32, sf40, sf64, sf80, sf128, sf160, sf320, sf640, spare6, spare5, spare4, spare3, spare2, spare1},
    implicitReleaseAfter ENUMERATED {e2, e3, e4, e8},
    p0-Persistent SEQUENCE {
      p0-NominalPUSCH-Persistent INTEGER (-126..24),
      p0-UE-PUSCH-Persistent INTEGER (-8..7)
    } OPTIONAL, -- Need OP
    twoIntervalsConfig ENUMERATED {true} OPTIONAL, -- Cond TDD
    
    [[[ p0-PersistentSubframeSet2-r12 CHOICE {
        release NULL,
        setup SEQUENCE {
          p0-NominalPUSCH-PersistentSubframeSet2-r12 INTEGER (-126..24),
          p0-UE-PUSCH-PersistentSubframeSet2-r12 INTEGER (-8..7)
        }
      }]]
    },
    [[[ numberOfConfULSPS-Processes-r13 INTEGER (1..8) OPTIONAL -- Need OR
    ]]]
  }
}

N1PUCCH-AN-PersistentList ::= SEQUENCE (SIZE (1..4)) OF INTEGER (0..2047)
-- ASN1STOP
<table>
<thead>
<tr>
<th><strong>SPS-Config field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>implicitReleaseAfter</strong></td>
</tr>
<tr>
<td>Number of empty transmissions before implicit release, see TS 36.321 [6, 5.10.2]. Value e2 corresponds to 2 transmissions, e3 corresponds to 3 transmissions and so on.</td>
</tr>
<tr>
<td><strong>n1PUCCH-AN-PersistentList, n1PUCCH-AN-PersistentListP1</strong></td>
</tr>
<tr>
<td>List of parameter: ( n_{P_{\text{PUCCH}}}^{(1)} ) for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1]. Field ( n_{1\text{-PUCCH-AN-PersistentListP1}^{(1)}} ) is applicable only if the \text{twoAntennaPortActivatedPUCCH-Format1a1b} in \text{PUCCH-ConfigDedicated-v1020} is set to true. Otherwise the field is not configured.</td>
</tr>
<tr>
<td><strong>numberOfConfSPS-Processes</strong></td>
</tr>
<tr>
<td>The number of configured HARQ processes for downlink Semi-Persistent Scheduling, see TS 36.321 [6].</td>
</tr>
<tr>
<td><strong>numberOfConfULSPS-Processes</strong></td>
</tr>
<tr>
<td>The number of configured HARQ processes for uplink Semi-Persistent Scheduling, see TS 36.321 [6]. E-UTRAN always configures this field for asynchronous UL HARQ. Otherwise it does not configure this field.</td>
</tr>
<tr>
<td><strong>p0-NominalPUSCH-Persistent</strong></td>
</tr>
<tr>
<td>Parameter: ( R_{\text{P_{\text{PUSCH}}}^{(0)}} ). See TS 36.213 [23, 5.1.1.1], unit dBm step 1. This field is applicable for persistent scheduling, only. If choice setup is used and p0-Persistent is absent, apply the value of p0-NominalPUSCH-Persistent. If uplink power control subframe sets are configured by \text{tpc-SubframeSet}, this field applies for uplink power control subframe set 1.</td>
</tr>
<tr>
<td><strong>p0-NominalPUSCH-PersistentSubframeSet2</strong></td>
</tr>
<tr>
<td>Parameter: ( R_{\text{P_{\text{PUSCH}}}^{(0)}} ). See TS 36.213 [23, 5.1.1.1], unit dBm step 1. This field is applicable for persistent scheduling, only. If p0-PersistentSubframeSet2-r12 is not configured, apply the value of p0-NominalPUSCH-SubframeSet2-r12 for p0-NominalPUSCH-PersistentSubframeSet2. E-UTRAN configures this field only if uplink power control subframe sets are configured by \text{tpc-SubframeSet}, in which case this field applies for uplink power control subframe set 2.</td>
</tr>
<tr>
<td><strong>p0-UE-PUSCH-Persistent</strong></td>
</tr>
<tr>
<td>Parameter: ( R_{\text{P_{\text{PUSCH}}}^{(0)}} ). See TS 36.213 [23, 5.1.1.1], unit dB. This field is applicable for persistent scheduling, only. If choice setup is used and p0-Persistent is absent, apply the value of p0-UE-PUSCH-Persistent. If uplink power control subframe sets are configured by \text{tpc-SubframeSet}, this field applies for uplink power control subframe set 1.</td>
</tr>
<tr>
<td><strong>p0-UE-PUSCH-PersistentSubframeSet2</strong></td>
</tr>
<tr>
<td>Parameter: ( R_{\text{P_{\text{PUSCH}}}^{(0)}} ). See TS 36.213 [23, 5.1.1.1], unit dB. This field is applicable for persistent scheduling, only. If p0-PersistentSubframeSet2-r12 is not configured, apply the value of p0-UE-PUSCH-SubframeSet2-r12 for p0-UE-PUSCH-PersistentSubframeSet2. E-UTRAN configures this field only if uplink power control subframe sets are configured by \text{tpc-SubframeSet}, in which case this field applies for uplink power control subframe set 2.</td>
</tr>
<tr>
<td><strong>semiPersistSchedC-RNTI</strong></td>
</tr>
<tr>
<td>Semi-persistent Scheduling C-RNTI, see TS 36.321 [6].</td>
</tr>
<tr>
<td><strong>semiPersistSchedIntervalDL</strong></td>
</tr>
<tr>
<td>Semi-persistent scheduling interval in downlink, see TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. For TDD, the UE shall round this parameter down to the nearest integer (of 10 sub-frames), e.g. sf10 corresponds to 10 sub-frames, sf32 corresponds to 30 sub-frames, sf128 corresponds to 120 sub-frames.</td>
</tr>
<tr>
<td><strong>semiPersistSchedIntervalUL</strong></td>
</tr>
<tr>
<td>Semi-persistent scheduling interval in uplink, see TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. For TDD, the UE shall round this parameter down to the nearest integer (of 10 sub-frames), e.g. sf10 corresponds to 10 sub-frames, sf32 corresponds to 30 sub-frames, sf128 corresponds to 120 sub-frames.</td>
</tr>
<tr>
<td><strong>twoIntervalsConfig</strong></td>
</tr>
<tr>
<td>Trigger of two-intervals-Semi-Persistent Scheduling in uplink. See TS 36.321 [6, 5.10]. If this field is present, two-intervals-SPS is enabled for uplink. Otherwise, two-intervals-SPS is disabled.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Conditional presence</strong></th>
<th><strong>Explanation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TDD</strong></td>
<td>This field is optional present for TDD, need OR; it is not present for FDD and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

---

**TDD-Config**

The IE **TDD-Config** is used to specify the TDD specific physical channel configuration.

**TDD-Config** information element

```asn1
TDD-Config ::= SEQUENCE {
  ...
}
```
subframeAssignment  ENUMERATED { sa0, sa1, sa2, sa3, sa4, sa5, sa6},
specialSubframePatterns  ENUMERATED { ssp0, ssp1, ssp2, ssp3, ssp4, ssp5, ssp6, ssp7, ssp8} }

TDD-Config-v1130 ::= SEQUENCE { specialSubframePatterns-v1130  ENUMERATED {ssp7, ssp9} }

TDD-ConfigSL-r12 ::= SEQUENCE { subframeAssignmentSL-r12  ENUMERATED { none, sa0, sa1, sa2, sa3, sa4, sa5, sa6} }

<table>
<thead>
<tr>
<th>specialSubframePatterns</th>
<th>Indicates Configuration as in TS 36.211 [21, table 4.2-1] where ssp0 points to Configuration 0, ssp1 to Configuration 1 etc. Value ssp7 points to Configuration 7 for extended cyclic prefix and value ssp9 points to Configuration 9 for normal cyclic prefix. E-UTRAN signals ssp7 only when setting specialSubframePatterns (without suffix i.e. the version defined in REL-8) to ssp4. E-UTRAN signals value ssp9 only when setting specialSubframePatterns (without suffix) to ssp5. If specialSubframePatterns-v1130 is present, the UE shall ignore specialSubframePatterns (without suffix).</th>
</tr>
</thead>
<tbody>
<tr>
<td>subframeAssignmentSL</td>
<td>Indicates UL/ DL subframe configuration where sa0 points to Configuration 0, sa1 to Configuration 1 etc. as specified in TS 36.211 [21, table 4.2-2]. The value none means that no TDD specific physical channel configuration is applicable (i.e. the carrier on which MasterInformationBlock-SL is transmitted is an FDD UL carrier).</td>
</tr>
</tbody>
</table>

--- TimeAlignmentTimer

The IE TimeAlignmentTimer is used to control how long the UE considers the serving cells belonging to the associated TAG to be uplink time aligned. Corresponds to the Timer for time alignment in TS 36.321 [6]. Value in number of sub-frames. Value sf500 corresponds to 500 sub-frames, sf750 corresponds to 750 sub-frames and so on.

--- TPC-PDCCH-Config

The IE TPC-PDCCH-Config is used to specify the RNTIs and indexes for PUCCH and PUSCH power control according to TS 36.212 [22]. The power control function can either be setup or released with the IE.
TPC-Index

TPC-Index ::= CHOICE {
    indexOfFormat3       INTEGER (1..15),
    indexOfFormat3A       INTEGER (1..31)
}

TunnelConfigLWIP

The IE TunnelConfigLWIP is used to setup/release LWIP Tunnel.

IP-Address
Parameter indicates the LWIP-SeGW IP Address to be used by the UE for initiating LWIP Tunnel establishment [32].

ike-Identity
Parameter indicates the IKE Identity elements (IDi) to be used in IKE Authentication Procedures [32].

lwip-Counter
Indicates the parameter used by UE for computing the security keys used in LWIP tunnel establishment, as specified in TS 33.401 [32].

LWIP-Setup
The field is mandatory present upon setup of LWIP tunnel. Otherwise the field is optional, Need ON.
UplinkPowerControl

The IE UplinkPowerControlCommon and IE UplinkPowerControlDedicated are used to specify parameters for uplink power control in the system information and in the dedicated signalling, respectively.

UplinkPowerControl information elements

-- ASN1START
UplinkPowerControlCommon ::= SEQUENCE {
p0-NominalPUSCH      INTEGER (-126..24),
alpha        Alpha-r12,
p0-NominalPUCCH      INTEGER (-127..-96),
deltaFList-PUCCH     DeltaFList-PUCCH,
deltaPreambleMsg3     INTEGER (-1..6)
}

UplinkPowerControlCommon-v1020 ::= SEQUENCE {
deltaF-PUCCH-Format3-r10    ENUMERATED {deltaF-1, deltaF0, deltaF2, deltaF3, deltaF4, deltaF5, deltaF6},
deltaF-PUCCH-Format1bCS-r10    ENUMERATED {deltaF1, deltaF2, spare2, spare1}
}

UplinkPowerControlCommon-v1310 ::= SEQUENCE {
deltaF-PUCCH-Format4-r13   ENUMERATED {deltaF16, deltaF15, deltaF14, deltaF13, deltaF12, deltaF11, deltaF10, spare1} OPTIONAL, -- Need OR
deltaF-PUCCH-Format5-13     ENUMERATED {deltaF13, deltaF12, deltaF11, deltaF10, deltaF9, deltaF8, deltaF7, spare1} OPTIONAL -- Need OR
}

UplinkPowerControlCommonPSCell-r12 ::= SEQUENCE {
deltaF-PUCCH-Format3-r12    ENUMERATED {deltaF-1, deltaF0, deltaF1, deltaF2, deltaF3, deltaF4, deltaF5, deltaF6},
deltaF-PUCCH-Format1bCS-r12    ENUMERATED {deltaF1, deltaF2, spare2, spare1},
p0-NominalPUCCH-r12      INTEGER (-127..-96),
deltaFList-PUCCH-r12     DeltaFList-PUCCH
}

UplinkPowerControlCommonSCell-r10 ::= SEQUENCE {
p0-NominalPUSCH-r10     INTEGER (-126..24),
alpha-r10       Alpha-r12
}

UplinkPowerControlCommonSCell-v1130 ::= SEQUENCE {
deltaPreambleMsg3-r11    INTEGER (-1..6)
}

UplinkPowerControlCommonSCell-v1310 ::= SEQUENCE {
deltaF-PUCCH-Format3-r12    ENUMERATED {deltaF-1, deltaF0, deltaF1, deltaF2, deltaF3, deltaF4, deltaF5, deltaF6} OPTIONAL, -- Need OR
deltaF-PUCCH-Format1bCS-r12    ENUMERATED {deltaF1, deltaF2, spare2, spare1} OPTIONAL, -- Need OR
deltaF-PUCCH-Format4-r13     ENUMERATED {deltaF16, deltaF15, deltaF14, deltaF13, deltaF12, deltaF11, deltaF10, spare1} OPTIONAL, -- Need OR
deltaF-PUCCH-Format5-13      ENUMERATED {deltaF13, deltaF12, deltaF11, deltaF10, deltaF9, deltaF8, deltaF7, spare1} OPTIONAL -- Need OR
}

UplinkPowerControlDedicated ::= SEQUENCE {
p0-UE-PUSCH       INTEGER (-8..7),
deltaNo2-Enabled     ENUMERATED {en0, en1},
accumulationEnabled     BOOLEAN,
p0-UE-PUCCH       INTEGER (-8..7),
pSRS-Offset       INTEGER (0..15),
filterCoefficient     FilterCoefficient     DEFAULT fc4
}

UplinkPowerControlDedicated-v1020 ::= SEQUENCE {
deltaTxD-OffsetListPUCCH-r10 DeltaTxD-OffsetListPUCCH-r10 OPTIONAL, -- Need OR

-- ASN1END
pSRS-OffsetAp-r10 INTEGER (0..15) OPTIONAL -- Need OR
}

UplinkPowerControlDedicated-v1130 ::= SEQUENCE {
   pSRS-Offset-v1130 INTEGER (16..31) OPTIONAL, -- Need OR
   pSRS-OffsetAp-v1130 INTEGER (16..31) OPTIONAL, -- Need OR
   deltaTxD-OffsetListPUCCH-v1130 DeltaTxD-OffsetListPUCCH-v1130 OPTIONAL -- Need OR
}

UplinkPowerControlDedicated-v1250 ::= SEQUENCE {
   set2PowerControlParameter CHOICE {
      release NULL,
      setup SEQUENCE {
         tpc-9SubframeSet-r12 BIT STRING (SIZE(10)),
         p0-NominalPUSCH-9SubframeSet2-r12 INTEGER (-126..24),
         alpha-9SubframeSet2-r12 Alpha-r12,
         p0-UE-PUSCH-SubframeSet2-r12 INTEGER (-8..7)
      }
   }
}

UplinkPowerControlDedicatedSCell-r10 ::= SEQUENCE {
   p0-UE-PUSCH-r10 INTEGER (-8..7),
   accumulationEnabled-r10 BOOLEAN,
   pSRS-Offset-r10 INTEGER (0..15),
   pSRS-OffsetAp-r10 INTEGER (0..15) OPTIONAL, -- Need OR
   filterCoefficient-r10 FilterCoefficient DEFAULT fc4,
   pathlossReferenceLinking-r10 ENUMERATED {pCell, sCell}
}

UplinkPowerControlDedicatedSCell-v1310 ::= SEQUENCE {
   -- Release 8
   p0-UE-PUCCH INTEGER (-8..7),
   -- Release 10
   deltaTxD-OffsetListPUCCH-r10 DeltaTxD-OffsetListPUCCH-r10 OPTIONAL -- Need OR
}

Alpha-r12 ::= ENUMERATED {al0, al04, al05, al06, al07, al08, al09, al1}

DeltaFList-PUCCH ::= SEQUENCE {
   deltaF-PUCCH-Format1 ENUMERATED {deltaF-2, deltaF0, deltaF2},
   deltaF-PUCCH-Format1b ENUMERATED {deltaF1, deltaF3, deltaF5},
   deltaF-PUCCH-Format2 ENUMERATED {deltaF-2, deltaF0, deltaF2},
   deltaF-PUCCH-Format2a ENUMERATED {deltaF-2, deltaF0, deltaF2},
   deltaF-PUCCH-Format2b ENUMERATED {deltaF-2, deltaF0, deltaF2}
}

DeltaTxD-OffsetListPUCCH-r10 ::= SEQUENCE {
   deltaTxD-OffsetPUCCH-Format1-r10 ENUMERATED {dB0, dB-2},
   deltaTxD-OffsetPUCCH-Format1a-b-r10 ENUMERATED {dB0, dB-2},
   deltaTxD-OffsetPUCCH-Format2a2b-r10 ENUMERATED {dB0, dB-2},
   deltaTxD-OffsetPUCCH-Format3-r10 ENUMERATED {dB0, dB-2},
   ...
}

DeltaTxD-OffsetListPUCCH-v1130 ::= SEQUENCE {
   deltaTxD-OffsetPUCCH-Format1bCS-r11 ENUMERATED {dB0, dB-1}
}

-- ASN1STOP
UplinkPowerControl field descriptions

**accumulationEnabled**
Parameter: Accumulation-enabled, see TS 36.213 [23, 5.1.1.1]. TRUE corresponds to "enabled" whereas FALSE corresponds to "disabled".

**alpha**
Parameter: \( \alpha \) See TS 36.213 [23, 5.1.1.1] where al0 corresponds to 0, al04 corresponds to value 0.4, al05 to 0.5, al06 to 0.6, al07 to 0.7, al08 to 0.8, al09 to 0.9 and al1 corresponds to 1. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by tpc-SubframeSet.

**alpha-SubframeSet2**
Parameter: \( \alpha \). See TS 36.213 [23, 5.1.1.1] where al0 corresponds to 0, al04 corresponds to value 0.4, al05 to 0.5, al06 to 0.6, al07 to 0.7, al08 to 0.8, al09 to 0.9 and al1 corresponds to 1. This field applies for uplink power control subframe set 2 if uplink power control subframe sets are configured by tpc-SubframeSet.

**deltaF-PUCCH-FormatX**
Parameter: \( \Delta F_{PUCCH} \) for the PUCCH formats 1, 1b, 2, 2a, 2b, 3, 4, 5 and 1b with channel selection. See TS 36.213 [23, 5.1.2] where deltaF-2 corresponds to -2 dB, deltaF0 corresponds to 0 dB and so on.

**deltaMCS-Enabled**
Parameter: Ks See TS 36.213 [23, 5.1.1.1]. en0 corresponds to value 0 corresponding to state "disabled". en1 corresponds to value 1.25 corresponding to "enabled".

**deltaPreambleMsg3**
Parameter: \( 3 \ \text{MsgPREAMBLE} \Delta \) see TS 36.213 [23, 5.1.1.1]. Actual value = field value * 2 [dB].

**deltaTxD-OffsetPUCCH-FormatX**
Parameter: \( \Delta FTxD \) for the PUCCH formats 1, 1a/1b, 1b with channel selection, 2/2a/2b and 3 when two antenna ports are configured for PUCCH transmission. See TS 36.213 [23, 5.1.2.1] where dB0 corresponds to 0 dB, dB-1 corresponds to -1 dB, dB-2 corresponds to -2 dB. EUTRAN configures the field deltaTxD-OffsetPUCCH-Format1bCS-r11 for the PCell and/or the PSCell only.

**filterCoefficient**
Specifies the filtering coefficient for RSRP measurements used to calculate path loss, as specified in TS 36.213 [23, 5.1.1.1]. The same filtering mechanism applies as for quantityConfig described in 5.5.3.2.

**p0-NominalPUCCH**
Parameter: \( P_{O_{\text{NOMINAL}}_{-PUCCH}} \) See TS 36.213 [23, 5.1.2.1], unit dB.

**p0-NominalPUSCH**
Parameter: \( P_{O_{\text{NOMINAL}}_{-PUSCH}} \) See TS 36.213 [23, 5.1.2.1], unit dB. This field is applicable for non-persistent scheduling only. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by tpc-SubframeSet.

**p0-NominalPUSCH-SubframeSet2**
Parameter: \( P_{O_{\text{NOMINAL}}_{-PUSCH}} \) See TS 36.213 [23, 5.1.2.1], unit dB. This field is applicable for non-persistent scheduling only. This field applies for uplink power control subframe set 2 if uplink power control subframe sets are configured by tpc-SubframeSet.

**p0-UE-PUCCH**
Parameter: \( P_{0_{-UE-PUCCH}} \) See TS 36.213 [23, 5.1.2.1]. Unit dB

**p0-UE-PUSCH**
Parameter: \( P_{0_{-UE-PUSCH}} \) See TS 36.213 [23, 5.1.2.1], unit dB. This field is applicable for non-persistent scheduling, only. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by tpc-SubframeSet.

**p0-UE-PUSCH-SubframeSet2**
Parameter: \( P_{0_{-UE-PUSCH}} \) See TS 36.213 [23, 5.1.2.1], unit dB. This field is applicable for non-persistent scheduling, only. This field applies for uplink power control subframe set 2 if uplink power control subframe sets are configured by tpc-SubframeSet.

**pathlossReferenceLinking**
Indicates whether the UE shall apply as pathloss reference either the downlink of the PCell or of the SCell that corresponds with this uplink (i.e. according to the cellIdentification within the field sCellToAddMod). For SCells part of an STAG E-UTRAN sets the value to sCell.

**pSRS-Offset, pSRS-OffsetAp**
Parameter: \( pSRS_{OFFSET} \) for periodic and aperiodic sounding reference signal transmission, respectively. See TS 36.213 [23, 5.1.3.1]. For Ks=1.25, the actual parameter value is \[ pSRS-Offset - 3 \] For Ks=0, the actual parameter value is \[ -0.5 + 1.5 \times pSRS-Offset \].

If \( pSRS-Offset-v1130 \) is included, the UE ignores \( pSRS-Offset \) (i.e., without suffix). Likewise, if \( pSRS-OffsetAp-v1130 \) is included, the UE ignores \( pSRS-OffsetAp \). For Ks=0, E-UTRAN does not set values larger than 26.
UplinkPowerControl field descriptions

**tpc-SubframeSet**
Indicates the uplink subframes (including UpPTS in special subframes) of the uplink power control subframe sets. Value 0 means the subframe belongs to uplink power control subframe set 1, and value 1 means the subframe belongs to uplink power control subframe set 2.

---

**WLAN-Id-List**
The IE WLAN-Id-List is used to list WLAN(s) for configuration of WLAN measurements and WLAN mobility set.

```asn1
WLAN-Id-List-r13 ::=    SEQUENCE (SIZE (1..maxWLAN-Id-r13)) OF WLAN-Identifiers-r12
```

---

**WLAN-MobilityConfig**
The IE WLAN-MobilityConfig is used for configuration of WLAN mobility set and WLAN Status Reporting. E-UTRAN configures at least one WLAN identifier in the WLAN-MobilityConfig.

```asn1
WLAN-MobilityConfig-r13 ::=  SEQUENCE {
  wlan-ToReleaseList-r13    WLAN-Id-List-r13   OPTIONAL, -- Need ON
  wlan-ToAddList-r13     WLAN-Id-List-r13   OPTIONAL, -- Need ON
  associationTimer-r13    ENUMERATED {s10, s30, s60, s120, s240}   OPTIONAL, -- Need OR
  successReportRequested-r13   ENUMERATED {true}   OPTIONAL, -- Need OR
  ...
}
```

**WLAN-MobilityConfig field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>associationTimer</td>
<td>Indicates the maximum time for connection to WLAN before connection failure reporting is initiated. Value s10 means 10 seconds, value s30 means 30 seconds and so on. E-UTRAN includes associationTimer only upon change in WLAN mobility set, lwa-WT-Counter or lwip-Counter.</td>
</tr>
<tr>
<td>successReportRequested</td>
<td>Indicates whether the UE shall report successful connection to WLAN. Applicable to LWA and LWIP.</td>
</tr>
<tr>
<td>wlan-ToAddList</td>
<td>Indicates the WLAN identifiers to be added to the WLAN mobility set.</td>
</tr>
<tr>
<td>wlan-ToReleaseList</td>
<td>Indicates the WLAN identifiers to be removed from the WLAN mobility set.</td>
</tr>
</tbody>
</table>

6.3.3 Security control information elements

**NextHopChainingCount**
The IE NextHopChainingCount is used to update the K_{NB} key and corresponds to parameter NCC: See TS 33.401 [32, 7.2.8.4].

```asn1
NextHopChainingCount ::= INTEGER (0..7)
```
The IE `SecurityAlgorithmConfig` is used to configure AS integrity protection algorithm (SRBs) and AS ciphering algorithm (SRBs and DRBs). For RNs, the IE `SecurityAlgorithmConfig` is also used to configure AS integrity protection algorithm for DRBs between the RN and the E-UTRAN.

**SecurityAlgorithmConfig information element**

```asn1
SecurityAlgorithmConfig ::= SEQUENCE {
  cipheringAlgorithm     CipheringAlgorithm-r12,
  integrityProtAlgorithm    ENUMERATED {
    eia0-v920, eia1, eia2, eia3-v1130, spare4, spare3,
    spare2, spare1, ...}
}
CipheringAlgorithm-r12 ::= ENUMERATED {
  eea0, eea1, eea2, eea3-v1130, spare4, spare3,
  spare2, spare1, ...}
```

**SecurityAlgorithmConfig field descriptions**

- `cipheringAlgorithm`
  Indicates the ciphering algorithm to be used for SRBs and DRBs, as specified in TS 33.401 [32, 5.1.3.2].

- `integrityProtAlgorithm`
  Indicates the integrity protection algorithm to be used for SRBs, as specified in TS 33.401 [32, 5.1.4.2]. For RNs, also indicates the integrity protection algorithm to be used for integrity protection-enabled DRB(s).

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 security configuration of the source PCell, as specified in 5.3.7.4.

**ShortMAC-I information element**

```asn1
ShortMAC-I ::= BIT STRING (SIZE (16))
```

### 6.3.4 Mobility control information elements

- **AdditionalSpectrumEmission**

  If an extension is signalled using the extended value range (as defined by IE `AdditionalSpectrumEmission-v10l0`), the corresponding original field, using the value range as defined by IE `AdditionalSpectrumEmission` i.e. without suffix) shall be set to value 32, if signalled. UE supporting an LTE band assigned NS values larger than 32 as defined in TS 36.101 [42, 6.2.4], needs to support extension signaling (as defined by IE `AdditionalSpectrumEmission-v10l0`).

**AdditionalSpectrumEmission information element**

```asn1
AdditionalSpectrumEmission ::= INTEGER (1..32)
AdditionalSpectrumEmission-v10l0 ::= INTEGER (33..288)
```

The IE `ARFCN-ValueCDMA2000` used to indicate the CDMA2000 carrier frequency within a CDMA2000 band, see C.S0002 [12].
**ARFCN-ValueCDMA2000** information element

```asn1
ARFCN-ValueCDMA2000 ::= INTEGER (0..2047)
```

**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 [42]. If an extension is signalled using the extended value range (as defined by IE **ARFCN-ValueEUTRA-v9e0**), the UE shall only consider this extension (and hence ignore the corresponding original field, using the value range as defined by IE **ARFCN-ValueEUTRA** i.e. without suffix, if signalled). In dedicated signalling, E-UTRAN only provides an EARFCN corresponding to an E-UTRA band supported by the UE.

```asn1
ARFCN-ValueEUTRA ::= INTEGER (0..maxEARFCN)
ARFCN-ValueEUTRA-v9e0 ::= INTEGER (maxEARFCN-Plus1..maxEARFCN2)
ARFCN-ValueEUTRA-r9 ::= INTEGER (0..maxEARFCN2)
```

**NOTE:** For fields using the original value range, as defined by IE **ARFCN-ValueEUTRA** i.e. without suffix, value `maxEARFCN` indicates that the E-UTRA carrier frequency is indicated by means of an extension. In such a case, UEs not supporting the extension consider the field to be set to a not supported value.

**ARFCN-ValueGERAN**

The IE **ARFCN-ValueGERAN** is used to specify the ARFCN value applicable for a GERAN BCCH carrier frequency, see TS 45.005 [20].

```asn1
ARFCN-ValueGERAN ::= INTEGER (0..1023)
```

**ARFCN-ValueUTRA**

The IE **ARFCN-ValueUTRA** is used to indicate the ARFCN applicable for a downlink (Nd, FDD) or bi-directional (Nt, TDD) UTRA carrier frequency, as defined in TS 25.331 [19].

```asn1
ARFCN-ValueUTRA ::= INTEGER (0..16383)
```

**BandclassCDMA2000**

The IE **BandclassCDMA2000** is used to define the CDMA2000 band in which the CDMA2000 carrier frequency can be found, as defined in C.S0057 [24, table 1.5-1].
BandclassCDMA2000 information element

-- ASN1START
BandclassCDMA2000 ::= ENUMERATED {
  bc0, bc1, bc2, bc3, bc4, bc5, bc6, bc7, bc8,
  bc9, bc10, bc11, bc12, bc13, bc14, bc15, bc16,
  bc17, bc18-v9a0, bc19-v9a0, bc20-v9a0, bc21-v9a0,
  spare10, spare9, spare8, spare7, spare6, spare5, spare4,
  spare3, spare2, spare1, ...}
-- ASN1STOP

– BandIndicatorGERAN

The IE BandIndicatorGERAN indicates how to interpret an associated GERAN carrier ARFCN, see TS 45.005 [20]. More specifically, the IE indicates the GERAN frequency band in case the ARFCN value can concern either a DCS 1800 or a PCS 1900 carrier frequency. For ARFCN values not associated with one of these bands, the indicator has no meaning.

BandIndicatorGERAN information element

-- ASN1START
BandIndicatorGERAN ::= ENUMERATED {dcs1800, pcs1900}
-- ASN1STOP

– CarrierFreqCDMA2000

The IE CarrierFreqCDMA2000 used to provide the CDMA2000 carrier information.

CarrierFreqCDMA2000 information element

-- ASN1START
CarrierFreqCDMA2000 ::= SEQUENCE {
  bandClass       BandclassCDMA2000,
  arfcn       ARFCN-ValueCDMA2000
}
-- ASN1STOP

– CarrierFreqGERAN

The IE CarrierFreqGERAN is used to provide an unambiguous carrier frequency description of a GERAN cell.

CarrierFreqGERAN information element

-- ASN1START
CarrierFreqGERAN ::= SEQUENCE {
  arfcn       ARFCN-ValueGERAN,
  bandIndicator     BandIndicatorGERAN
}
-- ASN1STOP

CarrierFreqGERAN field descriptions

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>arfcn</td>
<td>GERAN ARFCN of BCCH carrier.</td>
</tr>
<tr>
<td>bandIndicator</td>
<td>Indicates how to interpret the ARFCN of the BCCH carrier.</td>
</tr>
</tbody>
</table>
CarrierFreqsGERAN

The IE CarrierFreqListGERAN is used to provide one or more GERAN ARFCN values, as defined in TS 45.005 [43], which represents a list of GERAN BCCH carrier frequencies.

CarrierFreqsGERAN information element

```
CarrierFreqsGERAN ::= SEQUENCE {
  startingARFCN      ARFCN-ValueGERAN,
  bandIndicator      BandIndicatorGERAN,
  followingARFCNs    CHOICE {
    explicitListOfARFCNs    ExplicitListOfARFCNs,
    equallySpacedARFCNs     SEQUENCE {
      arfcn-Spacing      INTEGER (1..8),
      numberOfFollowingARFCNs    INTEGER (0..31)
    },
    variableBitMapOfARFCNs    OCTET STRING (SIZE (1..16))
  }
}
ExplicitListofARFCNs ::= SEQUENCE (SIZE (0..31)) OF ARFCN-ValueGERAN
```

CarrierFreqsGERAN field descriptions

- **arfcn-Spacing**
  Space, d, between a set of equally spaced ARFCN values.

- **bandIndicator**
  Indicates how to interpret the ARFCN of the BCCH carrier.

- **explicitListOfARFCNs**
  The remaining ARFCN values in the set are explicitly listed one by one.

- **followingARFCNs**
  Field containing a representation of the remaining ARFCN values in the set.

- **numberOfFollowingARFCNs**
  The number, n, of the remaining equally spaced ARFCN values in the set. The complete set of (n+1) ARFCN values is defined as: \{s, (s+d) mod 1024, (s+2*d) mod 1024, ..., (s+n*d) mod 1024\}.

- **startingARFCN**
  The first ARFCN value, s, in the set.

- **variableBitMapOfARFCNs**
  Bitmap field representing the remaining ARFCN values in the set. The leading bit of the first octet in the bitmap corresponds to the ARFCN = (s + 1) mod 1024, the next bit to the ARFCN = (s + 2) mod 1024, and so on. If the bitmap consist of N octets, the trailing bit of octet N corresponds to ARFCN = (s + 8*N) mod 1024. The complete set of ARFCN values consists of ARFCN = s and the ARFCN values, where the corresponding bit in the bitmap is set to "1".

CarrierFreqListMBMS

The IE CarrierFreqListMBMS is used to indicate the E-UTRA ARFCN values of the one or more MBMS frequencies the UE is interested to receive.

CarrierFreqListMBMS information element

```
CarrierFreqListMBMS-r11 ::= SEQUENCE (SIZE (1..maxFreqMBMS-r11)) OF ARFCN-ValueEUTRA-r9
```

CDMA2000-Type

The IE CDMA2000-Type is used to describe the type of CDMA2000 network.

CDMA2000-Type information element

```
CDMA2000-Type ::= SEQUENCE {
  nTypeCDMA2000      INTEGER (0..16),
  cchCarrier         INTEGER (0..23),
  controlChannel      INTEGER (0..3),
  typeA                  INTEGER (0..2),
  typeB                  INTEGER (0..3)
}
```

-- ASN1START

CarrierFreqsGERAN ::= SEQUENCE {
  startingARFCN      ARFCN-ValueGERAN,
  bandIndicator      BandIndicatorGERAN,
  followingARFCNs    CHOICE {
    explicitListOfARFCNs    ExplicitListOfARFCNs,
    equallySpacedARFCNs     SEQUENCE {
      arfcn-Spacing      INTEGER (1..8),
      numberOfFollowingARFCNs    INTEGER (0..31)
    },
    variableBitMapOfARFCNs    OCTET STRING (SIZE (1..16))
  }
}
ExplicitListOfARFCNs ::= SEQUENCE (SIZE (0..31)) OF ARFCN-ValueGERAN

-- ASN1STOP

CarrierFreqListMBMS-r11 ::= SEQUENCE (SIZE (1..maxFreqMBMS-r11)) OF ARFCN-ValueEUTRA-r9

-- ASN1STOP

CDMA2000-Type ::= SEQUENCE {
  nTypeCDMA2000      INTEGER (0..16),
  cchCarrier         INTEGER (0..23),
  controlChannel      INTEGER (0..3),
  typeA                  INTEGER (0..2),
  typeB                  INTEGER (0..3)
}

-- ASN1START
CDMA2000-Type ::= ENUMERATED {type1XRTT, typeHRPD}
-- ASN1STOP

-- CellIdentity

The IE CellIdentity is used to unambiguously identify a cell within a PLMN.

**CellIdentity information element**

-- ASN1START
CellIdentity ::= BIT STRING (SIZE (28))
-- ASN1STOP

-- CellIndexList

The IE CellIndexList concerns a list of cell indices, which may be used for different purposes.

**CellIndexList information element**

-- ASN1START
CellIndexList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF CellIndex
CellIndex ::= INTEGER (1..maxCellMeas)
-- ASN1STOP

-- CellReselectionPriority

The IE CellReselectionPriority concerns the absolute priority of the concerned carrier frequency/ set of frequencies (GERAN)/ bandclass (CDMA2000), as used by the cell reselection procedure. Corresponds with parameter "priority" in TS 36.304 [4]. Value 0 means: lowest priority. The UE behaviour for the case the field is absent, if applicable, is specified in TS 36.304 [4].

**CellReselectionPriority information element**

-- ASN1START
CellReselectionPriority ::= INTEGER (0..7)
-- ASN1STOP

-- CellSelectionInfoCE

The IE CellSelectionInfoCE contains cell selection information for CE. The q-RxLevMinCE corresponds to parameter Q_{levmin,CE} in TS 36.304 [4]. The q-QualMinRSRQ-CE corresponds to parameter Q_{qualmin,CE} in TS 36.304 [4]. If q-QualMinRSRQ-CE is not present, the UE applies the (default) value of negative infinity for Q_{qualmin}.

**CellSelectionInfoCE information element**

-- ASN1START
CellSelectionInfoCE-r13 ::= SEQUENCE {
  q-RxLevMinCE-r13 Q-RxLevMin,
  q-QualMinRSRQ-CE-r13 Q-QualMin-r9 OPTIONAL -- Need OR
}
-- ASN1STOP
CellSelectionInfoCE1

The IE CellSelectionInfoCE1 contains cell selection information for BL UEs or UEs in CE supporting CE Mode B. The q-RxLevMinCE1 corresponds to parameter Q_{rxlevmin, CE1} in TS 36.304 [4]. If delta-RxLevMinCE1 is not included, actual value $Q_{rxlevmin, CE1} = q-RxLevMinCE1 * 2$ [dBm]. If delta-RxLevMinCE1 is included, the actual value $Q_{rxlevmin, CE1} = (q-RxLevMinCE1 + delta-RxLevMinCE1) * 2$ [dBm]. The q-QualMinRSRQ-CE1 corresponds to parameter Q_{qualmin, CE1} in TS 36.304 [4]. If q-QualMinRSRQ-CE1 is not present, the UE applies the (default) value of negative infinity for Q_{qualmin}.

### CellSelectionInfoCE1 information element

```asn1
CellSelectionInfoCE1-r13 ::=  SEQUENCE {
  q-RxLevMinCE1-r13    Q-RxLevMin,
  q-QualMinRSRQ-CE1-r13   Q-QualMin-r9      OPTIONAL -- Need OR
}

CellSelectionInfoCE1-v1360 ::= SEQUENCE {
  delta-RxLevMinCE1-v1360   INTEGER (-8..-1)
}
```

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. Value oDot2 corresponds to 0.2, oDot4 corresponds to 0.4 and so on.

### CellReselectionSubPriority information element

```asn1
CellReselectionSubPriority-r13 ::=   ENUMERATED {oDot2, oDot4, oDot6, oDot8}
```

CSFB-RegistrationParam1XRTT

The IE CSFB-RegistrationParam1XRTT is used to indicate whether or not the UE shall perform a CDMA2000 1xRTT pre-registration if the UE does not have a valid / current pre-registration.

```asn1
CSFB-RegistrationParam1XRTT ::=  SEQUENCE {
  sid         BIT STRING (SIZE (15)),
  nid         BIT STRING (SIZE (16)),
  multipleSID   BOOLEAN,
  multipleNID   BOOLEAN,
  homeReg       BOOLEAN,
  foreignSIDReg BOOLEAN,
  foreignNIDReg BOOLEAN,
  parameterReg  BOOLEAN,
  powerUpReg    BOOLEAN,
  registrationPeriod  BIT STRING (SIZE (7)),
  registrationZone   BIT STRING (SIZE (12)),
  totalZone        BIT STRING (SIZE (3)),
  zoneTimer        BIT STRING (SIZE (3))
}

CSFB-RegistrationParam1XRTT-v920 ::= SEQUENCE {
  powerDownReg-r9      ENUMERATED {true}
}
```
### CSFB-RegistrationParam1xRTT field descriptions

- **foreignNIDReg**
The CDMA2000 1xRTT NID roamer registration indicator.

- **foreignSIDReg**
The CDMA2000 1xRTT SID roamer registration indicator.

- **homeReg**
The CDMA2000 1xRTT Home registration indicator.

- **multipleNID**
The CDMA2000 1xRTT Multiple NID storage indicator.

- **multipleSID**
The CDMA2000 1xRTT Multiple SID storage indicator.

- **nid**
  Used along with the *sid* as a pair to control when the UE should Register or Re-Register with the CDMA2000 1xRTT network.

- **parameterReg**
The CDMA2000 1xRTT Parameter-change registration indicator.

- **powerDownReg**
The CDMA2000 1xRTT Power-down registration indicator. If set to TRUE, the UE that has a valid / current CDMA2000 1xRTT pre-registration will perform a CDMA2000 1xRTT power down registration when it is switched off.

- **powerUpReg**
The CDMA2000 1xRTT Power-up registration indicator.

- **registrationPeriod**
The CDMA2000 1xRTT Registration period.

- **registrationZone**
The CDMA2000 1xRTT Registration zone.

- **sid**
  Used along with the *nid* as a pair to control when the UE should Register or Re-Register with the CDMA2000 1xRTT network.

- **totalZone**
The CDMA2000 1xRTT Number of registration zones to be retained.

- **zoneTimer**
The CDMA2000 1xRTT Zone timer length.

---

### CellGlobalIdEUTRA

The IE **CellGlobalIdEUTRA** specifies the Evolved Cell Global Identifier (ECGI), the globally unique identity of a cell in E-UTRA.

#### CellGlobalIdEUTRA information element

```asn1
CellGlobalIdEUTRA ::= SEQUENCE {
  plmn-Identity     PLMN-Identity,
  cellIdentity      CellIdentity
}
```

#### CellGlobalIdEUTRA field descriptions

- **cellIdentity**
  Identity of the cell within the context of the PLMN.

- **plmn-Identity**
  Identifies the PLMN of the cell as given by the first PLMN entry in the *plmn-IdentityList* in *SystemInformationBlockType1*.

---

### CellGlobalIdUTRA

The IE **CellGlobalIdUTRA** specifies the global UTRAN Cell Identifier, the globally unique identity of a cell in UTRA.

#### CellGlobalIdUTRA information element

```asn1
CellGlobalIdUTRA ::= SEQUENCE {
  plmn-Identity     PLMN-Identity,
}
```
CellGlobalIdUTRA field descriptions

cellIdentity
UTRA Cell Identifier which is unique within the context of the identified PLMN as defined in TS 25.331 [19].

plmn-Identity
Identifies the PLMN of the cell as given by the common PLMN broadcast in the MIB, as defined in TS 25.331 [19].

-- CellGlobalIdGERAN

The IE CellGlobalIdGERAN specifies the Cell Global Identification (CGI), the globally unique identity of a cell in GERAN.

CellGlobalIdGERAN information element

-- CellGlobalIdCDMA2000

The IE CellGlobalIdCDMA2000 specifies the Cell Global Identification (CGI), the globally unique identity of a cell in CDMA2000.

CellGlobalIdCDMA2000 field descriptions

cellGlobalId1XRTT
Unique identifier for a CDMA2000 1xRTT cell, corresponds to BASEID, SID and NID parameters (in that order) defined in C.S0005 [25].

cellGlobalIdHRPD
Unique identifier for a CDMA2000 HRPD cell, corresponds to SECTOR ID parameter defined in C.S0024 [26, 14.9].
The IE **CellSelectionInfoNFreq** includes the parameters used for cell selection on a neighbouring frequency, see TS 36.304 [4].

**CellSelectionInfoNFreq** information element

```asn1
CellSelectionInfoNFreq-r13 ::= SEQUENCE {
  q-RxLevMin-r13     Q-RxLevMin,  
  q-RxLevMinOffset     INTEGER (1..8)   OPTIONAL,  
  q-Hyst-r13       ENUMERATED {  
    dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,  
    dB12, dB14, dB16, dB18, dB20, dB22, dB24},  
  q-RxLevMinReselection-r13   Q-RxLevMin,  
  t-ReselectionEUTRA-r13    T-Reselection
}
```

**CSG-Identity**

The IE **CSG-Identity** is used to identify a Closed Subscriber Group.

**CSG-Identity** information element

```asn1
CSG-Identity ::=     BIT STRING (SIZE (27))
```

**FreqBandIndicator**

The IE **FreqBandIndicator** indicates the E-UTRA operating band as defined in TS 36.101 [42, table 5.5-1]. If an extension is signalled using the extended value range (as defined by IE **FreqBandIndicator-v9e0**), the UE shall only consider this extension (and hence ignore the corresponding original field, using the value range as defined by IE **FreqBandIndicator** i.e. without suffix, if signalled).

**FreqBandIndicator** information element

```asn1
FreqBandIndicator ::=     INTEGER (1..maxFBI)  
FreqBandIndicator-v9e0 ::=    INTEGER (maxFBI-Plus1..maxFBI2)  
FreqBandIndicator-r11 ::=    INTEGER (1..maxFBI2)
```

**NOTE:** For fields using the original value range, as defined by IE **FreqBandIndicator** i.e. without suffix, value `maxFBI` indicates that the frequency band is indicated by means of an extension. In such a case, UEs not supporting the extension consider the field to be set to a not supported value.

**MobilityControlInfo**

The IE **MobilityControlInfo** includes parameters relevant for network controlled mobility to/within E-UTRA.
MobilityControlInfo information element

-- ASN1START

MobilityControlInfo ::= SEQUENCE {
  targetPhysCellId     PhysCellId,
  carrierFreq          CarrierFreqEUTRA OPTIONAL, -- Cond HO-
toEUTRA2              CarrierBandwidthEUTRA OPTIONAL, -- Cond HO-
toEUTRA               CarrierFreqEUTRA OPTIONAL, -- Cond HO-
  additionalSpectrumEmission   AdditionalSpectrumEmission OPTIONAL, -- Cond HO-
  t304                  ENUMERATED {
    ms50, ms100, ms150, ms200, ms500, ms1000, ms2000, ms10000-v1310},
  newUE-Identity        C-RNTI,
  radioResourceConfigCommon RadioResourceConfigCommon,  
rach-ConfigDedicated    RACH-ConfigDedicated OPTIONAL, -- Need OP...

  [[ carrierFreq-v9e0    CarrierFreqEUTRA-v9e0 OPTIONAL -- Need ON ]],
  [[ drb-ContinueROHC-r11 ENUMERATED {true} OPTIONAL -- Cond HO ]]
}

MobilityControlInfo-v1010 ::= SEQUENCE {
  additionalSpectrumEmission-v1010 AdditionalSpectrumEmission-v1010 OPTIONAL -- Need ON
}

MobilityControlInfoSCG-r12 ::= SEQUENCE {
  t307-r12       ENUMERATED {
    ms50, ms100, ms150, ms200, ms500, ms1000, 
    ms2000, spare1},
  ue-IdentitySCG-r12     C-RNTI       OPTIONAL, -- Cond SCGEst,
  rach-ConfigDedicated-r12   RACH-ConfigDedicated   OPTIONAL, -- Need OP
  cipheringAlgorithmSCG-r12  CipheringAlgorithm-r12 OPTIONAL, -- Need ON...
}

CarrierBandwidthEUTRA ::= SEQUENCE {
  dl-Bandwidth      ENUMERATED {
    n6, n15, n25, n50, n75, n100, spare10,
    spare9, spare8, spare7, spare6, spare5,
    spare4, spare3, spare2, spare1},
  ul-Bandwidth      ENUMERATED {
    n6, n15, n25, n50, n75, n100, spare10,
    spare9, spare8, spare7, spare6, spare5,
    spare4, spare3, spare2, spare1} OPTIONAL -- Need OP
}

CarrierFreqEUTRA ::= SEQUENCE {
  dl-CarrierFreq     ARFCN-ValueEUTRA,  
  ul-CarrierFreq     ARFCN-ValueEUTRA OPTIONAL -- Cond FDD
}

CarrierFreqEUTRA-v9e0 ::= SEQUENCE {
  dl-CarrierFreq-v9e0 ARFCN-ValueEUTRA-v9e0,  
  ul-CarrierFreq-v9e0 ARFCN-ValueEUTRA-v9e0 OPTIONAL -- Cond FDD
}

-- ASN1STOP
**MobilityControllInfo field descriptions**

**additionalSpectrumEmission**
For a UE with no SCells configured for UL in the same band as the PCell, the UE shall apply the value for the PCell instead of the corresponding value from SystemInformationBlockType2 or SystemInformationBlockType1. For a UE with SCell(s) configured for UL in the same band as the PCell, the UE shall, in case all SCells configured for UL in that band are released after handover completion, apply the value for the PCell instead of the corresponding value from SystemInformationBlockType2 or SystemInformationBlockType1. The UE requirements related to IE AdditionalSpectrumEmission are defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs.

**carrierBandwidth**
Provides the parameters Downlink bandwidth, and Uplink bandwidth, see TS 36.101 [42].

**carrierFreq**
Provides the EARFCN to be used by the UE in the target cell.

**cipheringAlgorithmSCG**
Indicates the ciphering algorithm to be used for SCG DRBs. E-UTRAN includes the field upon SCG change when one or more SCG DRBs are configured. Otherwise E-UTRAN does not include the field.

**dl-Bandwidth**
Parameter: Downlink bandwidth, see TS 36.101 [42].

**drb-ContinueROHC**
This field indicates whether to continue or reset, for this handover, the header compression protocol context for the RLC UM bearers configured with the header compression protocol. Presence of the field indicates that the header compression protocol context continues while absence indicates that the header compression protocol context is reset. E-UTRAN includes the field only in case of a handover within the same eNB.

**rach-ConfigDedicated**
The dedicated random access parameters. If absent the UE applies contention based random access as specified in TS 36.321 [6].

**t304**
Timer T304 as described in section 7.3. ms50 corresponds with 50 ms, ms100 corresponds with 100 ms and so on. EUTRAN includes extended value ms10000-v1310 only when UE supports CE.

**t307**
Timer T307 as described in section 7.3. ms50 corresponds with 50 ms, ms100 corresponds with 100 ms and so on.

**ul-Bandwidth**
Parameter: Uplink bandwidth, see TS 36.101 [42, table 5.6-1]. For TDD, the parameter is absent and it is equal to downlink bandwidth. If absent for FDD, apply the same value as applies for the downlink bandwidth.

**Conditional presence**

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDD</td>
<td>The field is mandatory with default value (the default duplex distance defined for the concerned band, as specified in TS 36.101 [42]) in case of &quot;FDD&quot;; otherwise the field is not present.</td>
</tr>
<tr>
<td>HO</td>
<td>This field is optionally present, need OP, in case of handover within E-UTRA when the fullConfig is not included; otherwise the field is not present.</td>
</tr>
<tr>
<td>HO-toEUTRA</td>
<td>The field is mandatory present in case of inter-RAT handover to E-UTRA; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td>HO-toEUTRA2</td>
<td>The field is absent if carrierFreq-v9e0 is present. Otherwise it is mandatory present in case of inter-RAT handover to E-UTRA and optionally present, need ON, in all other cases.</td>
</tr>
<tr>
<td>SCGEst</td>
<td>This field is mandatory present in case of SCG establishment; otherwise the field is optionally present, need ON.</td>
</tr>
</tbody>
</table>

– MobilityParametersCDMA2000 (1xRTT)

The MobilityParametersCDMA2000 contains the parameters provided to the UE for handover and (enhanced) CSFB to 1xRTT support, as defined in C.S0097 [53].

**MobilityParametersCDMA2000 information element**

```--- ASN1START
MobilityParametersCDMA2000 ::= OCTET STRING
--- ASN1STOP
```

– MobilityStateParameters

The IE MobilityStateParameters contains parameters to determine UE mobility state.
### MobilityStateParameters information element

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>t-Evaluation</td>
<td>The duration for evaluating criteria to enter mobility states. Correlates to TCRmax in TS 36.304 [4]. Value in seconds, s30 corresponds to 30 s and so on.</td>
</tr>
<tr>
<td>t-HystNormal</td>
<td>The additional duration for evaluating criteria to enter normal mobility state. Correlates to TCRmaxHyst in TS 36.304 [4]. Value in seconds, s30 corresponds to 30 s and so on.</td>
</tr>
<tr>
<td>n-CellChangeHigh</td>
<td>The number of cell changes to enter high mobility state. Corresponds to NCR_H in TS 36.304 [4].</td>
</tr>
<tr>
<td>n-CellChangeMedium</td>
<td>The number of cell changes to enter medium mobility state. Corresponds to NCR_M in TS 36.304 [4].</td>
</tr>
</tbody>
</table>

### MultiBandInfoList information element

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>freqBandIndicator-v9e0</td>
<td>Sequence (SIZE (1..maxMultiBands)) OF FreqBandIndicator-v9e0</td>
</tr>
<tr>
<td>freqBandIndicator-v10l0</td>
<td>Sequence (SIZE (1..maxMultiBands)) OF FreqBandIndicator-v10l0</td>
</tr>
</tbody>
</table>

### NS-PmaxList information element

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>additionalPmax</td>
<td>Sequence (SIZE (1..maxNS-Pmax-r10)) OF NS-PmaxValue-r10</td>
</tr>
<tr>
<td>additionalSpectrumEmission</td>
<td>Sequence (SIZE (1..maxNS-Pmax-v10l0)) OF NS-PmaxValue-v10l0</td>
</tr>
</tbody>
</table>
– **PhysCellId**

The IE **PhysCellId** is used to indicate the physical layer identity of the cell, as defined in TS 36.211 [21].

*PhysCellId information element*

```
-- ASN1START
PhysCellId ::= INTEGER (0..503)
-- ASN1STOP
```

– **PhysCellIdRange**

The IE **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 **PhysCellIdRange**, E-UTRAN may configure overlapping ranges of physical cell identities.

*PhysCellIdRange information element*

```
-- ASN1START
PhysCellIdRange ::= SEQUENCE {
  start            PhysCellId,
  range            ENUMERATED {
    n4, n8, n12, n16, n24, n32, n48, n64, n84,
    n96, n128, n168, n252, n504, spare2,
    spare1} OPTIONAL -- Need OP
}
-- ASN1STOP
```

**PhysCellIdRange field descriptions**

- **range**
  Indicates the number of physical cell identities in the range (including `start`). Value n4 corresponds with 4, 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.

– **PhysCellIdRangeUTRA-FDDList**

The IE **PhysCellIdRangeUTRA-FDDList** is used to encode one or more of **PhysCellIdRangeUTRA-FDD**. While the IE **PhysCellIdRangeUTRA-FDD** is used to encode either a single physical layer identity or a range of physical layer identities, i.e. primary scrambling codes. Each range is encoded by using a `start` value and by indicating the number of consecutive physical cell identities (including `start`) in the range.

*PhysCellIdRangeUTRA-FDDList information element*

```
-- ASN1START
PhysCellIdRangeUTRA-FDDList-r9 ::= SEQUENCE (SIZE (1..maxPhysCellIdRange-r9)) OF
  PhysCellIdRangeUTRA-FDD-r9
PhysCellIdRangeUTRA-FDD-r9 ::= SEQUENCE {
  start-r9            PhysCellIdUTRA-FDD,
  range-r9            INTEGER (2..512) OPTIONAL -- Need OP
}
-- ASN1STOP
```
- **PhysCellIdCDMA2000**

The IE *PhysCellIdCDMA2000* identifies the PNOffset that represents the "Physical cell identity" in CDMA2000.

**PhysCellIdCDMA2000 information element**

```asn1
PhysCellIdCDMA2000 ::= INTEGER (0..maxPNOffset)
```

- **PhysCellIdGERAN**

The IE *PhysCellIdGERAN* contains the Base Station Identity Code (BSIC).

**PhysCellIdGERAN information element**

```asn1
PhysCellIdGERAN ::= SEQUENCE {
  networkColourCode     BIT STRING (SIZE (3)),
  baseStationColourCode    BIT STRING (SIZE (3))
}
```

**PhysCellIdGERAN field descriptions**

- **networkColourCode**
  Base station Colour Code as defined in TS 23.003 [27].
- **baseStationColourCode**
  Network Colour Code as defined in TS 23.003 [27].

- **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 [19].

**PhysCellIdUTRA-FDD information element**

```asn1
PhysCellIdUTRA-FDD ::= INTEGER (0..511)
```

- **PhysCellIdUTRA-TDD**

The IE *PhysCellIdUTRA-TDD* is used to indicate the physical layer identity of the cell, i.e. the cell parameters ID (TDD), as specified in TS 25.331 [19]. Also corresponds to the Initial Cell Parameter Assignment in TS 25.223 [46].

**PhysCellIdUTRA-TDD information element**

```asn1
PhysCellIdUTRA-TDD ::= INTEGER (0..127)
```
PLMN-Identity

The IE `PLMN-Identity` identifies a Public Land Mobile Network. Further information regarding how to set the IE are specified in TS 23.003 [27].

**PLMN-Identity information element**

```
-- ASN1START

PLMN-Identity ::= SEQUENCE {
  mcc  MCC  OPTIONAL,     -- Cond MCC
  mnc  MNC
}

MCC ::= SEQUENCE (SIZE (3)) OF MCC-MNC-Digit

MNC ::= SEQUENCE (SIZE (2..3)) OF MCC-MNC-Digit

MCC-MNC-Digit ::= INTEGER (0..9)

-- 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 [27].

**mnc**
The first element contains the first MNC digit, the second element the second MNC digit and so on. See TS 23.003 [27].

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCC</td>
<td>This IE is mandatory when <code>PLMN-Identity</code> is included in <code>CellGlobalIdEUTRA</code>, in <code>CellGlobalIdUTRA</code>, in <code>CellGlobalIdGERAN</code> or in <code>RegisteredMME</code>. This IE is also mandatory in the first occurrence of the IE <code>PLMN-Identity</code> within the IE <code>PLMN-IdentityList</code>. Otherwise it is optional, need OP.</td>
</tr>
</tbody>
</table>

---

**PLMN-IdentityList3**

Includes a list of PLMN identities.

**PLMN-IdentityList3 information element**

```
-- ASN1START

PLMN-IdentityList3-r11 ::= SEQUENCE (SIZE (1..16)) OF PLMN-Identity

-- ASN1STOP
```

---

**PreRegistrationInfoHRPD**

```
-- ASN1START

PreRegistrationInfoHRPD ::= SEQUENCE {
  preRegistrationAllowed BOOLEAN,     -- cond PreRegAllowed
  preRegistrationZoneId       PreRegistrationZoneIdHRPD OPTIONAL, -- cond PreRegAllowed
  secondaryPreRegistrationZoneIdList SecondaryPreRegistrationZoneIdListHRPD OPTIONAL -- Need OR
}

SecondaryPreRegistrationZoneIdListHRPD ::= SEQUENCE (SIZE (1..2)) OF PreRegistrationZoneIdHRPD

PreRegistrationZoneIdHRPD ::= INTEGER (0..255)

-- ASN1STOP
```

**Conditional presence**

- **PreRegistrationAllowed**
  - This field is mandatory when `PreRegistrationInfoHRPD` is included in `PreRegistrationInfoHRPD`. Otherwise it is optional, need OP.
### PreRegistrationInfoHRPD field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>preRegistrationAllowed</td>
<td>TRUE indicates that a UE shall perform a CDMA2000 HRPD pre-registration if the UE does not have a valid / current pre-registration. FALSE indicates that the UE is not allowed to perform CDMA2000 HRPD pre-registration in the current cell.</td>
</tr>
<tr>
<td>preRegistrationZoneID</td>
<td>ColorCode (see C.S0024 [26], C.S0087 [44]) of the CDMA2000 Reference Cell corresponding to the HRPD sector under the HRPD AN that is configured for this LTE cell. It is used to control when the UE should register or re-register.</td>
</tr>
<tr>
<td>secondaryPreRegistrationZoneIdList</td>
<td>List of SecondaryColorCodes (see C.S0024 [26], C.S0087 [44]) of the CDMA2000 Reference Cell corresponding to the HRPD sector under the HRPD AN that is configured for this LTE cell. They are used to control when the UE should re-register.</td>
</tr>
</tbody>
</table>

### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PreRegAllowed</td>
<td>The field is mandatory in case the preRegistrationAllowed is set to true. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

---

**Q-QualMin**

The IE **Q-QualMin** is used to indicate for cell selection/ re-selection the required minimum received RSRQ level in the (E-UTRA) cell. Corresponds to parameter \( Q_{\text{qualmin}} \) in TS 36.304 [4]. Actual value \( Q_{\text{qualmin}} = \text{field value} \) [dB].

**Q-QualMin information element**

```
-- ASN1START
Q-QualMin-r9 ::=     INTEGER (-34..-3)
-- ASN1STOP
```

---

**Q-RxLevMin**

The IE **Q-RxLevMin** is used to indicate for cell selection/ re-selection the required minimum received RSRP level in the (E-UTRA) cell. Corresponds to parameter \( Q_{\text{rxlevmin}} \) in TS 36.304 [4]. Actual value \( Q_{\text{rxlevmin}} = \text{field value} \times 2 \) [dBm].

**Q-RxLevMin information element**

```
-- ASN1START
Q-RxLevMin ::=      INTEGER (-70..-22)
-- ASN1STOP
```

---

**Q-OffsetRange**

The IE **Q-OffsetRange** is used to indicate a cell, CSI-RS resource or frequency specific offset to be applied when evaluating candidates for cell re-selection or when evaluating triggering conditions for measurement reporting. The value in dB. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.

**Q-OffsetRange information element**

```
-- ASN1START
Q-OffsetRange ::=      ENUMERATED {
  dB-24, dB-22, dB-20, dB-18, dB-16, dB-14,  
  dB-12, dB-10, dB-8, dB-6, dB-5, dB-4, dB-3,  
  dB-2, dB-1, dB0, dB1, dB2, dB3, dB4, dB5,  
  dB6, dB8, dB10, dB12, dB14, dB16, dB18,  
  dB20, dB22, dB24}
-- ASN1STOP
```
The IE \textit{Q-OffsetRangeInterRAT} is used to indicate a frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value in dB.

\textbf{Q-OffsetRangeInterRAT} information element

\begin{verbatim}
Q-OffsetRangeInterRAT ::= INTEGER (-15..15)
\end{verbatim}

\textbf{ReselectionThreshold} is used to indicate an Rx level threshold for cell reselection. Actual value of threshold = field value \times 2 \text{ [dB]}.

\textbf{ReselectionThreshold} information element

\begin{verbatim}
ReselectionThreshold ::= INTEGER (0..31)
\end{verbatim}

\textbf{ReselectionThresholdQ} is used to indicate a quality level threshold for cell reselection. Actual value of threshold = field value \text{ [dB]}.

\textbf{ReselectionThresholdQ} information element

\begin{verbatim}
ReselectionThresholdQ-r9 ::= INTEGER (0..31)
\end{verbatim}

\textbf{SCellIndex} concerns a short identity, used to identify an SCell.

\textbf{SCellIndex} information element

\begin{verbatim}
SCellIndex-r10 ::= INTEGER (1..7)
SCellIndex-r13 ::= INTEGER (1..31)
\end{verbatim}

\textbf{ServCellIndex} concerns a short identity, used to identify a serving cell (i.e. the PCell or an SCell). Value 0 applies for the PCell, while the \textit{SCellIndex} that has previously been assigned applies for SCells.

\textbf{ServCellIndex} information element

\begin{verbatim}
ServCellIndex-r10 ::= INTEGER (0..7)
ServCellIndex-r13 ::= INTEGER (0..31)
\end{verbatim}
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**

```plaintext
SpeedStateScaleFactors ::=   SEQUENCE {
  sf-Medium       ENUMERATED {oDot25, oDot5, oDot75, lDot0},
  sf-High        ENUMERATED {oDot25, oDot5, oDot75, lDot0}
}
```

**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 36.304 [4]. Value oDot25 corresponds to 0.25, 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 36.304 [4]. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5, oDot75 corresponds to 0.75 and so on.

The IE *SystemInfoListGERAN* contains system information of a GERAN cell.

**SystemInfoListGERAN information element**

```plaintext
SystemInfoListGERAN ::=    SEQUENCE (SIZE (1..maxGERAN-SI)) OF
  OCTET STRING (SIZE (1..23))
```

**SystemInfoListGERAN field descriptions**

Each OCTET STRING contains one System Information (SI) message as defined in TS 44.018 [45, table 9.1.1] excluding the L2 Pseudo Length, the RR management Protocol Discriminator and the Skip Indicator or a complete Packet System Information (PSI) message as defined in TS 44.060 [36, table 11.2.1].

The IE *SystemTimeInfoCDMA2000* informs the UE about the absolute time in the current cell. The UE uses this absolute time knowledge to derive the CDMA2000 Physical cell identity, expressed as PNOffset, of neighbour CDMA2000 cells.

**SystemTimeInfoCDMA2000 information element**

```plaintext
SystemTimeInfoCDMA2000 ::=   SEQUENCE {
  cdma-EUTRA-Synchronisation   BOOLEAN,
  cdma-SystemTime      CHOICE {
    synchronousSystemTime    BIT STRING (SIZE (39)),
    asynchronousSystemTime    BIT STRING (SIZE (49))
  }
}
```
SystemTimeInfoCDMA2000 field descriptions

**asynchronousSystemTime**
The CDMA2000 system time corresponding to the SFN boundary at or after the ending boundary of the SI-Window in which SystemInformationBlockType8 is transmitted. E-UTRAN includes this field if the E-UTRA frame boundary is not aligned to the start of CDMA2000 system time. This field size is 49 bits and the unit is 8 CDMA chips based on 1.2288 Mcps.

**cdma-EUTRA-Synchronisation**
TRUE indicates that there is no drift in the timing between E-UTRA and CDMA2000. FALSE indicates that the timing between E-UTRA and CDMA2000 can drift. NOTE 1

**synchronousSystemTime**
CDMA2000 system time corresponding to the SFN boundary at or after the ending boundary of the SI-window in which SystemInformationBlockType8 is transmitted. E-UTRAN includes this field if the E-UTRA frame boundary is aligned to the start of CDMA2000 system time. This field size is 39 bits and the unit is 10 ms based on a 1.2288 Mcps chip rate.

NOTE 1: The following table shows the recommended combinations of the *cdma-EUTRA-Synchronisation* field and the choice of *cdma-SystemTime* included by E-UTRAN for FDD and TDD:

<table>
<thead>
<tr>
<th>FDD/TDD</th>
<th>cdma-EUTRA-Synchronisation</th>
<th>synchronousSystemTime</th>
<th>asynchronousSystemTime</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDD</td>
<td>FALSE</td>
<td>Not Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>FDD</td>
<td>TRUE</td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>TDD</td>
<td>FALSE</td>
<td>Not Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>TDD</td>
<td>TRUE</td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
</tbody>
</table>

---

**TrackingAreaCode**
The IE *TrackingAreaCode* is used to identify a tracking area within the scope of a PLMN, see TS 24.301 [35].

**TrackingAreaCode information element**

```-- ASN1START
TrackingAreaCode ::=  BIT STRING (SIZE (16))
-- ASN1STOP```

---

**T-Reselection**
The IE *T-Reselection* concerns the cell reselection timer TreselectionRAT for E-UTRA, UTRA, GERAN or CDMA2000. Value in seconds. For value 0, behaviour as specified in 7.3.2 applies.

**T-Reselection information element**

```-- ASN1START
T-Reselection ::=  INTEGER (0..7)
-- ASN1STOP```

---

**T-ReselectionEUTRA-CE**
The IE *T-ReselectionEUTRA-CE* concerns the cell reselection timer TreselectionEUTRA_CE as specified in TS 36.304 [4]. Value in seconds. For value 0, behaviour as specified in 7.3.2 applies.

**T-ReselectionEUTRA-CE information element**

```-- ASN1START
T-ReselectionEUTRA-CE-r13 ::=  INTEGER (0..15)
-- ASN1STOP```
6.3.5 Measurement information elements

– **AllowedMeasBandwidth**

The IE *AllowedMeasBandwidth* is used to indicate the maximum allowed measurement bandwidth on a carrier frequency as defined by the parameter Transmission Bandwidth Configuration “$N_{RB}$” TS 36.104 [47]. The values mbw6, mbw15, mbw25, mbw50, mbw75, mbw100 indicate 6, 15, 25, 50, 75 and 100 resource blocks respectively.

**AllowedMeasBandwidth** information element

```asn1
AllowedMeasBandwidth ::= ENumerated {mbw6, mbw15, mbw25, mbw50, mbw75, mbw100}
```

– **CSI-RSRP-Range**

The IE *CSI-RSRP-Range* specifies the value range used in CSI-RSRP measurements and thresholds. Integer value for CSI-RSRP measurements according to mapping table in TS 36.133 [16].

**CSI-RSRP-Range** information element

```asn1
CSI-RSRP-Range-r12 ::= INTEGER(0..97)
```

– **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

```asn1
Hysteresis ::= INTEGER (0..30)
```

– **LocationInfo**

The IE *LocationInfo* is used to transfer detailed location information available at the UE to correlate measurements and UE position information.

**LocationInfo** information element

```asn1
LocationInfo-r10 ::= SEQUENCE {
  locationCoordinates-r10 CHOICE {
    ellipsoid-Point-r10 OCTET STRING,
    ellipsoidPointWithAltitude-r10 OCTET STRING,
    ..., ellipsoidPointWithUncertaintyCircle-r11 OCTET STRING,
    ellipsoidPointWithUncertaintyEllipse-r11 OCTET STRING,
    ellipsoidPointWithAltitudeAndUncertaintyEllipse-r11 OCTET STRING,
    ellipsoidArc-r11 OCTET STRING,
    polygon-r11 OCTET STRING
  },
  horizontalVelocity-r10 OCTET STRING OPTIONAL,
  gnss-TOD-msec-r10 OCTET STRING OPTIONAL,
  ...
}
```
LocationInfo field descriptions

- **ellipsoidArc**
  Parameter EllipsoidArc defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

- **ellipsoid-Point**
  Parameter Ellipsoid-Point defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

- **ellipsoidPointWithAltitude**
  Parameter EllipsoidPointWithAltitude defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

- **ellipsoidPointWithAltitudeAndUncertaintyEllipsoid**
  Parameter EllipsoidPointWithAltitudeAndUncertaintyEllipsoid defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

- **ellipsoidPointWithUncertaintyCircle**
  Parameter Ellipsoid-PointWithUncertaintyCircle defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

- **ellipsoidPointWithUncertaintyEllipse**
  Parameter EllipsoidPointWithUncertaintyEllipse defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

- **gnss-TOD-msec**
  Parameter Gnss-TOD-msec defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

- **horizontalVelocity**
  Parameter HorizontalVelocity defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

- **polygon**
  Parameter Polygon defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

---

**MBSFN-RSRQ-Range**

The IE MBSFN-RSRQ-Range specifies the value range used in MBSFN RSRQ measurements. Integer value for MBSFN RSRQ measurements according to mapping table in TS 36.133 [16].

**MBSFN-RSRQ-Range information element**

```asn1
-- ASN1START
MBSFN-RSRQ-Range-r12 ::=    INTEGER(0..31)
-- ASN1STOP
```

---

**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**

```asn1
-- ASN1START
MeasConfig ::=      SEQUENCE {
  -- Measurement objects
 _measObjectToRemoveList    MeasObjectToRemoveList    OPTIONAL, -- Need ON
  measObjectToAddModList    MeasObjectToAddModList    OPTIONAL, -- Need ON
  -- Reporting configurations
  reportConfigToRemoveList   ReportConfigToRemoveList   OPTIONAL, -- Need ON
  reportConfigToAddModList   ReportConfigToAddModList   OPTIONAL, -- Need ON
  -- Measurement identities
  measIdToRemoveList     MeasIdToRemoveList     OPTIONAL, -- Need ON
  measIdToAddModList     MeasIdToAddModList     OPTIONAL, -- Need ON
  -- Other parameters
  quantityConfig         QuantityConfig         OPTIONAL, -- Need ON
  measGapConfig          MeasGapConfig          OPTIONAL, -- Need ON
  s-Measure             RSRP-Range              OPTIONAL, -- Need ON
  preRegistrationInfoHRPD PreRegistrationInfoHRPD OPTIONAL, -- Need OP
  speedStatePars         CHOICE {
    -- Measurement objects
    ...}

-- ASN1END
```
MeasConfig field descriptions

allowInterruptions
Value TRUE indicates that the UE is allowed to cause interruptions to serving cells when performing measurements of deactivated SCell carriers for measCycleSCell of less than 640ms, as specified in TS 36.133 [16]. E-UTRAN enables this field only when an SCell is configured.

measGapConfig
Used to setup and release measurement gaps.

measIdToAddModList
List of measurement identities. Field measIdToAddModListExt includes additional measurement identities i.e. extends the size of the measurement identity list using the general principles specified in 5.1.2. If E-UTRAN includes measIdToAddModList-v1310 it includes the same number of entries, and listed in the same order, as in measIdToAddModList (i.e. without suffix). If E-UTRAN includes measIdToAddModListExt-v1310, it includes the same number of entries, and listed in the same order, as in measIdToAddModListExt-r12.

measIdToRemoveList
List of measurement identities to remove. Field measIdToRemoveListExt includes additional measurement identities i.e. extends the size of the measurement identity list using the general principles specified in 5.1.2.

measObjectToAddModList
If E-UTRAN includes measObjectToAddModList-v9e0 it includes the same number of entries, and listed in the same order, as in measObjectToAddModList (i.e. without suffix). Field measObjectToAddModListExt includes additional measurement object identities i.e. extends the size of the measurement object identity list using the general principles specified in 5.1.2.

measObjectToRemoveList
List of measurement objects to remove. Field measObjectToRemoveListExt includes additional measurement object identities i.e. extends the size of the measurement object identity list using the general principles specified in 5.1.2.

measRSRQ-OnAllSymbols
Value TRUE indicates that the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols with wider bandwidth for concerned frequency in accordance with TS 36.214 [48]. If widebandRSRQ-Meas is enabled for the frequency in MeasObjectEUTRA, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols with wider bandwidth for concerned frequency in accordance with TS 36.214 [48].

measScaleFactor
Even if reducedMeasPerformance is not included in any measObjectEUTRA or measObjectUTRA, E-UTRAN may configure this field. The UE behavior is specified in TS 36.133 [16].
**MeasConfig field descriptions**

*preRegistrationInfoHRPD*
The CDMA2000 HRPD Pre-Registration Information tells the UE if it should pre-register with the CDMA2000 HRPD network and identifies the Pre-registration zone to the UE.

*reportConfigToRemoveList*
List of measurement reporting configurations to remove.

*s-Measure*
PCell quality threshold controlling whether or not the UE is required to perform measurements of intra-frequency, inter-frequency and inter-RAT neighbouring cells. Value "0" indicates to disable *s-Measure*.

*timeToTrigger-SF*
The *timeToTrigger* in *ReportConfigEUTRA* and in *ReportConfigInterRAT* are multiplied with the scaling factor applicable for the UE’s speed state.

---

**MeasDS-Config**
The IE *MeasDS-Config* specifies information applicable for discovery signals measurement.

**MeasDS-Config information elements**

```asn1
-- ASN1START
MeasDS-Config-r12 ::= CHOICE {
  release       NULL,
  setup        SEQUENCE {
    dmtc-PeriodOffset-r12       CHOICE {
      ms40-r12      INTEGER(0..39),
      ms80-r12      INTEGER(0..79),
      ms160-r12     INTEGER(0..159),
      ...}
    ds-OccasionDuration-r12    CHOICE {
      durationFDD-r12    INTEGER(1..maxDS-Duration-r12),
      durationTDD-r12    INTEGER(2..maxDS-Duration-r12)
    },
    measCSI-RS-ToRemoveList-r12    MeasCSI-RS-ToRemoveList-r12 OPTIONAL, -- Need ON
    measCSI-RS-ToAddModList-r12   MeasCSI-RS-ToAddModList-r12 OPTIONAL, -- Need ON
    ...}
} }
MeasCSI-RS-ToRemoveList-r12 ::= SEQUENCE (SIZE (1..maxCSI-RS-Meas-r12)) OF MeasCSI-RS-Id-r12
MeasCSI-RS-ToAddModList-r12 ::= SEQUENCE (SIZE (1..maxCSI-RS-Meas-r12)) OF MeasCSI-RS-Id-r12
MeasCSI-RS-Id-r12 ::= INTEGER (1..maxCSI-RS-Meas-r12)
MeasCSI-RS-Config-r12 ::= SEQUENCE {
  measCSI-RS-Id-r12    MeasCSI-RS-Id-r12,
  physCellId-r12     INTEGER (0..503),
  scramblingIdentity-r12       INTEGER (0..503),
  resourceConfig-r12       INTEGER (0..31),
  subframeOffset-r12     INTEGER (0..4),
  csi-RS-IndividualOffset-r12  Q-OffsetRange,
  ...}
-- ASN1STOP
```
MeasDS-Config field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>csi-RS-IndividualOffset</td>
<td>CSI-RS individual offset applicable to a specific CSI-RS resource. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.</td>
</tr>
<tr>
<td>dmtc-PeriodOffset</td>
<td>Indicates the discovery signals measurement timing configuration (DMTC) periodicity (dmtc-Periodicity) and offset (dmtc-Offset) for this frequency. For DMTC periodicity, value ms40 corresponds to 40ms, ms80 corresponds to 80ms and so on. The value of DMTC offset is in number of subframe(s). The duration of a DMTC occasion is 6ms.</td>
</tr>
<tr>
<td>ds-OccasionDuration</td>
<td>Indicates the duration of discovery signal occasion for this frequency. Discovery signal occasion duration is common for all cells transmitting discovery signals on one frequency. If the carrierFreq in the measurement object is on an unlicensed band as specified in [42], the UE shall ignore the field ds-OccasionDuration for the carrier frequency and apply a value 1 instead.</td>
</tr>
<tr>
<td>measCSI-RS-ToAddModList</td>
<td>List of CSI-RS resources to add/modify in the CSI-RS resource list for discovery signals measurement.</td>
</tr>
<tr>
<td>measCSI-RS-ToRemoveList</td>
<td>List of CSI-RS resources to remove from the CSI-RS resource list for discovery signals measurement.</td>
</tr>
<tr>
<td>physCellId</td>
<td>Indicates the physical cell identity where UE may assume that the CSI-RS and the PSS/SSS/CRS corresponding to the indicated physical cell identity are quasi co-located with respect to average delay and doppler shift.</td>
</tr>
<tr>
<td>resourceConfig</td>
<td>Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2]. If the carrierFreq in the measurement object is on an unlicensed band as specified in [42], E-UTRAN does not configure the values {0, 4, 5, 9, 10, 11, 18, 19}.</td>
</tr>
<tr>
<td>scramblingIdentity</td>
<td>Parameter: Pseudo-random sequence generator parameter, $n_{ID}$, see TS 36.213 [23, 7.2.5].</td>
</tr>
<tr>
<td>subframeOffset</td>
<td>Indicates the subframe offset between SSS of the cell indicated by physCellId and the CSI-RS resource in a discovery signal occasion. The field subframeOffset is set to values 0 if the carrierFreq in the measurement object is on an unlicensed band as specified in [42].</td>
</tr>
</tbody>
</table>

MeasGapConfig

The IE MeasGapConfig specifies the measurement gap configuration and controls setup/release of measurement gaps.

MeasGapConfig information element

```asn1
MeasGapConfig ::= CHOICE {
  release         NULL,
  setup           SEQUENCE {
    gapOffset       CHOICE {
      gp0         INTEGER (0..39),
      gp1         INTEGER (0..79),
      ...
    }
  }
}
```

MeasGapConfig field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>gapOffset</td>
<td>Value gapOffset of gp0 corresponds to gap offset of Gap Pattern Id &quot;0&quot; with MGRP = 40ms, gapOffset of gp1 corresponds to gap offset of Gap Pattern Id &quot;1&quot; with MGRP = 80ms. Also used to specify the measurement gap pattern to be applied, as defined in TS 36.133 [16].</td>
</tr>
</tbody>
</table>

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

```
MeasId ::= INTEGER {1..maxMeasId}
MeasId-v1250 ::= INTEGER {maxMeasId-Plus1..maxMeasId-r12}
```

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. Field measIdToAddModListExt includes additional measurement identities i.e. extends the size of the measurement identity list using the general principles specified in 5.1.2.

```
MeasIdToAddModList ::= SEQUENCE {SIZE (1..maxMeasId)} OF MeasIdToAddMod
MeasIdToAddModList-v1310 ::= SEQUENCE {SIZE (1..maxMeasId)} OF MeasIdToAddMod-v1310
MeasIdToAddModListExt-r12 ::= SEQUENCE {SIZE (1..maxMeasId)} OF MeasIdToAddModExt-r12
MeasIdToAddModListExt-v1310 ::= SEQUENCE {SIZE (1..maxMeasId)} OF MeasIdToAddMod-v1310
```

MeasIdToAddMod

```
MeasIdToAddMod ::= SEQUENCE {
    measId        MeasId,
    measObjectId      MeasObjectId,
    reportConfigId      ReportConfigId
}
```

MeasIdToAddModExt-r12

```
MeasIdToAddModExt-r12 ::= SEQUENCE {
    measId-v1250      MeasId-v1250,
    measObjectId-r12     MeasObjectId,
    reportConfigId-r12     ReportConfigId
}
```

MeasIdToAddMod-v1310

```
MeasIdToAddMod-v1310 ::= SEQUENCE {
    measObjectId-v1310   MeasObjectId-v1310  OPTIONAL
}
```

MeasIdToAddModList field descriptions

**measObjectId**

If the measObjectId-v1310 is included, the measObjectId or measObjectId-r12 is ignored by the UE.

MeasObjectCDMA2000

The IE MeasObjectCDMA2000 specifies information applicable for inter-RAT CDMA2000 neighbouring cells.

```
MeasObjectCDMA2000 ::= SEQUENCE {
    cdma2000-Type      CDMA2000-Type,
    carrierFreq       CarrierFreqCDMA2000,      OPTIONAL, -- Need ON
    searchWindowSize     INTEGER (0..15)      OPTIONAL, -- Need ON
    offsetFreq       Q-OffsetRangeInterRAT    DEFAULT 0,      OPTIONAL, -- Need ON
    cellsToRemoveList     CellIndexList      OPTIONAL, -- Need ON
    cellsToAddModList     CellsToAddModListCDMA2000   OPTIONAL, -- Need ON
    cellForWhichToReportCGI    PhysCellIdCDMA2000  OPTIONAL, -- Need ON
    ...
}
```

CellsToAddModListCDMA2000

```
CellsToAddModListCDMA2000 ::= SEQUENCE {SIZE (1..maxCellMeas)} OF CellsToAddModCDMA2000
```
MeasObjectCDMA2000 field descriptions

- **carrierInfo**: Identifies CDMA2000 carrier frequency for which this configuration is valid.
- **cdma2000-Type**: The type of CDMA2000 network: CDMA2000 1xRTT or CDMA2000 HRPD.
- **cellIndex**: Entry index in the neighbouring cell list.
- **cellsToAddModList**: List of cells to add/modify in the neighbouring cell list.
- **cellsToRemoveList**: List of cells to remove from the neighbouring cell list.
- **physCellId**: CDMA2000 Physical cell identity of a cell in neighbouring cell list expressed as PNOffset.

searchWindowSize
Provides the search window size to be used by the UE for the neighbouring pilot, see C.S0005 [25].

---

**MeasObjectEUTRA**

The IE MeasObjectEUTRA specifies information applicable for intra-frequency or inter-frequency E-UTRA cells.

**MeasObjectEUTRA information element**

---

MeasObjectEUTRA ::= SEQUENCE {
  carrierFreq             ARFCN-ValueEUTRA,
  allowedMeasBandwidth    AllowedMeasBandwidth,
  presenceAntennaPort1    PresenceAntennaPort1,
  neighCellConfig         NeighCellConfig,
  offsetFreq              Q-OffsetRange DEFAULT dB0,
  -- Cell list
  cellsToRemoveList       CellIndexList OPTIONAL, -- Need ON
  cellsToAddModList       CellsToAddModList OPTIONAL, -- Need ON
  -- Black list
  blackCellsToRemoveList  CellIndexList OPTIONAL, -- Need ON
  blackCellsToAddModList  BlackCellsToAddModList OPTIONAL, -- Need ON
  cellForWhichToReportCGI PhysCellId OPTIONAL, -- Need ON
  ...,
  [[measCycleSCell-r10    MeasCycleSCell-r10 OPTIONAL, -- Need ON
    measSubframePatternConfigNeigh-r10 MeasSubframePatternConfigNeigh-r10 OPTIONAL -- Need ON
    ],
  [[widebandRSRQ-Meas-r11 BOOLEAN OPTIONAL -- Cond WB-RSRQ
    ],
  [[ altTTT-CellsToRemoveList-r12 CellIndexList OPTIONAL, -- Need ON
    altTTT-CellsToAddModList-r12 CellIndexList OPTIONAL, -- Need ON
    t312-r12              CHOICE {
      release              NULL,
      setup                ENUMERATED {ms0, ms50, ms100, ms200,
                                ms300, ms400, ms500, ms1000}
    } OPTIONAL, -- Need ON
    reducedMeasPerformance-r12 BOOLEAN OPTIONAL, -- Need ON
    measDS-Config-r12     MeasDS-Config-r12 OPTIONAL -- Need ON
    ],
  [[ whiteCellsToRemoveList-r13 CellIndexList OPTIONAL, -- Need ON
    whiteCellsToAddModList-r13 CellIndexList OPTIONAL, -- Need ON
    rmtc-Config-r13        RMT-C-Config-r13 OPTIONAL, -- Need ON
    carrierFreq-r13        ARFCN-ValueEUTRA-v9e0 OPTIONAL -- Need ON
    ],
  [[ carrierFreq-v9e0     ARFCN-ValueEUTRA-v9e0
  ]
}

MeasObjectEUTRA-v9e0 ::= SEQUENCE [-- ASN1STOP
  carrierFreq-v9e0     ARFCN-ValueEUTRA-v9e0
]
CellsToAddModList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddMod

CellsToAddMod ::= SEQUENCE {
  cellIndex       INTEGER (1..maxCellMeas),
  physCellId       PhysCellId,
  cellIndividualOffset    Q-OffsetRange
}

BlackCellsToAddModList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF BlackCellsToAddMod

BlackCellsToAddMod ::= SEQUENCE {
  cellIndex       INTEGER (1..maxCellMeas),
  physCellIdRange      PhysCellIdRange
}

MeasCycleSCell-r10 ::= ENUMERATED {sf160, sf256, sf320, sf512, sf640, sf1024, sf1280, spare1}

MeasSubframePatternConfigNeigh-r10 ::= CHOICE {
  release NULL,
  setup    SEQUENCE {
    measSubframePatternNeigh-r10   MeasSubframePattern-r10,
    measSubframeCellList-r10    MeasSubframeCellList-r10 OPTIONAL -- Cond
    always
  }
}

MeasSubframeCellList-r10 ::= SEQUENCE (SIZE (1..maxCellMeas)) OF PhysCellIdRange

AltTTT-CellsToAddModList-r12 ::= SEQUENCE (SIZE (1..maxCellMeas)) OF AltTTT-CellsToAddMod-r12

AltTTT-CellsToAddMod-r12 ::= SEQUENCE {
  cellIndex-r12       INTEGER (1..maxCellMeas),
  physCellIdRange-r12      PhysCellIdRange
}

WhiteCellsToAddModList-r13 ::= SEQUENCE (SIZE (1..maxCellMeas)) OF WhiteCellsToAddMod-r13

WhiteCellsToAddMod-r13 ::= SEQUENCE {
  cellIndex-r13       INTEGER (1..maxCellMeas),
  physCellIdRange-r13      PhysCellIdRange
}

RMTC-Config-r13 ::= CHOICE {
  release NULL,
  setup    SEQUENCE {
    rmrtc-Period-r13     ENUMERATED {ms40, ms80, ms160, ms320, ms640},
    rmrtc-SubframeOffset-r13   INTEGER(0..639) OPTIONAL,  -- Need ON
    measDuration-r13    ENUMERATED {sym1, sym14, sym28, sym42, sym70},
    ...
  }
}

-- ASN1STOP
**MeasObjectEUTRA field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>altTTT-CellsToAddModList</td>
<td>List of cells to add/ modify in the cell list for which the alternative time to trigger specified by alternativeTimeToTrigger in reportConfigEUTRA, if configured, applies.</td>
<td></td>
</tr>
<tr>
<td>altTTT-CellsToRemoveList</td>
<td>List of cells to remove from the list of cells for alternative time to trigger.</td>
<td></td>
</tr>
<tr>
<td>blackCellsToAddModList</td>
<td>List of cells to add/ modify in the black list of cells.</td>
<td></td>
</tr>
<tr>
<td>blackCellsToRemoveList</td>
<td>List of cells to remove from the black list of cells.</td>
<td></td>
</tr>
<tr>
<td>carrierFreq</td>
<td>Identifies E-UTRA carrier frequency for which this configuration is valid. E-UTRA does not configure more than one measurement object for the same physical frequency regardless of the E-ARFCN used to indicate this. CarrierFreq-r13 is included only when the extension list measObjectToAddModListExt-r13 is used. If carrierFreq-r13 is present, carrierFreq (i.e., without suffix) shall be set to value maxEARFCN.</td>
<td></td>
</tr>
<tr>
<td>cellIndex</td>
<td>Entry index in the cell list. An entry may concern a range of cells, in which case this value applies to the entire range.</td>
<td></td>
</tr>
<tr>
<td>cell IndividualOffset</td>
<td>Cell individual offset applicable to a specific cell. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.</td>
<td></td>
</tr>
<tr>
<td>cellsToAddModList</td>
<td>List of cells to add/ modify in the cell list.</td>
<td></td>
</tr>
<tr>
<td>cellsToRemoveList</td>
<td>List of cells to remove from the cell list.</td>
<td></td>
</tr>
<tr>
<td>measCycleSCell</td>
<td>The parameter is used only when an SCell is configured on the frequency indicated by the measObject and is in deactivated state, see TS 36.133 [16, 8.3.3]. E-UTRA configures the parameter whenever an SCell is configured on the frequency indicated by the measObject, but the field may also be signalled when an SCell is not configured. Value sf160 corresponds to 160 sub-frames, sf256 corresponds to 256 sub-frames and so on.</td>
<td></td>
</tr>
<tr>
<td>measDS-Config</td>
<td>Parameters applicable to discovery signals measurement on the carrier frequency indicated by carrierFreq.</td>
<td></td>
</tr>
<tr>
<td>measDuration</td>
<td>Number of consecutive symbols for which the Physical Layer reports samples of RSSI, see TS 36.214 [48]. Value sym1 corresponds to one symbol, sym14 corresponds to 14 symbols, and so on.</td>
<td></td>
</tr>
<tr>
<td>measSubframeCellList</td>
<td>List of cells for which measSubframePatternNeigh is applied.</td>
<td></td>
</tr>
<tr>
<td>measSubframePatternNeigh</td>
<td>Time domain measurement resource restriction pattern applicable to neighbour cell RSRP and RSQ measurements on the carrier frequency indicated by carrierFreq. For cells in measSubframeCellList the UE shall assume that the subframes indicated by measSubframePatternNeigh are non-MBSFN subframes, and have the same special subframe configuration as PCell.</td>
<td></td>
</tr>
<tr>
<td>offsetFreq</td>
<td>Offset value applicable to the carrier frequency. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.</td>
<td></td>
</tr>
<tr>
<td>physCellId</td>
<td>Physical cell identity of a cell in the cell list.</td>
<td></td>
</tr>
<tr>
<td>physCellIdRange</td>
<td>Physical cell identity or a range of physical cell identities.</td>
<td></td>
</tr>
<tr>
<td>reducedMeasPerformance</td>
<td>If set to TRUE, the EUTRA carrier frequency is configured for reduced measurement performance, otherwise it is configured for normal measurement performance, see TS 36.133 [16].</td>
<td></td>
</tr>
<tr>
<td>rmtc-Config</td>
<td>Parameters applicable to RSSI and channel occupancy measurement on the carrier frequency indicated by carrierFreq.</td>
<td></td>
</tr>
<tr>
<td>rmtc-Period</td>
<td>Indicates the RSSI measurement timing configuration (RMTC) periodicity for this frequency. Value ms40 corresponds to 40 ms periodicity, ms80 corresponds to 80 ms periodicity and so on, see TS 36.214 [48].</td>
<td></td>
</tr>
<tr>
<td>rmtc-SubframeOffset</td>
<td>Indicates the RSSI measurement timing configuration (RMTC) subframe offset for this frequency. The value of rmtc-SubframeOffset should be smaller than the value of rmtc-Period, see TS 36.214 [48]. 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 measDuration which shall be selected to be between 0 and the configured rmtc-Period with equal probability.</td>
<td></td>
</tr>
<tr>
<td>t312</td>
<td>The value of timer T312. Value ms0 represents 0 ms, ms50 represents 50 ms and so on.</td>
<td></td>
</tr>
</tbody>
</table>
MeasObjectEUTRA field descriptions

**widebandRSRQ-Meas**
If this field is set to TRUE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16].

**whiteCellsToAddModList**
List of cells to add/modify in the white list of cells.

**whiteCellsToRemoveList**
List of cells to remove from the white list of cells.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>always</td>
<td>The field is mandatory present.</td>
</tr>
<tr>
<td>WB-RSRQ</td>
<td>The field is optionally present, need ON, if the measurement bandwidth indicated by allowedMeasBandwidth is 50 resource blocks or larger; otherwise it is not present and the UE shall delete any existing value for this field, if configured.</td>
</tr>
</tbody>
</table>

— **MeasObjectGERAN**

The IE *MeasObjectGERAN* specifies information applicable for inter-RAT GERAN neighbouring frequencies.

**MeasObjectGERAN** information element

```asn1
MeasObjectGERAN ::=     SEQUENCE {
  carrierFreqs      CarrierFreqsGERAN,
  offsetFreq       Q-OffsetRangeInterRAT  DEFAULT 0,
  ncc-Permitted      BIT STRING(SIZE (8))  DEFAULT '11111111'B,
  cellForWhichToReportCGI    PhysCellIdGERAN    OPTIONAL, -- Need ON
  ...
}
```

**MeasObjectGERAN** field descriptions

**ncc-Permitted**
Field encoded as a bit map, where bit N is set to "0" if a BCCH carrier with NCC = N-1 is not permitted for monitoring and set to "1" if a BCCH carrier with NCC = N-1 is permitted for monitoring; N = 1 to 8; bit 1 of the bitmap is the leading bit of the bit string.

**carrierFreqs**
If E-UTRAN includes cellForWhichToReportCGI, it includes only one GERAN ARFCN value in carrierFreqs.

— **MeasObjectId**

The IE *MeasObjectId* used to identify a measurement object configuration.

**MeasObjectId** information element

```asn1
MeasObjectId ::=     INTEGER (1..maxObjectId)
MeasObjectId-v1310 ::=   INTEGER (maxObjectId-Plus1-r13..maxObjectId-r13)
MeasObjectId-r13 ::=    INTEGER (1..maxObjectId-r13)
```

— **MeasObjectToAddModList**

The IE *MeasObjectToAddModList* concerns a list of measurement objects to add or modify

**MeasObjectToAddModList** information element

```asn1
```
Conditional presence | Explanation
---|---
eutra | The field is optional present, need OR, if for the corresponding entry in MeasObjectToAddModList or MeasObjectToAddModListExt-r13 field measObject is set to measObjectEUTRA and its sub-field carrierFreq is set to maxEARFCN. Otherwise the field is not present and the UE shall delete any existing value for this field.

---

MeasObjectUTRA

The IE MeasObjectUTRA specifies information applicable for inter-RAT UTRA neighbouring cells.

MeasObjectUTRA information element

---

MeasObjectUTRA ::= SEQUENCE {
  carrierFreq       ARFCN-ValueUTRA,
  offsetFreq       Q-OffsetRangeInterRAT  DEFAULT 0,
  cellsToRemoveList     CellIndexList    OPTIONAL,   -- Need ON
  cellsToAddModListUTRA-FDD   CellsToAddModListUTRA-FDD,
  cellsToAddModListUTRA-TDD   CellsToAddModListUTRA-TDD
}

MeasObjectUTRA-FDD ::= SEQUENCE {
  cellIndex       INTEGER (1..maxCellMeas),
}
physCellId       PhysCellIdUTRA-FDD
}

CellsToAddModListUTRA-FDD ::= SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModUTRA-FDD

CellsToAddModListUTRA-TDD ::= SEQUENCE {
    cellIndex       INTEGER (1..maxCellMeas),
    physCellId       PhysCellIdUTRA-TDD
}

CSG-AllowedReportingCells-r9 ::= SEQUENCE {
    physCellIdRangeUTRA-FDDList-r9       PhysCellIdRangeUTRA-FDDList-r9 OPTIONAL -- Need OR
}

-- ASN1STOP

MeasObjectUTRA field descriptions

carrierFreq
Identifies UTRA carrier frequency for which this configuration is valid. E-UTRAN does not configure more than one
measurement object for the same physical frequency regardless of the ARFCN used to indicate this.

cellIndex
Entry index in the neighbouring cell list.

cellsToAddModListUTRA-FDD
List of UTRA FDD cells to add/modify in the neighbouring cell list.

cellsToAddModListUTRA-TDD
List of UTRA TDD cells to add/modify in the neighbouring cell list.

cellsToRemoveList
List of cells to remove from the neighbouring cell list.

csG-allowedReportingCells
One or more ranges of physical cell identities for which UTRA-FDD reporting is allowed.

reducedMeasPerformance
If set to TRUE the UTRA carrier frequency is configured for reduced measurement performance, otherwise it is
configured for normal measurement performance, see TS 36.133 [16].

-- MeasObjectWLAN

The IE MeasObjectWLAN specifies information applicable for inter-RAT WLAN measurements. E-UTRAN configures
at least one WLAN identifier in the MeasObjectWLAN.

-- ASN1START

MeasObjectWLAN-r13 ::= SEQUENCE {
    carrierFreq-r13     CHOICE {
        bandIndicatorListWLAN-r13       SEQUENCE (SIZE (1..maxWLAN-Bands-r13)) OF WLAN-
CarrierInfo-r13,  
        carrierInfoListWLAN-r13        SEQUENCE (SIZE (1..maxWLAN-CarrierInfo-r13)) OF WLAN-
CarrierInfo-r13  
    }  OPTIONAL, -- Need ON
    wlan-ToAddModList-r13  WLAN-Id-List-r13 OPTIONAL, -- Need ON
    wlan-ToRemoveList-r13  WLAN-Id-List-r13 OPTIONAL, -- Need ON
    ...
}

WLAN-BandIndicator-r13 ::= ENUMERATED {band2dot4, band5, spare6, spare5, spare4, spare3, spare2, spare1, ...}

-- ASN1STOP

MeasObjectWLAN field descriptions

bandIndicatorListWLAN
Includes the list of WLAN bands where the value band2dot4 indicates the 2.4Ghz band; the value band5 indicates the
5Ghz band.

carrierInfoListWLAN
Includes the list of WLAN carrier information for the measurement object.

wlan-ToAddModList
Includes the list of WLAN identifiers to be added to the measurement configuration.

wlan-ToRemoveList
Includes the list of WLAN identifiers to be removed from the measurement configuration.
MeasResults

The IE MeasResults covers measured results for intra-frequency, inter-frequency and inter-RAT mobility.

MeasResults information element

```asn1
MeasResults ::= SEQUENCE {
  measId               MeasId,
  measResultPCell      SEQUENCE {
    rsrpResult       RSRP-Range,
    rsrqResult       RSRQ-Range
  },
  measResultNeighCells CHOICE {
    measResultListEUTRA  MeasResultListEUTRA,
    measResultListUTRA   MeasResultListUTRA,
    measResultListGERAN  MeasResultListGERAN,
    measResultsCDMA2000  MeasResultsCDMA2000,
    ...                OPTIONAL,
  },
  ...,
  [[ measResultForECID-r9  MeasResultForECID-r9  OPTIONAL
  ]],
  [[ locationInfo-r10     LocationInfo-r10     OPTIONAL,
    measResultServFreqList-r10  MeasResultServFreqList-r10  OPTIONAL
  ]],
  [[ meaId-v1250          MeaId-v1250          OPTIONAL,
    measResultPCell-v1250   RSRQ-Range-v1250   OPTIONAL,
    measResultCSI-RS-List-r12  MeasResultCSI-RS-List-r12  OPTIONAL
  ]],
  [[ measResultForRSSI-r13  MeasResultForRSSI-r13  OPTIONAL,
    measResultServFreqListExt-r13  MeasResultServFreqListExt-r13  OPTIONAL,
    measResultSSD-r13       MeasResultSSD-r13       OPTIONAL,
    measResultPCell-v1310   SEQUENCE {
      rs-sinr-Result-r13     RS-SINR-Range-r13
    },
    ul-PDCP-DelayResultList-r13  UL-PDCP-DelayResultList-r13  OPTIONAL,
    measResultListWLAN-r13  MeasResultListWLAN-r13  OPTIONAL
  ]],
  [[ measResultPCell-v1360  RSRP-Range-v1360  OPTIONAL
  ]]
}

MeasResultListEUTRA ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultEUTRA

MeasResultEUTRA ::= SEQUENCE {
  physCellId       PhysCellId,
  cgi-Info         SEQUENCE {
    cellGlobalId     CellGlobalIdEUTRA,
    trackingAreaCode TrackingAreaCode,
    plmn-IdentityList PLMN-IdentityList2
  } OPTIONAL,
  measResult       SEQUENCE {
    rsrpResult       RSRP-Range
    rsrqResult       RSRQ-Range
    ...,
    [[ additionalSI-Info-r9  AdditionalSI-Info-r9  OPTIONAL
      ]],
    [[ primaryPLMN-Suitable-r12  ENUMERATED {true}  OPTIONAL,
      meaResult-v1250  RSRQ-Range-v1250
    ]],
    [[ rs-sinr-Result-r13  RS-SINR-Range-r13
      cgi-Info-v1310   SEQUENCE {
        freqBandIndicator-r13  FreqBandIndicator-r13
        MultiBandInfoList-r11  MultiBandInfoList-r11
        freqBandIndicatorPriority-r13  ENUMERATED {true}
      } OPTIONAL
    ]],
    [[ measResult-v1360  RSRP-Range-v1360
      ]]
}
```
MeasResultServFreqList-r10 ::= SEQUENCE (SIZE (1..maxServCell-r10)) OF MeasResultServFreq-r10

MeasResultServFreqListExt-r13 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF MeasResultServFreq-r13

MeasResultServFreq-r10 ::= SEQUENCE {
  servFreqId-r10       ServCellIndex-r10,
  measResultSCell-r10     SEQUENCE {
    rsrpResultSCell-r10     RSRP-Range,
    rsrqResultSCell-r10     RSRQ-Range
  }               OPTIONAL,
  measResultBestNeighCell-r10  SEQUENCE {
    physCellId-r10       PhysCellId,
    rsrpResultNCell-r10     RSRP-Range,
    rsrqResultNCell-r10     RSRQ-Range
  }               OPTIONAL,
  ...,
  [[ measResultSCell-v1250     RSRQ-Range-v1250 OPTIONAL,
    measResultBestNeighCell-v1250  RSRQ-Range-v1250 OPTIONAL
  ]],
  [[ measResultSCell-v1310     SEQUENCE {
    rs-sinr-Result-r13     RS-SINR-Range-r13
  }  OPTIONAL,
    measResultBestNeighCell-v1310  SEQUENCE {
    rs-sinr-Result-r13     RS-SINR-Range-r13
  }  OPTIONAL
  ]]
}

MeasResultServFreq-r13 ::= SEQUENCE {
  servFreqId-r13       ServCellIndex-r13,
  measResultSCell-r13     SEQUENCE {
    rsrpResultSCell-r13     RSRP-Range,
    rsrqResultSCell-r13     RSRQ-Range-r13,
    rs-sinr-Result-r13     RS-SINR-Range-r13 OPTIONAL
  }               OPTIONAL,
  measResultBestNeighCell-r13  SEQUENCE {
    physCellId-r13       PhysCellId,
    rsrpResultNCell-r13     RSRP-Range,
    rsrqResultNCell-r13     RSRQ-Range-r13,
    rs-sinr-Result-r13     RS-SINR-Range-r13 OPTIONAL
  }               OPTIONAL,
  ...,
  [[ measResultBestNeighCell-v1360  SEQUENCE {
    rsrpResultNCell-v1360    RSRP-Range-v1360
  }              OPTIONAL
  ]]
}

MeasResultCSI-RS-List-r12 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultCSI-RS-r12

MeasResultCSI-RS-r12 ::=  SEQUENCE {
  measCSI-RS-Id-r12    MeasCSI-RS-Id-r12,
  csi-RSRP-Result-r12  CSI-RSRP-Range-r12,
  ...}

MeasResultListUTRA ::=    SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultUTRA

MeasResultUTRA ::= SEQUENCE { physCellId CHOICE { fdd PhysCellIdUTRA-FDD, tdd PhysCellIdUTRA-TDD },
  cgi-Info SEQUENCE {
    cellGlobalId CellGlobalIdUTRA,
    locationAreaCode BIT STRING (SIZE (16)) OPTIONAL,
    routingAreaCode BIT STRING (SIZE (8)) OPTIONAL,
    plmn-IdentityList PLMN-IdentityList2 OPTIONAL
  } OPTIONAL,
  measResult SEQUENCE {
    utra-RSCP INTEGER (-5..91) OPTIONAL,
    utra-EcN0 INTEGER (0..49) OPTIONAL,
    ...,
    [[ additionalSI-Info-r9 AdditionalSI-Info-r9 OPTIONAL
      ]],
    [[ primaryPLMN-Suitable-r12 ENUMERATED {true} OPTIONAL
      ]]
  }
MeasResultListGERAN ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultGERAN

MeasResultGERAN ::= SEQUENCE {
carrierFreq CarrierFreqGERAN,
physCellId PhysCellIdGERAN,
cgi-Info SEQUENCE {
cellGlobalId CellGlobalIdGERAN,
routingAreaCode BIT STRING (SIZE (8)) OPTIONAL,
}  
measResult SEQUENCE {
  rssi INTEGER (0..63),
  ... 
}
}

MeasResultsCDMA2000 ::= SEQUENCE {
  preRegistrationStatusHRPD BOOLEAN,
  measResultListCDMA2000 MeasResultListCDMA2000
}

MeasResultCDMA2000 ::= SEQUENCE {
  physCellId PhysCellIdCDMA2000,
cgi-Info CellGlobalIdCDMA2000 OPTIONAL,
measResult SEQUENCE {
pilotPnPhase INTEGER (0..32767) OPTIONAL,
pilotStrength INTEGER (0..63),
... 
}
}

MeasResultListWLAN-r13 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultWLAN-r13

MeasResultWLAN-r13 ::= SEQUENCE {
wlan-Identifiers-r13 WLAN-Identifiers-r12,
carrierInfoWLAN-r13 WLAN-CarrierInfo-r13 OPTIONAL,
bandWLAN-r13 WLAN-BandIndicator-r13 OPTIONAL,
rssiWLAN-r13 WLAN-RSSI-Range-r13,
availableAdmissionCapacityWLAN-r13 INTEGER (0..31250) OPTIONAL,
backhaulUL-BandwidthWLAN-r13 WLAN-backhaulRate-r12 OPTIONAL,
backhaulDL-BandwidthWLAN-r13 WLAN-backhaulRate-r12 OPTIONAL,
channelUtilizationWLAN-r13 INTEGER (0..255) OPTIONAL,
stationCountWLAN-r13 INTEGER (0..65535) OPTIONAL,
connectedWLAN-r13 ENUMERATED {true} OPTIONAL,
... 
}

MeasResultForECID-r9 ::= SEQUENCE {
  ue-RxTxTimeDiffResult-r9 INTEGER (0..4095),
currentSFN-r9 BIT STRING (SIZE (10))
}

PLMN-IdentityList2 ::= SEQUENCE (SIZE (1..5)) OF PLMN-Identity

AdditionalSI-Info-r9 ::= SEQUENCE {
csg-MemberStatus-r9 ENUMERATED {member} OPTIONAL,
csg-Identity-r9 CSG-Identity OPTIONAL
}

MeasResultForRSSI-r13 ::= SEQUENCE {
rssi-Result-r13 RSSI-Range-r13,
channelOccupancy-r13 INTEGER (0..100),
... 
}

UL-PDCP-DelayResultList-r13 ::= SEQUENCE (SIZE (1..maxQCI-r13)) OF UL-PDCP-DelayResult-r13

UL-PDCP-DelayResult-r13 ::= SEQUENCE {
  qci-Id-r13 ENUMERATED {qci1, qci2, qci3, qci4, spare4, spare3, spare2, spare1},
excessDelay-r13 INTEGER (0..31),
... 
}
MeasResults field descriptions

availableAdmissionCapacityWLAN
Indicates the available admission capacity of WLAN as defined in IEEE 802.11-2012 [67].

backhaulDL-BandwidthWLAN
Indicates the backhaul available downlink bandwidth of WLAN, equal to Downlink Speed times Downlink Load defined in Wi-Fi Alliance Hotspot 2.0 [76].

backhaulUL-BandwidthWLAN
Indicates the backhaul available uplink bandwidth of WLAN, equal to Uplink Speed times Uplink Load defined in Wi-Fi Alliance Hotspot 2.0 [76].

bandWLAN
Indicates the WLAN band.

carrierInfoWLAN
Indicates the WLAN channel information.

channelOccupancy
Indicates the percentage of samples when the RSSI was above the configured channelOccupancyThreshold for the associated reportConfig.

channelUtilizationWLAN
Indicates WLAN channel utilization as defined in IEEE 802.11-2012 [67].

connectedWLAN
Indicates whether the UE is connected to the WLAN for which the measurement results are applicable.

csg-MemberStatus
Indicates whether or not the UE is a member of the CSG of the neighbour cell.

currentSFN
Indicates the current system frame number when receiving the UE Rx-Tx time difference measurement results from lower layer.

excessDelay
Indicates excess queueing delay ratio in UL, according to excess delay ratio measurement report mapping table, as defined in TS 36.314 [71, Table 4.2.1.1.1-1]

locationAreaCode
A fixed length code identifying the location area within a PLMN, as defined in TS 23.003 [27].

measId
Identifies the measurement identity for which the reporting is being performed. If the measId-v1250 is included, the measId (i.e. without a suffix) is ignored by eNB.

measResult
Measured result of an E-UTRA cell;
Measured result of a UTRA cell;
Measured result of a GERAN cell or frequency;
Measured result of a CDMA2000 cell;
Measured result of a WLAN;
Measured result of UE Rx–Tx time difference;
Measured result of UE SFN, radio frame and subframe timing difference; or
Measured result of RSSI and channel occupancy.

measResultCSI-RS-List
Measured results of the CSI-RS resources in discovery signals measurement.

measResultListCDMA2000
List of measured results for the maximum number of reported best cells for a CDMA2000 measurement identity.

measResultListEUTRA
List of measured results for the maximum number of reported best cells for an E-UTRA measurement identity. For BL UEs or UEs in CE, when operating in CE Mode B, measResult-v1360 is reported if the measured RSRP is less than -140 dBm.

measResultListGERAN
List of measured results for the maximum number of reported best cells or frequencies for a GERAN measurement identity.

measResultListUTRA
List of measured results for the maximum number of reported best cells for a UTRA measurement identity.

measResultListWLAN
List of measured results for the maximum number of reported best WLAN outside the WLAN mobility set and connected WLAN, if any, for a WLAN measurement identity.

measResultPCell
Measured result of the PCell. For BL UEs or UEs in CE, when operating in CE Mode B, measResultPCell-v1360 is reported if the measured RSRP is less than -140 dBm.

measResultsCDMA2000
Contains the CDMA2000 HRPD pre-registration status and the list of CDMA2000 measurements.
MeasResults field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MeasResultServFreqList</td>
<td>Measured results of the serving frequencies: the measurement result of each SCell, if any, and of the best neighbouring cell on each serving frequency. For BL UEs or UEs in CE, when operating in CE Mode B, <code>measResultBestNeighCell-v1360</code> is reported if the measured RSRP is less than -140 dBm.</td>
</tr>
<tr>
<td>pilotPnPhase</td>
<td>Indicates the arrival time of a CDMA2000 pilot, measured relative to the UE's time reference in units of PN chips, see C.S0005 [25]. This information is used in either SRVCC handover or enhanced 1xRTT CS fallback procedure to CDMA2000 1xRTT.</td>
</tr>
<tr>
<td>plmn-IdentityList</td>
<td>The list of PLMN Identity read from broadcast information when the multiple PLMN Identities are broadcast.</td>
</tr>
<tr>
<td>preRegistrationStatusHRPD</td>
<td>Set to TRUE if the UE is currently pre-registered with CDMA2000 HRPD. Otherwise set to FALSE. This can be ignored by the eNB for CDMA2000 1xRTT.</td>
</tr>
<tr>
<td>qci-id</td>
<td>Indicates QCI value for which <code>excessDelay</code> is provided, according to TS 36.314 [71].</td>
</tr>
<tr>
<td>routingAreaCode</td>
<td>The RAC identity read from broadcast information, as defined in TS 23.003 [27].</td>
</tr>
<tr>
<td>rsrpResult</td>
<td>Measured RSRP result of an E-UTRA cell. The <code>rsrpResult</code> is only reported if configured by the eNB.</td>
</tr>
<tr>
<td>rsrqResult</td>
<td>Measured RSRQ result of an E-UTRA cell. The <code>rsrqResult</code> is only reported if configured by the eNB.</td>
</tr>
<tr>
<td>rssi</td>
<td>GERAN Carrier RSSI. RXLEV is mapped to a value between 0 and 63, TS 45.008 [28]. When mapping the RXLEV value to the RSSI bit string, the first/leftmost bit of the bit string contains the most significant bit.</td>
</tr>
<tr>
<td>rssi-Result</td>
<td>Measured RSI result in dBm.</td>
</tr>
<tr>
<td>rs-sinr-Result</td>
<td>Measured RS-SINR result of an E-UTRA cell. The <code>rs-sinr-Result</code> is only reported if configured by the eNB.</td>
</tr>
<tr>
<td>rssiWLAN</td>
<td>Measured WLAN RSSI result in dBm.</td>
</tr>
<tr>
<td>stationCountWLAN</td>
<td>Indicates the total number stations currently associated with this WLAN as defined in IEEE 802.11-2012 [67].</td>
</tr>
<tr>
<td>ue-RxTxTimeDiffResult</td>
<td>UE Rx-Tx time difference measurement result of the PCell, provided by lower layers. If <code>ue-RxTxTimeDiffPeriodicalTDD-r13</code> is set to TRUE, the measurement mapping is according to EUTRAN TDD UE Rx-Tx time difference report mapping in TS 36.133 [16] and measurement result includes <code>NTAoffset</code>, else the measurement mapping is according to EUTRAN FDD UE Rx-Tx time difference report mapping in TS 36.133 [16].</td>
</tr>
<tr>
<td>utra-EcN0</td>
<td>According to CPICH_Ec/No in TS 25.133 [29] for FDD. Fourteen spare values. The field is not present for TDD.</td>
</tr>
<tr>
<td>wlan-Identifiers</td>
<td>Indicates the WLAN parameters used for identification of the WLAN for which the measurement results are applicable.</td>
</tr>
</tbody>
</table>

---

### MeasResultSSTD

The IE `MeasResultSSTD` consists of SFN, radio frame and subframe boundary difference between the PCell and the PSCell as specified in TS 36.214 [48] and TS 36.133 [16].

#### MeasResultSSTD information element

```asn1
MeasResultSSTD-r13 ::= SEQUENCE {
  sfn-OffsetResult-r13                  INTEGER (0..1023),
  frameBoundaryOffsetResult-r13        INTEGER (-5..4),
  subframeBoundaryOffsetResult-r13     INTEGER (0..127)
}
```
-- ASN1STOP

<table>
<thead>
<tr>
<th>Field Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>sfn-OffsetResult</em></td>
</tr>
<tr>
<td>Indicates the SFN difference between the PCell and the PSCell as an integer value according to TS 36.214 [48].</td>
</tr>
<tr>
<td><em>frameBoundaryOffsetResult</em></td>
</tr>
<tr>
<td>Indicates the frame boundary difference between the PCell and the PSCell as an integer value according to TS 36.214 [48].</td>
</tr>
<tr>
<td><em>subframeBoundaryOffsetResult</em></td>
</tr>
<tr>
<td>Indicates the subframe boundary difference between the PCell and the PSCell as an integer value according to the mapping table in TS 36.133 [16].</td>
</tr>
</tbody>
</table>

---

**MeasScaleFactor**

The IE *MeasScaleFactor* specifies the factor for scaling the measurement performance requirements in TS 36.133 [16].

---

**MeasScaleFactor Information Element**

```
MeasScaleFactor-r12 ::=   ENUMERATED {sf-EUTRA-cf1, sf-EUTRA-cf2}
```

---

NOTE: If the *reducedMeasPerformance* is not included in any *measObjectEUTRA* or *measObjectUTRA* and the *measScaleFactor* is included in the *measConfig*, E-UTRAN can configure any of the values for the *measScaleFactor* as specified in TS 36.133 [16].

---

**QuantityConfig**

The IE *QuantityConfig* specifies the measurement quantities and layer 3 filtering coefficients for E-UTRA and inter-RAT measurements.

---

**QuantityConfig Information Element**

```
QuantityConfig ::=     SEQUENCE {
  quantityConfigEUTRA     QuantityConfigEUTRA     OPTIONAL, -- Need ON
  quantityConfigUTRA     QuantityConfigUTRA     OPTIONAL, -- Need ON
  quantityConfigGERAN     QuantityConfigGERAN     OPTIONAL, -- Need ON
  quantityConfigCDMA2000    QuantityConfigCDMA2000    OPTIONAL, -- Need ON
  ..., 
  [[ quantityConfigUTRA-v1020  QuantityConfigUTRA-v1020   OPTIONAL -- Need ON
    ],
  [[ quantityConfigEUTRA-v1250  QuantityConfigEUTRA-v1250   OPTIONAL -- Need ON
    ]],
  [[ quantityConfigEUTRA-v1310  QuantityConfigEUTRA-v1310   OPTIONAL -- Need ON
    ]],
  quantityConfigWLAN-r13   QuantityConfigWLAN-r13    OPTIONAL -- Need ON
}
```

```
QuantityConfigEUTRA ::=    SEQUENCE {
  filterCoefficientRSRP    FilterCoefficient     DEFAULT fc4,
  filterCoefficientRSRQ    FilterCoefficient     DEFAULT fc4
}
```

```
QuantityConfigEUTRA-v1250 ::=  SEQUENCE {
  filterCoefficientCSI-RSRP-r12  FilterCoefficient     OPTIONAL  -- Need OR
}
```

```
QuantityConfigEUTRA-v1310 ::=  SEQUENCE {
  filterCoefficientRS-SINR-r13  FilterCoefficient     DEFAULT fc4
}
```

```
QuantityConfigUTRA ::=    SEQUENCE {
  measQuantityUTRA-FDD     ENUMERATED {cpich-RSCP, cpich-EcN0},
```
QuantityConfig field descriptions

**filterCoefficient2-FDD**
Specifies the filtering coefficient used for the UTRAN FDD measurement quantity, which is not included in `measQuantityUTRA-FDD`, when `reportQuantityUTRA-FDD` is present in `ReportConfigInterRAT`.

**filterCoefficientCSI-RSRP**
Specifies the filtering coefficient used for CSI-RSRP.

**filterCoefficientRSRP**
Specifies the filtering coefficient used for RSRP.

**filterCoefficientRSRQ**
Specifies the filtering coefficient used for RSRQ.

**filterCoefficientRS-SINR**
Specifies the filtering coefficient used for RS-SINR.

**measQuantityCDMA2000**
Measurement quantity used for CDMA2000 measurements. `pilotPnPhaseAndPilotStrength` is only applicable for `MeasObjectCDMA2000` of `cdma2000-Type = type1XRTT`.

**measQuantityGERAN**
Measurement quantity used for GERAN measurements.

**measQuantityUTRA**
Measurement quantity used for UTRA measurements.

**measQuantityWLAN**
Measurement quantity used for WLAN measurements.

**quantityConfigCDMA2000**
Specifies quantity configurations for CDMA2000 measurements.

**quantityConfigEUTRA**
Specifies filter configurations for E-UTRA measurements.

**quantityConfigGERAN**
Specifies quantity and filter configurations for GERAN measurements.

**quantityConfigUTRA**
Specifies quantity and filter configurations for UTRA measurements. Field `quantityConfigUTRA-v1020` is applicable only when `reportQuantityUTRA-FDD` is configured.

**quantityConfigWLAN**
Specifies quantity and filter configurations for WLAN measurements.

---

**ReportConfigEUTRA**

The IE `ReportConfigEUTRA` specifies criteria for triggering of an E-UTRA measurement reporting event. The E-UTRA measurement reporting events concerning CRS are labelled AN with `N` equal to 1, 2 and so on.
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 becomes better than another absolute threshold2.
Event A6: Neighbour becomes amount of offset better than SCell.

The E-UTRA measurement reporting events concerning CSI-RS are labelled C \( N \) with \( N \) equal to 1 and 2.

Event C1: CSI-RS resource becomes better than absolute threshold;
Event C2: CSI-RS resource becomes amount of offset better than reference CSI-RS resource.

---

ReportConfigEUTRA information element

```asn1
ReportConfigEUTRA ::= SEQUENCE {
  triggerType          CHOICE {
    event          SEQUENCE {
      eventId       CHOICE {
        eventA1        SEQUENCE {
          a1-Threshold      ThresholdEUTRA
        },
        eventA2        SEQUENCE {
          a2-Threshold      ThresholdEUTRA
        },
        eventA3        SEQUENCE {
          a3-Offset       INTEGER (-30..30),
          reportOnLeave      BOOLEAN
        },
        eventA4        SEQUENCE {
          a4-Threshold      ThresholdEUTRA
        },
        eventA5        SEQUENCE {
          a5-Threshold1      ThresholdEUTRA,
          a5-Threshold2      ThresholdEUTRA
        },
        ...,
        eventA6-r10       SEQUENCE {
          a6-Offset-r10      INTEGER (-30..30),
          a6-ReportOnLeave-r10    BOOLEAN
        },
        eventC1-r12       SEQUENCE {
          c1-Threshold-r12     ThresholdEUTRA-v1250,
          c1-ReportOnLeave-r12    BOOLEAN
        },
        eventC2-r12       SEQUENCE {
          c2-RefCSI-RS-r12     MeasCSI-RS-Id-r12,
          c2-Offset-r12      INTEGER (-30..30),
          c2-ReportOnLeave-r12    BOOLEAN
        }
      }
    },
    hysteresis       Hysteresis,
    timeToTrigger      TimeToTrigger
  },
  periodical        SEQUENCE {
    purpose         ENUMERATED {
      reportStrongestCells, reportCGI
    }
  },
  triggerQuantity    ENUMERATED {rsrp, rsrq},
  reportQuantity     ENUMERATED {sameAsTriggerQuantity, both},
  maxReportCells     INTEGER {1..maxCellReport},
  reportInterval     ReportInterval,
  reportAmount       ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
  ...,
  si-RequestForHO-r9     ENUMERATED {setup}  OPTIONAL, -- Cond reportCGI
  ue-RxTxTimeDiffPeriodical-r9 ENUMERATED {setup}  OPTIONAL -- Need OK
}
```
includeLocationInfo-r10  ENUMERATED {true}  OPTIONAL,  -- Need OR
reportAddNeighMeas-r10  ENUMERATED {true}  OPTIONAL,  -- Need OR

alternativeTimeToTrigger-r12  CHOICE {  
  release  OPTIONAL,  -- Need ON
  setup  TimeToTrigger  OPTIONAL,  -- Need ON
}

useT312-r12  BOOLEAN  OPTIONAL,  -- Need ON
usePSCell-r12  BOOLEAN  OPTIONAL,  -- Need ON
a5-Threshold1-v1250  RSRQ-RangeConfig-r12  OPTIONAL,  -- Need ON
a5-Threshold2-v1250  RSRQ-RangeConfig-r12  OPTIONAL,  -- Need ON
reportStrongestCSI-RSs-r12  BOOLEAN  OPTIONAL,  -- Need ON
reportCRS-Meas-r12  BOOLEAN  OPTIONAL,  -- Need ON
triggerQuantityCSI-RS-r12  BOOLEAN  OPTIONAL,  -- Need ON

reportSSTD-Meas-r13  BOOLEAN  OPTIONAL,  -- Need ON
rs-sinr-Config-r13  CHOICE {  
  release  NULL,  -- Need ON
  setup  SEQUENCE {  
    triggerQuantity-v1310  ENUMERATED {sinr}  OPTIONAL,  -- Need ON
    aN-Threshold1-r13  RS-SINR-Range-r13  OPTIONAL,  -- Need ON
    a5-Threshold2-r13  RS-SINR-Range-r13  OPTIONAL,  -- Need ON
    reportQuantity-v1310  ENUMERATED {rsrpANDsinr, rsrqANDsinr, all}  
  }  OPTIONAL,  -- Need ON
}

useWhiteCellList-r13  BOOLEAN  OPTIONAL,  -- Need ON
measRSSI-ReportConfig-r13  MeasRSSI-ReportConfig-r13  OPTIONAL,  -- Need ON
includeMultiBandInfo-r13  ENUMERATED {true}  OPTIONAL,  -- Cond

reportCGI  
ul-DelayConfig-r13  UL-DelayConfig-r13  OPTIONAL  -- Need ON

ue-RxTxTimeDiffPeriodicalTDD-r13  BOOLEAN  OPTIONAL  -- Need ON

RSRQ-RangeConfig-r12  ::=  CHOICE {  
  release  NULL,  -- Need ON
  setup  RSRQ-Range-v1250  
}

ThresholdEUTRA  ::=  CHOICE {  
  threshold-RSRP  RSRP-Range,  
  threshold-RSRQ  RSRQ-Range  
}

ThresholdEUTRA-v1250  ::=  CSI-RSRP-Range-r12

MeasRSSI-ReportConfig-r13  ::=  SEQUENCE {  
  channelOccupancyThreshold-r13  RSSI-Range-r13  OPTIONAL  -- Need OR
}

-- ASN1STOP
### ReportConfigEUTRA field descriptions

**a3-Offset/ a6-Offset/ c2-Offset**  
Offset value to be used in EUTRA measurement report triggering condition for event a3/ a6/ c2. The actual value is field value * 0.5 dB.

**alternativeTimeToTrigger**  
Indicates the time to trigger applicable for cells specified in altTTT-CellsToAddModList of the associated measurement object, if configured.

**aN-ThresholdM/ cN-ThresholdM**  
Threshold to be used in EUTRA measurement report triggering condition for event number aN/ cN. If multiple thresholds are defined for event number aN/ cN, the thresholds are differentiated by M. E-UTRAN configures aN-Threshold1 only for events A1, A2, A4, A5 and a5-Threshold2 only for event A5.

**c1-ReportOnLeave/ c2-ReportOnLeave**  
Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a CSI-RS resource in csi-RS-TriggeredList, as specified in 5.5.4.1.

**c2-RefCSI-RS**  
Identity of the CSI-RS resource from the measCSI-RS-ToAddModList of the associated measObject, to be used as the reference CSI-RS resource in EUTRA measurement report triggering condition for event c2.

**channelOccupancyThreshold**  
RSSI threshold which is used for channel occupancy evaluation.

**eventId**  
Choice of E-UTRA event triggered reporting criteria. EUTRAN may set this field to eventId C1 or eventId C2 only if measDS-Config is configured in the associated measObject with one or more CSI-RS resources. The eventId C1 and eventId C2 are not applicable for the eventId if RS-SINR is configured as triggerQuantity or reportQuantity.

**includeMultiBandInfo**  
If this field is present, the UE shall acquire and include multi band information in the measurement report.

**maxReportCells**  
Max number of cells, excluding the serving cell, to include in the measurement report concerning CRS, and max number of CSI-RS resources to include in the measurement report concerning CSI-RS.

**measRSSI-ReportConfig**  
If this field is included in the measurement report, the UE shall perform measurement reporting for RSSI and channel occupancy and ignore the triggerQuantity, reportQuantity and maxReportCells fields. E-UTRAN only sets this field to TRUE when setting triggerType to periodical and purpose to reportStrongestCells.

**reportAmount**  
Number of measurement reports applicable for triggerType event as well as for triggerType periodical. In case purpose is set to reportCGI or reportSSTD-Meas is set to TRUE, only value 1 applies.

**reportCRS-Meas**  
Indicates that UE shall include rsrp, rsrq together with csi-rsrp in the measurement report, if possible.

**reportOnLeave/ a6-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**  
The quantities to be included in the measurement report. The value both means that both the rsrp and rsrq quantities are to be included in the measurement report. The value rsrpANDsinr and rsrqANDsinr mean that both rsrp and rs-sinr quantities, and both rsrp and rs-sinr quantities are to be included respectively in the measurement report. The value all means that rsrp, rsrq and rs-sinr are to be included in the measurement report. In case triggerQuantityCSI-RS is included, only value sameAsTriggerQuantity applies. If reportQuantity-v1310 is configured, the UE only considers this extension (and ignores reportQuantity i.e. without suffix).

**reportSSTD-Meas**  
If this field is set to TRUE, the UE shall measure SSTD between the PCell and the PSCell as specified in TS 36.214 [48] and ignore the triggerQuantity, reportQuantity and maxReportCells fields. E-UTRAN only sets this field to TRUE when setting triggerType to periodical and purpose to reportStrongestCells.

**reportStrongestCSI-RSs**  
Indicates that periodical CSI-RS measurement report is performed. EUTRAN configures value TRUE only if measDS-Config is configured in the associated measObject with one or more CSI-RS resources.

**si-RequestForHO**  
The field applies to the reportCGI functionality, and when the field is included, the UE is allowed to use autonomous gaps in acquiring system information from the neighbour cell, applies a different value for T321, and includes different fields in the measurement report.

**ThresholdEUTRA**  
For RSRP: RSRP based threshold for event evaluation. The actual value is field value – 140 dBm.  
For RSRQ: RSRQ based threshold for event evaluation. The actual value is (field value – 40)/2 dB.  
For RS-SINR: RS-SINR based threshold for event evaluation. The actual value is (field value -46)/2 dB.  
For CSI-RSRP: CSI-RSRP based threshold for event evaluation. The actual value is field value – 140 dBm. EUTRAN configures the same threshold quantity for all the thresholds of an event.

**timeToTrigger**  
Time during which specific criteria for the event needs to be met in order to trigger a measurement report.
**ReportConfigEUTRA field descriptions**

**triggerQuantity**

The quantity used to evaluate the triggering condition for the event concerning CRS. EUTRAN sets the value according to the quantity of the ThresholdEUTRA for this event. The values rsrp, rsrq and sinr correspond to Reference Signal Received Power (RSRP), Reference Signal Received Quality (RSRQ) and Reference Signal to Noise and Interference Ratio (RS-SINR), see TS 36.214 [48]. If triggerQuantity-v1310 is configured, the UE only considers this extension (and ignores triggerQuantity i.e. without suffix).

**triggerQuantityCSI-RS**

The quantity used to evaluate the triggering condition for the event concerning CSI-RS. The value TRUE corresponds to CSI Reference Signal Received Power (CSI-RSRP), see TS 36.214 [48]. E-UTRAN configures value TRUE if and only if the measurement reporting event concerns CSI-RS.

**ue-RxTxTimeDiffPeriodical**

If this field is present, the UE shall perform UE Rx-Tx time difference measurement reporting and ignore the fields triggerQuantity, reportQuantity and maxReportCells. If the field is present, the only applicable values for the corresponding triggerType and purpose are periodical and reportStrongestCells respectively.

**ue-RxTxTimeDiffPeriodicalTDD**

If this field is set to TRUE, the UE shall perform UE Rx-Tx time difference measurement reporting according to EUTRAN TDD UE Rx-Tx time difference report mapping in TS 36.133 [16]. If the field is configured, the ue-RxTxTimeDiffPeriodical shall be configured. The field is applicable for TDD only.

**usePSCell**

If this field is set to TRUE the UE shall use the PSCell instead of the PCell. E-UTRAN configures value TRUE only for events A3 and A5, see 5.5.4.4 and 5.5.4.6.

**useT312**

If value TRUE is configured, the UE shall use the timer T312 with the value t312 as specified in the corresponding measObject. If the corresponding measObject does not include the timer T312 then the timer T312 is considered as not configured. E-UTRAN configures value TRUE only if triggerType is set to event.

**useWhiteCellList**

Indicates whether only the cells included in the white-list of the associated measObject are applicable as specified in 5.5.4.1. E-UTRAN does not configure the field for events A1, A2, C1 and C2.

**ul-DelayConfig**

If the field is present, E-UTRAN configures UL PDCP Packet Delay per QCI measurement and the UE shall ignore the fields triggerQuantity and maxReportCells. The applicable values for the corresponding triggerType and reportInterval are periodical and (one of the) ms1024, ms2048, ms5120 or ms10240 respectively. The reportInterval indicates the periodicity for performing and reporting of UL PDCP Delay per QCI measurement as specified in TS 36.314 [71].

### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>reportCGI</td>
<td>The field is optional, need OR, in case purpose is included and set to reportCGI; otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

---

**ReportConfigId**

The IE ReportConfigId is used to identify a measurement reporting configuration.

**ReportConfigId information element**

```
-- ASN1START
ReportConfigId ::= INTEGER (1..maxReportConfigId)
-- ASN1STOP
```

---

**ReportConfigInterRAT**

The IE ReportConfigInterRAT specifies criteria for triggering of an inter-RAT measurement reporting event. The inter-RAT measurement reporting events for UTRAN, GERAN and CDMA2000 are labelled BV with N equal to 1, 2 and so on. The inter-RAT measurement reporting events for WLAN are labelled WV 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 W1: WLAN becomes better than a threshold;
Event W2: All WLAN inside WLAN mobility set become worse than a threshold1 and a WLAN outside WLAN mobility set becomes better than a threshold2;
Event W3: All WLAN inside WLAN mobility set become worse than a threshold.

The b1 and b2 event thresholds for CDMA2000 are the CDMA2000 pilot detection thresholds are expressed as an unsigned binary number equal to \([-2 \times 10 \log_{10} E_c/I_o]\) in units of 0.5dB, see C.S0005 [25] for details.

**ReportConfigInterRAT information element**

--- ASN1START

ReportConfigInterRAT ::= SEQUENCE {
  triggerType
    CHOICE {
      event
        SEQUENCE {
          eventId
            CHOICE {
              eventB1
                SEQUENCE {
                  b1-Threshold
                    CHOICE {
                      b1-ThresholdUTRA ThresholdUTRA,
                      b1-ThresholdGERAN ThresholdGERAN,
                      b1-ThresholdCDMA2000 ThresholdCDMA2000
                    } ,
                },
              eventB2
                SEQUENCE {
                  b2-Threshold1 ThresholdEUTRA,
                  b2-Threshold2
                    CHOICE {
                      b2-Threshold2UTRA ThresholdUTRA,
                      b2-Threshold2GERAN ThresholdGERAN,
                      b2-Threshold2CDMA2000 ThresholdCDMA2000
                    } ,
                },
              ...
              eventW1-r13
                SEQUENCE {
                  w1-Threshold-r13 WLAN-RSSI-Range-r13
                },
              eventW2-r13
                SEQUENCE {
                  w2-Threshold1-r13 WLAN-RSSI-Range-r13,
                  w2-Threshold2-r13 WLAN-RSSI-Range-r13
                },
              eventW3-r13
                SEQUENCE {
                  w3-Threshold-r13 WLAN-RSSI-Range-r13
                }
            },
          hysteresis Hysteresis,
          timeToTrigger TimeToTrigger,
        },
      periodical
        SEQUENCE {
          purpose
            ENUMERATED {
              reportStrongestCells,
              reportStrongestCellsForSON,
              reportCGI
            }
        },
      maxReportCells INTEGER {1..maxCellReport},
      reportInterval ReportInterval,
      reportAmount ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
      [[
        si-RequestForHO-r9
          ENUMERATED {setup} OPTIONAL -- Cond reportCGI
      ]],
      [[
        reportQuantityUTRA-FDD-r10
          ENUMERATED {both} OPTIONAL -- Need OR
      ]],
      [[
        includeLocationInfo-r11
          BOOLEAN OPTIONAL -- Need ON
      ]],
      [[
        b2-Threshold1-v1250
          release
            CHOICE {
              NULL,
              RSRQ-Range-v1250
            } OPTIONAL -- Need ON
      ]],
      [[
        reportQuantityWLAN-r13
          ReportQuantityWLAN-r13 OPTIONAL -- Need ON
      ]]
    },
}
--- ASN1END
ThresholdUTRA ::= CHOICE{
  ultra-RSCP       INTEGER {-5..91},
  ultra-EcN0       INTEGER {0..49}
}

ThresholdGERAN ::= INTEGER {0..63}

ThresholdCDMA2000 ::= INTEGER {0..63}

ReportQuantityWLAN-r13 ::= SEQUENCE {
  bandRequestWLAN-r13            ENUMERATED {true} OPTIONAL, -- Need OR
  carrierInfoRequestWLAN-r13     ENUMERATED {true} OPTIONAL, -- Need OR
  availableAdmissionCapacityRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  backhaulDL-BandwidthRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  backhaulUL-BandwidthRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  channelUtilizationRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  stationCountRequestWLAN-r13    ENUMERATED {true} OPTIONAL, -- Need OR
  ...
}
### ReportConfigInterRAT field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>availableAdmissionCapacityRequestWLAN</td>
<td>The value true indicates that the UE shall include, if available, WLAN Available Admission Capacity in measurement reports.</td>
</tr>
<tr>
<td>backhaulDL-BandwidthRequestWLAN</td>
<td>The value true indicates that the UE shall include, if available, WLAN Backhaul Downlink Bandwidth in measurement reports.</td>
</tr>
<tr>
<td>backhaulUL-BandwidthRequestWLAN</td>
<td>The value true indicates that the UE shall include, if available, WLAN Backhaul Uplink Bandwidth in measurement reports.</td>
</tr>
<tr>
<td>bandRequestWLAN</td>
<td>The value true indicates that the UE shall include WLAN band in measurement reports.</td>
</tr>
<tr>
<td>bN-ThresholdM</td>
<td>Threshold to be used in inter RAT measurement report triggering condition for event number bN. If multiple thresholds are defined for event number bN, the thresholds are differentiated by M.</td>
</tr>
<tr>
<td>carrierInfoRequestWLAN</td>
<td>The value true indicates that the UE shall include, if available, WLAN Carrier Information in measurement reports.</td>
</tr>
<tr>
<td>channelUtilizationRequestWLAN</td>
<td>The value true indicates that the UE shall include, if available, WLAN Channel Utilization in measurement reports.</td>
</tr>
<tr>
<td>eventId</td>
<td>Choice of inter-RAT event triggered reporting criteria.</td>
</tr>
<tr>
<td>maxReportCells</td>
<td>Max number of cells, excluding the serving cell, to include in the measurement report. In case purpose is set to reportStrongestCellsForSON only value 1 applies. For inter-RAT WLAN, it is the maximum number of WLANs to include in the measurement report.</td>
</tr>
<tr>
<td>Purpose</td>
<td>reportStrongestCellsForSON applies only in case reportConfig is linked to a measObject set to measObjectUTRA or measObjectCDMA2000.</td>
</tr>
<tr>
<td>reportAmount</td>
<td>Number of measurement reports applicable for triggerType as well as for triggerType periodical. In case purpose is set to reportCGI or reportStrongestCellsForSON only value 1 applies.</td>
</tr>
<tr>
<td>reportQuantityUTRA-FDD</td>
<td>The quantities to be included in the UTRA measurement report. The value both means that both the cpich RSCP and cpich EcN0 quantities are to be included in the measurement report.</td>
</tr>
<tr>
<td>si-RequestForHO</td>
<td>The field applies to the reportCGI functionality, and when the field is included, the UE is allowed to use autonomous gaps in acquiring system information from the neighbour cell, applies a different value for T321, and includes different fields in the measurement report.</td>
</tr>
<tr>
<td>stationCountRequestWLAN</td>
<td>The value true indicates that the UE shall include, if available, WLAN Station Count in measurement reports.</td>
</tr>
<tr>
<td>b1-ThresholdGERAN, b2-Threshold2GERAN</td>
<td>The actual value is field value – 110 dBm.</td>
</tr>
<tr>
<td>b1-ThresholdUTRA, b2-Threshold2UTRA</td>
<td>utra-RSCP corresponds to CPICH_RSCP in TS 25.133 [29] for FDD and P-CCPCH_RSCP in TS 25.123 [30] for TDD. utra-EcN0 corresponds to CPICH_Ec/No in TS 25.133 [29] for FDD, and is not applicable for TDD. For utra-RSCP: The actual value is field value – 115 dBm. For utra-EcN0: The actual value is (field value – 49)/2 dB.</td>
</tr>
<tr>
<td>timeToTrigger</td>
<td>Time during which specific criteria for the event needs to be met in order to trigger a measurement report.</td>
</tr>
<tr>
<td>triggerType</td>
<td>E-UTRAN does not configure the value periodical in case reportConfig is linked to a measObject set to measObjectWLAN.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>reportCGI</td>
<td>The field is optional, need OR, in case purpose is included and set to reportCGI; otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

---

## ReportConfigToAddModList

The IE `ReportConfigToAddModList` concerns a list of reporting configurations to add or modify.

### ReportConfigToAddModList Information element

```
-- ASN1START

ReportConfigToAddModList ::= SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigToAddMod

-- ASN1END
```

---

ETSI
ReportConfigToAddMod ::= SEQUENCE {
  reportConfigId       ReportConfigId,
  reportConfig         CHOICE {
    reportConfigEUTRA    ReportConfigEUTRA,
    reportConfigInterRAT ReportConfigInterRAT
  }
}

-- ASN1STOP

ReportInterval

The ReportInterval indicates the interval between periodical reports. The ReportInterval is applicable if the UE performs periodical reporting (i.e. when reportAmount exceeds 1), for triggerType event as well as for triggerType periodical. Value ms120 corresponds with 120 ms, ms240 corresponds with 240 ms and so on, while value min1 corresponds with 1 min, min6 corresponds with 6 min and so on.

ReportInterval information element

-- ASN1START
ReportInterval ::=      ENUMERATED {
  ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240,
  min1, min6, min12, min30, min60, spare3, spare2, spare1}

-- ASN1STOP

RSRP-Range

The IE RSRP-Range specifies the value range used in RSRP measurements and thresholds. Integer value for RSRP measurements according to mapping table in TS 36.133 [16]. A given field using RSRP-Range-v1360 shall only be signalled if the corresponding original field (using RSRP-Range i.e. without suffix) is set to value 0.

RSRP-Range information element

-- ASN1START
RSRP-Range ::=      INTEGER(0..97)
RSRP-Range-v1360 ::=  INTEGER(-17..-1)
RSRP-RangeSL-r12 ::=   INTEGER(0..13)
RSRP-RangeSL2-r12 ::=   INTEGER(0..7)
RSRP-RangeSL3-r12 ::=   INTEGER(0..11)
RSRP-RangeSL4-r13 ::=   INTEGER(0..49)

-- ASN1STOP
### RSRP-Range field descriptions

**RSRP-Range**  
For BL UEs and UE in CE, when operating in CE Mode B, **RSRP-Range-v1360** (i.e., with suffix) is reported if the measured RSRP is less than -140 dBm.

**RSRP-RangeSL**  
Value 0 corresponds to -infinity, value 1 to -115dBm, value 2 to -110dBm, and so on (i.e. in steps of 5dBm) until value 12, which corresponds to -60dBm, while value 13 corresponds to +infinity.

**RSRP-RangeSL2**  
Value 0 corresponds to -infinity, value 1 to -110dBm, value 2 to -100dBm, and so on (i.e. in steps of 10dBm) until value 6, which corresponds to -60dBm, while value 7 corresponds to +infinity.

**RSRP-RangeSL3**  
Value 0 corresponds to -110dBm, value 1 to -105dBm, value 2 to -100dBm, and so on (i.e. in steps of 5dBm) until value 10, which corresponds to -60dBm, while value 11 corresponds to +infinity.

**RSRP-RangeSL4**  
Indicates the range for SD-RSRP. Value 0 corresponds to -130dBm, value 1 to -128dBm, value 2 to -126dBm, and so on (i.e. in steps of 2dBm) until value 48, which corresponds to -34dBm, while value 49 corresponds to +infinity.

### RSRQ-Range

The IE **RSRQ-Range** specifies the value range used in RSRQ measurements and thresholds. Integer value for RSRQ measurements is according to mapping table in TS 36.133 [16]. A given field using **RSRQ-Range-v1250** shall only be signalled if the corresponding original field (using **RSRQ-Range** i.e. without suffix) is set to value 0 or 34. Only a UE indicating support of **extendedRSRQ-LowerRange-r12** or **rsrq-OnAllSymbols-r12** may report **RSRQ-Range-v1250**, and this may be done without explicit configuration from the E-UTRAN. If received, the UE shall use the value indicated by the **RSRQ-Range-v1250** and ignore the value signalled by **RSRQ-Range** (without the suffix). **RSRQ-Range-r13** covers the original range and extended **RSRQ-Range-v1250**. **RSRQ-Range-r13** may be signalled without the corresponding original field and without any requirements for indicated support of **extendedRSRQ-LowerRange-r12** or **rsrq-OnAllSymbols-r12**.

**RSRQ-Range information element**

```asn1
RSRQ-Range ::= INTEGER(0..34)
RSRQ-Range-v1250 ::= INTEGER(-30..46)
RSRQ-Range-r13 ::= INTEGER(-30..46)
```

### RSRQ-Type

The IE **RSRQ-Type** specifies the RSRQ value type used in RSRQ measurements, see TS 36.214 [48].

**RSRQ-Type information element**

```asn1
RSRQ-Type-r12 ::= SEQUENCE {
  allSymbols-r12       BOOLEAN,
  wideBand-r12       BOOLEAN
}
```

### RSRQ-Type field descriptions

**allSymbols**  
Value TRUE indicates use of all OFDM symbols when performing RSRQ measurements.

**wideBand**  
Value TRUE indicates use of a wider bandwidth when performing RSRQ measurements.
-- **RS-SINR-Range**

The IE **RS-SINR-Range** specifies the value range used in RS-SINR measurements and thresholds. Integer value for RS-SINR measurements is according to mapping table in TS 36.133 [16].

**RS-SINR-Range information element**

```asn1
RS-SINR-Range-r13 ::= INTEGER(0..127)
```

-- **RSSI-Range-r13**

The IE **RSSI-Range** specifies the value range used in RSSI measurements and thresholds. Integer value for RSSI measurements is according to mapping table in TS 36.133 [16].

**RSSI-Range information element**

```asn1
RSSI-Range-r13 ::= INTEGER(0..76)
```

-- **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 7.3.2 applies, ms40 corresponds to 40 ms, and so on.

**TimeToTrigger information element**

```asn1
TimeToTrigger ::= ENUMERATED {
    ms0, ms40, ms64, ms80, ms100, ms128, ms160, ms256,
    ms320, ms480, ms512, ms640, ms1024, ms1280, ms2560,
    ms5120}
```

-- **UL-DelayConfig**

The IE **UL-DelayConfig** IE specifies the configuration of the UL PDCP Packet Delay per QCI measurement specified in TS36.314 [71].

**UL-DelayConfig information element**

```asn1
UL-DelayConfig-r13 ::= CHOICE {
    release        NULL,
    setup        SEQUENCE {
        delayThreshold-r13       ENUMERATED {
            ms30, ms40, ms50, ms60, ms70, ms80,
            ms90, ms100, ms150, ms300, ms500, ms750, spare4,
            spare3, spare2, spare1}
    }
}
```

-- **ASN1START**

RS-SINR-Range-r13 ::= INTEGER(0..127)
-- **ASN1STOP**

-- **ASN1START**

RSSI-Range-r13 ::= INTEGER(0..76)
-- **ASN1STOP**

-- **ASN1START**

TimeToTrigger ::= ENUMERATED {
    ms0, ms40, ms64, ms80, ms100, ms128, ms160, ms256,
    ms320, ms480, ms512, ms640, ms1024, ms1280, ms2560,
    ms5120}
-- **ASN1STOP**

-- **ASN1START**

UL-DelayConfig-r13 ::= CHOICE {
    release        NULL,
    setup        SEQUENCE {
        delayThreshold-r13       ENUMERATED {
            ms30, ms40, ms50, ms60, ms70, ms80,
            ms90, ms100, ms150, ms300, ms500, ms750, spare4,
            spare3, spare2, spare1}
    }
}
-- **ASN1STOP**
**UL-DelayConfig field descriptions**

*delayThreshold*
Indicates the delay threshold value used by UE to provide results of UL PDCP Packet Delay per QCI measurement as specified in TS 36.314 [71]. Value in milliseconds. Value ms30 means 30 ms and so on.

--

**WLAN-CarrierInfo**

The IE `WLAN-CarrierInfo` is used to identify the WLAN frequency band information, as specified in Annex E in [67].

**WLAN-CarrierInfo information element**

```plaintext
-- ASN1START
WLAN-CarrierInfo-r13 ::= SEQUENCE {
  operatingClass-r13  INTEGER (0..255)   OPTIONAL, -- Need ON
  countryCode-r13    ENUMERATED {unitedStates, europe, japan, global, ...} OPTIONAL, -- Need ON
  channelNumbers-r13 WLAN-ChannelList-r13 OPTIONAL, -- Need ON
  ...}
WLAN-ChannelList-r13 ::= SEQUENCE (SIZE (1..maxWLAN-Channels-r13)) OF WLAN-Channel-r13
WLAN-Channel-r13 ::= INTEGER (0..255)
-- ASN1STOP
```

**WLAN-CarrierInfo field descriptions**

*channelNumbers*
Indicates the WLAN channels as defined in IEEE 802.11-2012 [67]. Value 0 is not used.

*countryCode*
Indicates the country code of WLAN as defined in IEEE 802.11-2012 [67].

*operatingClass*
Indicates the Operating Class of WLAN as defined in IEEE 802.11-2012 [67].

--

**WLAN-RSSI-Range**

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 [16]. 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.

**WLAN-RSSI-Range information element**

```plaintext
-- ASN1START
WLAN-RSSI-Range-r13 ::= INTEGER (0..141)
-- ASN1STOP
```

--

**WLAN-Status**

The IE `WLAN-Status` indicates the current status of WLAN connection. The values are set as described in Sections 5.6.15.2 and 5.6.15.4.

**WLAN-Status information element**

```plaintext
-- ASN1START
WLAN-Status-r13 ::= ENUMERATED {successfulAssociation, failureWlanRadioLink, failureWlanUnavailable, failureTimeout}
-- ASN1STOP
```
6.3.6 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
AbsoluteTimeInfo-r10 ::= BIT STRING (SIZE (48))
-- ASN1STOP
```

– **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
AreaConfiguration-r10 ::= CHOICE {
    cellGlobalIdList-r10 CellGlobalIdList-r10,
    trackingAreaCodeList-r10 TrackingAreaCodeList-r10
}
AreaConfiguration-v1130 ::= SEQUENCE {
    trackingAreaCodeList-v1130 TrackingAreaCodeList-v1130
}
CellGlobalIdList-r10 ::= SEQUENCE (SIZE (1..32)) OF CellGlobalIdEUTRA
TrackingAreaCodeList-r10 ::= SEQUENCE (SIZE (1..8)) OF TrackingAreaCode
TrackingAreaCodeList-v1130 ::= SEQUENCE {
    plmn-Identity-perTAC-List-r11 SEQUENCE (SIZE (1..8)) OF PLMN-Identity
}
-- ASN1STOP
```

**AreaConfiguration field descriptions**

*plmn-Identity-perTAC-List*
Includes the PLMN identity for each of the TA codes included in *trackingAreaCodeList*. The PLMN identity listed first in *plmn-Identity-perTAC-List* corresponds with the TA code listed first in *trackingAreaCodeList* and so on.

– **C-RNTI**

The IE *C-RNTI* identifies a UE having a RRC connection within a cell.

**C-RNTI information element**

```
-- ASN1START
C-RNTI ::= BIT STRING (SIZE (16))
-- ASN1STOP
```

– **DedicatedInfoCDMA2000**

The *DedicatedInfoCDMA2000* is used to transfer UE specific CDMA2000 information between the network and the UE. The RRC layer is transparent for this information.
**DedicatedInfoCDMA2000 information element**

```
-- ASN1START
DedicatedInfoCDMA2000 ::= OCTET STRING
-- ASN1STOP
```

**DedicatedInfoNAS**

The IE DedicatedInfoNAS is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for this information.

```
-- ASN1START
DedicatedInfoNAS ::= OCTET STRING
-- ASN1STOP
```

**FilterCoefficient**

The IE FilterCoefficient specifies the measurement filtering coefficient. Value fc0 corresponds to k = 0, fc1 corresponds to k = 1, and so on.

```
-- ASN1START
FilterCoefficient ::= ENUMERATED {
    fc0, fc1, fc2, fc3, fc4, fc5, fc6, fc7, fc8, fc9, fc11, fc13, fc15, fc17, fc19, spare1, ...
}
-- 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.

```
-- ASN1START
LoggingDuration-r10 ::= ENUMERATED {
    min10, min20, min40, min60, min90, min120, spare2, spare1
}
-- ASN1STOP
```

**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.

```
-- ASN1START
LoggingInterval-r10 ::= ENUMERATED {
    ms1280, ms2560, ms5120, ms10240, ms20480, ms30720, ms40960, ms61440
}
-- ASN1STOP
```
The IE `MeasSubframePattern` is used to specify a subframe pattern. The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where SFN is that of PCell and x is the size of the bit string divided by 10. "1" denotes that the corresponding subframe is used.

**MeasSubframePattern information element**

```asn1
MeasSubframePattern-r10 ::= CHOICE {
  subframePatternFDD-r10    BIT STRING (SIZE (40)),
  subframePatternTDD-r10    CHOICE {
    subframeConfig1-5-r10     BIT STRING (SIZE (20)),
    subframeConfig0-r10      BIT STRING (SIZE (70)),
    subframeConfig6-r10      BIT STRING (SIZE (60)),
    ...
  },
  ...
}
```

---

The IE `MMEC` identifies an MME within the scope of an MME Group within a PLMN, see TS 23.003 [27].

**MMEC information element**

```asn1
MMEC ::=       BIT STRING (SIZE (8))
```

---

The IE `NeighCellConfig` is used to provide the information related to MBSFN and TDD UL/DL configuration of neighbour cells.

**NeighCellConfig information element**

```asn1
NeighCellConfig ::=   BIT STRING (SIZE (2))
```

**NeighCellConfig field descriptions**

`neighCellConfig`
- Provides information related to MBSFN and TDD UL/DL configuration of neighbour cells of this frequency
- 00: Not all neighbour cells have the same MBSFN subframe allocation as the serving cell on this frequency, if configured, and as the PCell otherwise
- 10: The MBSFN subframe allocations of all neighbour cells are identical to or subsets of that in the serving cell on this frequency, if configured, and of that in the PCell otherwise
- 01: No MBSFN subframes are present in all neighbour cells
- 11: Different UL/DL allocation in neighbouring cells for TDD compared to the serving cell on this frequency, if configured, and compared to the PCell otherwise

For TDD, 00, 10 and 01 are only used for same UL/DL allocation in neighbouring cells compared to the serving cell on this frequency, if configured, and compared to the PCell otherwise.
The IE OtherConfig contains configuration related to other configuration

**OtherConfig** information element

```asn1
-- ASN1START
OtherConfig-r9 ::= SEQUENCE {
  reportProximityConfig-r9  ReportProximityConfig-r9  OPTIONAL, -- Need ON
  ...,
  [[ idc-Config-r11  IDC-Config-r11  OPTIONAL, -- Need ON
    powerPrefIndicationConfig-r11  PowerPrefIndicationConfig-r11  OPTIONAL, -- Need ON
    obtainLocationConfig-r11  ObtainLocationConfig-r11  OPTIONAL -- Need ON
  ]]
}
IDC-Config-r11 ::=    SEQUENCE {
  idc-Indication-r11     ENUMERATED {setup}  OPTIONAL,  -- Need OR
  autonomousDenialParameters-r11  SEQUENCE {
    autonomousDenialSubframes-r11     ENUMERATED {n2, n5, n10, n15,
    autonomousDenialValidity-r11   ENUMERATED {
      sf200, sf500, sf1000, sf2000,
    spare4, spare3, spare2, spare1}
  }  OPTIONAL,  -- Need OR
  ...,
  [[ idc-Indication-UL-CA-r11  ENUMERATED {setup}  OPTIONAL  -- Cond idc-Ind
  ]],
  [[ idc-HardwareSharingIndication-r13  ENUMERATED {setup} OPTIONAL -- Need OR
  ]]
}
ObtainLocationConfig-r11 ::= SEQUENCE {
  obtainLocation-r11    ENUMERATED {setup}    OPTIONAL  -- Need OR
}
PowerPrefIndicationConfig-r11 ::= CHOICE{
  release     NULL,
  setup     SEQUENCE{
    powerPrefIndicationTimer-r11   ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20,
    s30, s60, s90, s120, s300, s600, spare3,
    spare2, spare1}
  }
}
ReportProximityConfig-r9 ::= SEQUENCE {
  proximityIndicationEUTRA-r9  ENUMERATED {enabled}  OPTIONAL, -- Need OR
  proximityIndicationUTRA-r9   ENUMERATED {enabled}  OPTIONAL -- Need OR
}
-- ASN1STOP
```
### OtherConfig field descriptions

**autonomousDenialSubframes**
Indicates the maximum number of the UL subframes for which the UE is allowed to deny any UL transmission. Value n2 corresponds to 2 subframes, n5 to 5 subframes and so on. E-UTRAN does not configure autonomous denial for frequencies on which SCG cells are configured.

**autonomousDenialValidity**
Indicates the validity period over which the UL autonomous denial subframes shall be counted. Value sf200 corresponds to 200 subframes, sf500 corresponds to 500 subframes and so on.

**idc-Indication**
The field is used to indicate whether the UE is configured to initiate transmission of the InDeviceCoexIndication message to the network.

**idc-HardwareSharingIndication**
The field is used to indicate whether the UE is allowed indicate in InDeviceCoexIndication that the cause of the problems are due to hardware sharing, and whether the UE is allowed to omit the TDM assistance information.

**idc-Indication-UL-CA**
The field is used to indicate whether the UE is configured to provide IDC indications for UL CA using the InDeviceCoexIndication message.

**obtainLocation**
Requests the UE to attempt to have detailed location information available using GNSS. E-UTRAN configures the field only if includeLocationInfo is configured for one or more measurements.

**powerPrefIndicationTimer**
Prohibit timer for Power Preference Indication reporting. Value in seconds. Value s0 means prohibit timer is set to 0 second, value s0d0t5 means prohibit timer is set to 0.5 second, value s1 means prohibit timer is set to 1 second and so on.

**reportProximityConfig**
Indicates, for each of the applicable RATs (EUTRA, UTRA), whether or not proximity indication is enabled for CSG member cell(s) of the concerned RAT. Note.

**NOTE:** Enabling/ disabling of proximity indication includes enabling/ disabling of the related functionality e.g. autonomous search in connected mode.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>idc-Ind</td>
<td>The field is optionally present if idc-Indication is present, need OR. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

---

**RAND-CDMA2000 (1xRTT)**

The RAND-CDMA2000 concerns a random value, generated by the eNB, to be passed to the CDMA2000 upper layers.

**RAND-CDMA2000 information element**

```
-- ASN1START
RAND-CDMA2000 ::= BIT STRING (SIZE (32))
-- ASN1STOP
```

---

**RAT-Type**

The IE RAT-Type is used to indicate the radio access technology (RAT), including E-UTRA, of the requested/ transferred UE capabilities.

**RAT-Type information element**

```
-- ASN1START
RAT-Type ::= ENUMERATED {
                               eutra, utra, geran-cs, geran-ps, cdma2000-1xRTT,
                               spare3, spare2, spare1, ...}
-- ASN1STOP
```

---

**ResumeIdentity**

The IE ResumeIdentity is used to identify the suspended UE context.
ResumeIdentity information element

```asn1
ResumeIdentity-r13 := BIT STRING (SIZE(40))
```

– **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

```asn1
RRC-TransactionIdentifier ::= INTEGER (0..3)
```

– **S-TMSI**

The IE `S-TMSI` contains an S-Temporary Mobile Subscriber Identity, a temporary UE identity provided by the EPC which uniquely identifies the UE within the tracking area, see TS 23.003 [27].

S-TMSI information element

```asn1
S-TMSI ::= SEQUENCE {
mmeC        MMEC,
m-TMSI        BIT STRING (SIZE (32)) }
```

**S-TMSI field descriptions**

- **m-TMSI**
  
The first/leftmost bit of the bit string contains the most significant bit of the M-TMSI.

– **TraceReference**

The `TraceReference` contains parameter Trace Reference as defined in TS 32.422 [58].

TraceReference information element

```asn1
TraceReference-r10 ::= SEQUENCE {
plmn-Identity-r10    PLMN-Identity,
traceId-r10      OCTET STRING (SIZE (3)) }
```

– **UE-CapabilityRAT-ContainerList**

The IE `UE-CapabilityRAT-ContainerList` contains list of containers, one for each RAT for which UE capabilities are transferred, if any.

UE-CapabilityRAT-ContainerList information element

```asn1
UE-CapabilityRAT-ContainerList ::= SEQUENCE (SIZE (0..n))
```
UE-CapabilityRAT-ContainerList ::= SEQUENCE (SIZE (0..maxRAT-Capabilities)) OF UE-CapabilityRAT-Container

UE-CapabilityRAT-Container ::= SEQUENCE {
  rat-Type               RAT-Type,
  ueCapabilityRAT-Container   OCTET STRING
}

-- ASN1STOP

**UECapabilityRAT-ContainerList field descriptions**

*ueCapabilityRAT-Container*

Container for the UE capabilities of the indicated RAT. The encoding is defined in the specification of each RAT:
- For E-UTRA: the encoding of UE capabilities is defined in IE *UE-EUTRA-Capability*.
- For UTRA: the octet string contains the INTER RAT HANDOVER INFO message defined in TS 25.331 [19].
- For GERAN CS: the octet string contains the concatenated string of the Mobile Station Classmark 2 and Mobile Station Classmark 3. The first 5 octets correspond to Mobile Station Classmark 2 and the following octets correspond to Mobile Station Classmark 3. The Mobile Station Classmark 2 is formatted as ‘TLV’ and is coded in the same way as the Mobile Station Classmark 2 information element in TS 24.008 [49]. The first octet is the Mobile station classmark 2 IEI and its value shall be set to 33H. The second octet is the length of mobile station classmark 2 and its value shall be set to 3. The octet 3 contains the first octet of the value part of the Mobile Station Classmark 2 information element, the octet 4 contains the second octet of the value part of the Mobile Station Classmark 2 information element and so on. For each of these octets, the first/ leftmost/ most significant bit of the octet contains b8 of the corresponding octet of the Mobile Station Classmark 2. The Mobile Station Classmark 3 is formatted as ‘V’ and is coded in the same way as the value part in the Mobile station classmark 3 information element in TS 24.008 [49]. The sixth octet of this octet string contains octet 1 of the value part of Mobile station classmark 3, the seventh of octet of this octet string contains octet 2 of the value part of Mobile station classmark 3 and so on. For GERAN PS: the encoding of UE capabilities is formatted as ‘V’ and is coded in the same way as the value part in the MS Radio Access Capability information element in TS 24.008 [49]. For CDMA2000-1XRTT: the octet string contains the A21 Mobile Subscription Information and the encoding of this is defined in A.S0008 [33]. The A21 Mobile Subscription Information contains the supported CDMA2000 1xRTT band class and band sub-class information.

**NOTE:** The value part is specified by means of CSN.1, which encoding results in a bit string, to which final padding may be appended up to the next octet boundary TS 24.008 [49]. The first/ leftmost bit of the CSN.1 bit string is placed in the first/ leftmost/ most significant bit of the first octet. This continues until the last bit of the CSN.1 bit string, which is placed in the last/ rightmost/ least significant bit of the last octet.

---

**UE-EUTRA-Capability**

The IE *UE-EUTRA-Capability* is used to convey the E-UTRA UE Radio Access Capability Parameters, see TS 36.306 [5], and the Feature Group Indicators for mandatory features (defined in Annexes B.1 and C.1) to the network. The IE *UE-EUTRA-Capability* is transferred in E-UTRA or in another RAT.

**NOTE 0:** For (UE capability specific) guidelines on the use of keyword OPTIONAL, see Annex A.3.5.

**UE-EUTRA-Capability information element**

---

**ASN1START**

UE-EUTRA-Capability ::= SEQUENCE { accessStratumRelease AccessStratumRelease, ue-Category       INTEGER (1..5), pdcp-Parameters      PDCP-Parameters, phyLayerParameters     PhyLayerParameters, rf-Parameters      RF-Parameters, measParameters      MeasParameters, featureGroupIndicators    BIT STRING (SIZE (32)) OPTIONAL, interRAT-Parameters      SEQUENCE {utraFDD IRAT-ParametersUTRA-FDD OPTIONAL, utraTDD0128 IRAT-ParametersUTRA-TDD128 OPTIONAL, utraTDD384 IRAT-ParametersUTRA-TDD384 OPTIONAL, utraTDD768 IRAT-ParametersUTRA-TDD768 OPTIONAL, geran IRAT-ParametersGERAN OPTIONAL, cdma2000-HPD IRAT-ParametersCDMA2000-HPD OPTIONAL, cdma2000-1xRTT IRAT-ParametersCDMA2000-1xRTT OPTIONAL }, nonCriticalExtension UE-EUTRA-Capability-v920-IEs OPTIONAL }

--- Late non critical extensions
UE-EUTRA-Capability-v9a0-IEs ::= SEQUENCE {
  featureGroupIndRel9Add-r9 BIT STRING (SIZE (32)) OPTIONAL,
  fdd-Add-UE-EUTRA-Capabilities-r9 UE-EUTRA-CapabilityAddXDD-Mode-r9 OPTIONAL,
  tdd-Add-UE-EUTRA-Capabilities-r9 UE-EUTRA-CapabilityAddXDD-Mode-r9 OPTIONAL,
  nonCriticalExtension UE-EUTRA-Capability-v9c0-IEs OPTIONAL
}

UE-EUTRA-Capability-v9c0-IEs ::=  SEQUENCE {
  interRAT-ParametersUTRA-v9c0 IRAT-ParametersUTRA-v9c0  OPTIONAL,
  nonCriticalExtension UE-EUTRA-Capability-v9d0-IEs OPTIONAL
}

UE-EUTRA-Capability-v9d0-IEs ::=  SEQUENCE {
  phyLayerParameters-v9d0 PhyLayerParameters-v9d0  OPTIONAL,
  nonCriticalExtension UE-EUTRA-Capability-v9e0-IEs OPTIONAL
}

UE-EUTRA-Capability-v9e0-IEs ::=  SEQUENCE {
  rf-Parameters-v9e0 RF-Parameters-v9e0  OPTIONAL,
  nonCriticalExtension UE-EUTRA-Capability-v9h0-IEs OPTIONAL
}

UE-EUTRA-Capability-v9h0-IEs ::=  SEQUENCE {
  interRAT-ParametersUTRA-v9h0 IRAT-ParametersUTRA-v9h0  OPTIONAL,
  lateNonCriticalExtension OCTET STRING (CONTAINING UE-EUTRA-Capability-v9h0-IEs) OPTIONAL,
  nonCriticalExtension UE-EUTRA-Capability-v10c0-IEs OPTIONAL
}

UE-EUTRA-Capability-v10c0-IEs ::= SEQUENCE {
  otdoa-PositioningCapabilities-r10 OTOA-PositioningCapabilities-r10  OPTIONAL,
  nonCriticalExtension UE-EUTRA-Capability-v10f0-IEs OPTIONAL
}

UE-EUTRA-Capability-v10f0-IEs ::= SEQUENCE {
  rf-Parameters-v10f0 RF-Parameters-v10f0  OPTIONAL,
  nonCriticalExtension UE-EUTRA-Capability-v10i0-IEs OPTIONAL
}

UE-EUTRA-Capability-v10i0-IEs ::= SEQUENCE {
  rf-Parameters-v10i0 RF-Parameters-v10i0  OPTIONAL,
  -- Following field is only to be used for late REL-10 extensions
  lateNonCriticalExtension OCTET STRING (CONTAINING UE-EUTRA-Capability-v10i0-IEs) OPTIONAL,
  nonCriticalExtension UE-EUTRA-Capability-v11d0-IEs OPTIONAL
}

UE-EUTRA-Capability-v11d0-IEs ::= SEQUENCE {
  rf-Parameters-v11d0 RF-Parameters-v11d0  OPTIONAL,
  otherParameters-v11d0 Other-Parameters-v11d0  OPTIONAL,
  nonCriticalExtension UE-EUTRA-Capability-v11x0-IEs OPTIONAL
}

UE-EUTRA-Capability-v11x0-IEs ::= SEQUENCE {
  -- Following field is only to be used for late REL-11 extensions
  lateNonCriticalExtension OCTET STRING (CONTAINING UE-EUTRA-Capability-v11x0-IEs) OPTIONAL,
  nonCriticalExtension UE-EUTRA-Capability-v12b0-IEs OPTIONAL
}

UE-EUTRA-Capability-v12b0-IEs ::= SEQUENCE {
  rf-Parameters-v12b0 RF-Parameters-v12b0  OPTIONAL,
  nonCriticalExtension UE-EUTRA-Capability-v12x0-IEs OPTIONAL
}

UE-EUTRA-Capability-v12x0-IEs ::= SEQUENCE {
  -- Following field is only to be used for late REL-12 extensions
  lateNonCriticalExtension OCTET STRING (CONTAINING UE-EUTRA-Capability-v12x0-IEs) OPTIONAL,
  nonCriticalExtension UE-EUTRA-Capability-v1370-IEs OPTIONAL
}

UE-EUTRA-Capability-v1370-IEs ::= SEQUENCE {
  ce-Parameters-v1370 CE-Parameters-v1370  OPTIONAL,
  fdd-Add-UE-EUTRA-Capabilities-v1370 UE-EUTRA-CapabilityAddXDD-Mode-v1370  OPTIONAL,
  nonCriticalExtension UE-EUTRA-Capability-v1370-IEs OPTIONAL
}
tdd-Add-UE-EUTRA-Capabilities-v1370  UE-EUTRA-CapabilityAddXDD-Mode-v1370  OPTIONAL,
nonCriticalExtension  UE-EUTRA-Capability-v1380-IEs  OPTIONAL
}

UE-EUTRA-Capability-v1380-IEs ::= SEQUENCE {
rf-Parameters-v1380  RF-Parameters-v1380  OPTIONAL,  ce-
fdd-Add-UE-EUTRA-Capabilities-v1380  UE-EUTRA-CapabilityAddXDD-Mode-v1380,  tdd-Add-UE-EUTRA-Capabilities-v1380  UE-EUTRA-CapabilityAddXDD-Mode-v1380,  -- Following field is only to be used for late REL-13 extensions
nonCriticalExtension  UE-EUTRA-Capability-v1390-IEs  OPTIONAL
}

UE-EUTRA-Capability-v1390-IEs ::= SEQUENCE {
rf-Parameters-v1390  RF-Parameters-v1390  OPTIONAL,  -- Following field is only to be used for late REL-13 extensions
nonCriticalExtension  SEQUENCE {}  OPTIONAL
}

-- Regular non critical extensions
UE-EUTRA-Capability-v920-IEs ::=  SEQUENCE {
phyLayerParameters-v920  PhyLayerParameters-v920,
interRAT-ParametersGERAN-v920  IRAT-ParametersGERAN-v920,
interRAT-ParametersUTRA-v920  IRAT-ParametersUTRA-v920,  OPTIONAL,
deviceType-r9  ENUMERATED {noBenFromBatConsumpOpt} OPTIONAL,
csg-ProximityIndicationParameters-r9  CSG-ProximityIndicationParameters-r9,
neighCellSI-AcquisitionParameters-r9  NeighCellSI-AcquisitionParameters-r9,
on-Parameters-r9  SON-Parameters-r9,
nonCriticalExtension  UE-EUTRA-Capability-v940-IEs  OPTIONAL
}

UE-EUTRA-Capability-v940-IEs ::= SEQUENCE {
lateNonCriticalExtension  OCTET STRING (CONTAINING UE-EUTRA-Capability-v9a0-IEs)  OPTIONAL,
nonCriticalExtension  UE-EUTRA-Capability-v1020-IEs  OPTIONAL
}

UE-EUTRA-Capability-v1020-IEs ::= SEQUENCE {
ue-Category-v1020  INTEGER (6..8)  OPTIONAL,
phyLayerParameters-v1020  PhyLayerParameters-v1020,
rf-Parameters-v1020  RF-Parameters-v1020,  OPTIONAL,
measParameters-v1020  MeasParameters-v1020,  OPTIONAL,
featureGroupIndRel10-r10  BIT STRING (SIZE (32))  OPTIONAL,
interRAT-ParametersCDMA2000-v1020  IRAT-ParametersCDMA2000-1XRTT-v1020  OPTIONAL,
uBasedNetwPerfMeasParameters-r10  UE-BasedNetwPerfMeasParameters-r10,  OPTIONAL,
interRAT-ParametersUTRA-TDD-v1020  IRAT-ParametersUTRA-TDD-v1020  OPTIONAL,
nonCriticalExtension  UE-EUTRA-Capability-v1060-IEs  OPTIONAL
}

UE-EUTRA-Capability-v1060-IEs ::= SEQUENCE {
fdd-Add-UE-EUTRA-Capabilities-v1060  UE-EUTRA-CapabilityAddXDD-Mode-v1060  OPTIONAL,
tdd-Add-UE-EUTRA-Capabilities-v1060  UE-EUTRA-CapabilityAddXDD-Mode-v1060,  rf-Parameters-v1060  RF-Parameters-v1060,  OPTIONAL,
nonCriticalExtension  UE-EUTRA-Capability-v1090-IEs  OPTIONAL
}

UE-EUTRA-Capability-v1090-IEs ::= SEQUENCE {
rf-Parameters-v1090  RF-Parameters-v1090  OPTIONAL,
nonCriticalExtension  UE-EUTRA-Capability-v1130-IEs  OPTIONAL
}

UE-EUTRA-Capability-v1130-IEs ::= SEQUENCE {
pdcp-Parameters-v1130  PDCP-Parameters-v1130,  phyLayerParameters-v1130  PhyLayerParameters-v1130,  rf-Parameters-v1130  RF-Parameters-v1130,  OPTIONAL,
measParameters-v1130  MeasParameters-v1130,  OPTIONAL,
featureGroupIndRel11-r11  BIT STRING (SIZE (32))  OPTIONAL,
otherParameters-r11  Other-Parameters-r11,  OPTIONAL,
}

UE-EUTRA-Capability-v1170-IEs ::= SEQUENCE {
phyLayerParameters-v1170  PhyLayerParameters-v1170  OPTIONAL,
ue-Category-v1170  INTEGER (9..10)  OPTIONAL,
nonCriticalExtension  UE-EUTRA-Capability-v1180-IEs  OPTIONAL
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UE-EUTRA-Capability-v1180-IEs ::= SEQUENCE {
    rf-Parameters-v1180     RF-Parameters-v1180      OPTIONAL,
    mbms-Parameters-v1180   MBMS-Parameters-v1180 OPTIONAL,
    tdd-Add-UE-EUTRA-Capabilities-v1180 UE-EUTRA-CapabilityAddXDD-Mode-v1180 OPTIONAL,
    nonCriticalExtension    UE-EUTRA-Capability-v11a0-IEs   OPTIONAL
}

UE-EUTRA-Capability-v11a0-IEs ::= SEQUENCE {
    ue-Category-v11a0     INTEGER (11..12)      OPTIONAL,
    measParameters-v11a0  MeasParameters-v11a0 OPTIONAL,
    nonCriticalExtension    UE-EUTRA-Capability-v1250-IEs   OPTIONAL
}

UE-EUTRA-Capability-v1250-IEs ::= SEQUENCE {
    phyLayerParameters-v1250   PhyLayerParameters-v1250    OPTIONAL,
    rlc-Parameters-r12     RLC-Parameters-r12      OPTIONAL,
    ue-BasedNetwPerfMeasParameters-v1250 UE-BasedNetwPerfMeasParameters-v1250 OPTIONAL,
    ue-CategoryDL-r12     INTEGER (0..14)       OPTIONAL,
    ue-CategoryUL-r12     INTEGER (0..13)       OPTIONAL,
    wlan-IW-Parameters-r12 WLAN-IW-Parameters-r12     OPTIONAL,
    dc-Parameters-r12     DC-Parameters-r12      OPTIONAL,
    mbms-Parameters-v1250   MBMS-Parameters-v1250 OPTIONAL,
    mac-Parameters-r12     MAC-Parameters-r12      OPTIONAL,
    tdd-Add-UE-EUTRA-Capabilities-v1250 UE-EUTRA-CapabilityAddXDD-Mode-v1250 OPTIONAL,
    sl-Parameters-r12     SL-Parameters-r12     OPTIONAL,
    nonCriticalExtension    UE-EUTRA-Capability-v1260-IEs   OPTIONAL
}

UE-EUTRA-Capability-v1260-IEs ::= SEQUENCE {
    ue-CategoryDL-v1260     INTEGER (15..16)      OPTIONAL,
    nonCriticalExtension    UE-EUTRA-Capability-v1270-IEs   OPTIONAL
}

UE-EUTRA-Capability-v1270-IEs ::= SEQUENCE {
    rf-Parameters-v1270     RF-Parameters-v1270      OPTIONAL,
    nonCriticalExtension    UE-EUTRA-Capability-v1280-IEs   OPTIONAL
}

UE-EUTRA-Capability-v1280-IEs ::= SEQUENCE {
    phyLayerParameters-v1280   PhyLayerParameters-v1280    OPTIONAL,
    nonCriticalExtension    UE-EUTRA-Capability-v1310-IEs   OPTIONAL
}

UE-EUTRA-Capability-v1310-IEs ::= SEQUENCE {
    ue-CategoryDL-v1310     INTEGER (n17, m1)   OPTIONAL,
    ue-CategoryUL-v1310     INTEGER (n14, m1)   OPTIONAL,
    pdcp-Parameters-v1310   PDCP-Parameters-v1310, 
    rlc-Parameters-v1310   RLC-Parameters-v1310, 
    mac-Parameters-v1310   MAC-Parameters-v1310, 
    phyLayerParameters-v1310 PhyLayerParameters-v1310, 
    rf-Parameters-v1310     RF-Parameters-v1310      OPTIONAL,
    meaParameters-v1310     MeaParameters-v1310 OPTIONAL,
    dc-Parameters-v1310     DC-Parameters-v1310      OPTIONAL,
    sl-Parameters-v1310     SL-Parameters-v1310      OPTIONAL,
    scptm-Parameters-r13   SCPTM-Parameters-r13     OPTIONAL,
    ce-Parameters-r13     CE-Parameters-r13      OPTIONAL,
    interRAT-ParametersWLAN-r13 ITRAT-ParametersWLAN-r13, 
    lasa-Parameters-r13  LASA-Parameters-r13, 
    lwa-Parameters-r13   LWPA-Parameters-r13, 
    wlan-IW-Parameters-v1310 WLAN-IW-Parameters-v1310, 
    lwip-Parameters-r13   LWIP-Parameters-r13, 
    tdd-Add-UE-EUTRA-Capabilities-v1310 UE-EUTRA-CapabilityAddXDD-Mode-v1310 OPTIONAL,
    nonCriticalExtension    UE-EUTRA-Capability-v1320-IEs   OPTIONAL
}

UE-EUTRA-Capability-v1320-IEs ::= SEQUENCE {
    ce-Parameters-v1320     CE-Parameters-v1320      OPTIONAL,
    phyLayerParameters-v1320 PhyLayerParameters-v1320, 
    rf-Parameters-v1320     RF-Parameters-v1320      OPTIONAL,
    fdd-Add-UE-EUTRA-Capabilities-v1320 UE-EUTRA-CapabilityAddXDD-Mode-v1320 OPTIONAL,
    tdd-Add-UE-EUTRA-Capabilities-v1320 UE-EUTRA-CapabilityAddXDD-Mode-v1320 OPTIONAL,
UE-EUTRA-Capability-v1330-IEs ::= SEQUENCE {
  ue-CategoryDL-v1330    INTEGER (18..19)      OPTIONAL,
  phyLayerParameters-v1330 PhyLayerParameters-v1330 OPTIONAL,
  ue-CE-NeedULGaps-r13    ENUMERATED {true}     OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v1340-IEs OPTIONAL
}

UE-EUTRA-Capability-v1340-IEs ::= SEQUENCE {
  ue-CategoryUL-v1340    INTEGER (15)       OPTIONAL,
  nonCriticalExtension   UE-EUTRA-Capability-v1350-IEs OPTIONAL
}

UE-EUTRA-Capability-v1350-IEs ::= SEQUENCE {
  ue-CategoryDL-v1350    ENUMERATED {oneBis}      OPTIONAL,
  ue-CategoryUL-v1350    ENUMERATED {oneBis}     OPTIONAL,
  ce-Parameters-v1350    CE-Parameters-v1350,
  nonCriticalExtension   UE-EUTRA-Capability-v1360-IEs OPTIONAL
}

UE-EUTRA-Capability-v1360-IEs ::= SEQUENCE {
  other-Parameters-v1360 Other-Parameters-v1360 OPTIONAL,
  nonCriticalExtension   SEQUENCE {}        OPTIONAL
}

UE-EUTRA-CapabilityAddXDD-Mode-r9 ::= SEQUENCE {
  phyLayerParameters-r9    PhyLayerParameters OPTIONAL,
  featureGroupIndicators-r9 BIT STRING (SIZE (32))OPTIONAL,
  featureGroupIndRel9Add-r9 BIT STRING (SIZE (32)) OPTIONAL,
  interRAT-ParametersGERAN-r9  IRAT-ParametersGERAN OPTIONAL,
  interRAT-ParametersUTRA-r9  IRAT-ParametersUTRA-v920 OPTIONAL,
  interRAT-ParametersCDMA2000-r9 IRAT-ParametersCDMA2000-1XRTT-v920 OPTIONAL,
  neighCellSI-AcquisitionParameters-r9 NeighCellSI-AcquisitionParameters-r9 OPTIONAL,
  ...
}

UE-EUTRA-CapabilityAddXDD-Mode-v1060 ::= SEQUENCE {
  phyLayerParameters-v1060 PhyLayerParameters-v1020 OPTIONAL,
  featureGroupIndRel10-v1060 BIT STRING (SIZE (32)) OPTIONAL,
  interRAT-ParametersCDMA2000-v1060 IRAT-ParametersCDMA2000-1XRTT-v1020 OPTIONAL,
  interRAT-ParametersUTRA-TDD-v1060 IRAT-ParametersUTRA-TDD-v1020 OPTIONAL,
  ...
  [[ otdoa-PositioningCapabilities-r10 OTDOA-PositioningCapabilities-r10 OPTIONAL ]]
}

UE-EUTRA-CapabilityAddXDD-Mode-v1130 ::= SEQUENCE {
  phyLayerParameters-v1130 PhyLayerParameters-v1130 OPTIONAL,
  measParameters-v1130    MeasParameters-v1130    OPTIONAL,
  otherParameters-r11     Other-Parameters-r11     OPTIONAL,
  ...
}

UE-EUTRA-CapabilityAddXDD-Mode-v1180 ::= SEQUENCE {
  mbms-Parameters-r11     MBMS-Parameters-r11
}

UE-EUTRA-CapabilityAddXDD-Mode-v1250 ::= SEQUENCE {
  phyLayerParameters-v1250 PhyLayerParameters-v1250 OPTIONAL,
  measParameters-v1250    MeasParameters-v1250    OPTIONAL
}

UE-EUTRA-CapabilityAddXDD-Mode-v1310 ::= SEQUENCE {
  phyLayerParameters-v1310 PhyLayerParameters-v1310 OPTIONAL
}

UE-EUTRA-CapabilityAddXDD-Mode-v1320 ::= SEQUENCE {
  phyLayerParameters-v1320 PhyLayerParameters-v1320 OPTIONAL,
  scptm-Parameters-r13     SCPTM-Parameters-r13     OPTIONAL
}

UE-EUTRA-CapabilityAddXDD-Mode-v1370 ::= SEQUENCE {
  ce-Parameters-v1370     CE-Parameters-v1370     OPTIONAL
}
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UE-EUTRA-CapabilityAddXDD-Mode-v1380 ::= SEQUENCE {
  ce-Parameters-v1380  CE-Parameters-v1380
}

AccessStratumRelease ::= ENUMERATED {
  rel8, rel9, rel10, rel11, rel12, rel13,
  spare2, spare1, ...}

DC-Parameters-r12 ::= SEQUENCE {
  drb-TypeSplit-r12  ENUMERATED (supported)  OPTIONAL,
  drb-TypeSCG-r12  ENUMERATED (supported)  OPTIONAL
}

DC-Parameters-v1310 ::= SEQUENCE {
  pdcp-TransferSplitUL-r13  ENUMERATED (supported)  OPTIONAL,
  ue-SSTD-Meas-r13  ENUMERATED (supported)  OPTIONAL
}

MAC-Parameters-r12 ::= SEQUENCE {
  logicalChannelSR-ProhibitTimer-r12  ENUMERATED (supported)  OPTIONAL,
  longDRX-Command-r12  ENUMERATED (supported)  OPTIONAL
}

MAC-Parameters-v1310 ::= SEQUENCE {
  extendedMAC-LengthField-r13  ENUMERATED (supported)  OPTIONAL,
  extendedLongDRX-r13  ENUMERATED (supported)  OPTIONAL
}

RLC-Parameters-r12 ::= SEQUENCE {
  extendedRLC-SN-SO-Field-r13  ENUMERATED (supported)  OPTIONAL
}

RLC-Parameters-v1310 ::= SEQUENCE {
  extendedRLC-SN-SO-Field-r13  ENUMERATED (supported)  OPTIONAL
}

PDCP-Parameters ::= SEQUENCE {
  supportedROHC-Profiles  SEQUENCE {
    profile0x0001  BOOLEAN,
    profile0x0002  BOOLEAN,
    profile0x0003  BOOLEAN,
    profile0x0004  BOOLEAN,
    profile0x0005  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}  DEFAULT cs16,
}

PDCP-Parameters-v1130 ::= SEQUENCE {
  pdcp-SN-Extension-r11  ENUMERATED (supported)  OPTIONAL,
  supportRohcContextContinue-r11  ENUMERATED (supported)  OPTIONAL
}

PDCP-Parameters-v1310 ::= SEQUENCE {
  pdcp-SN-Extension-18bits-r13  ENUMERATED (supported)  OPTIONAL
}

PhyLayerParameters ::= SEQUENCE {
  ue-TxAntennaSelectionSupported  BOOLEAN,
  ue-SpecificRefSigsSupported  BOOLEAN
}

PhyLayerParameters-v920 ::= SEQUENCE {
  enhancedDualLayerFDD-r9  ENUMERATED (supported)  OPTIONAL,
  enhancedDualLayerTDD-r9  ENUMERATED (supported)  OPTIONAL
}

PhyLayerParameters-v9d0 ::= SEQUENCE {
  tm5-FDD-r9  ENUMERATED (supported)  OPTIONAL,
  tm5-TDD-r9  ENUMERATED (supported)  OPTIONAL
}
PhyLayerParameters-v1020 ::= SEQUENCE {
  twoAntennaPortsForPUCCH-r10 ENUMERATED {supported} OPTIONAL,
  tm9-With-8Tx-FDD-r10 ENUMERATED {supported} OPTIONAL,
  pmi-Disabling-r10 ENUMERATED {supported} OPTIONAL,
  crossCarrierScheduling-r10 ENUMERATED {supported} OPTIONAL,
  simultaneousPUCCH-PUSCH-r10 ENUMERATED {supported} OPTIONAL,
  multiClusterPUSCH-WithinCC-r10 ENUMERATED {supported} OPTIONAL,
  nonContiguousUL-RA-WithinCC-List-r10 NonContiguousUL-RA-WithinCC-List-r10 OPTIONAL
}

PhyLayerParameters-v1130 ::= SEQUENCE {
  csi-InterfHandl-r11 ENUMERATED {supported} OPTIONAL,
  ePDCCH-r11 ENUMERATED {supported} OPTIONAL,
  multiACK-CSI-Reporting-r11 ENUMERATED {supported} OPTIONAL,
  ss-CH-InterfHandl-r11 ENUMERATED {supported} OPTIONAL,
  tdd-SpecialSubframe-r11 ENUMERATED {supported} OPTIONAL,
  txDiv-PUCCHib-ChSelect-r11 ENUMERATED {supported} OPTIONAL,
  ul-CoWP-r11 ENUMERATED {supported} OPTIONAL
}

PhyLayerParameters-v1170 ::= SEQUENCE {
  interBandTDD-CA-WithDifferentConfig-r11 BIT STRING (SIZE (2)) OPTIONAL
}

PhyLayerParameters-v1250 ::= SEQUENCE {
  e-HARQ-Pattern-FDD-r12 ENUMERATED {supported} OPTIONAL,
  enhanced-4TxCodebook-r12 ENUMERATED {supported} OPTIONAL,
  fdd-HARQ-TimingTDD-r13 ENUMERATED {supported} OPTIONAL,
  maxNumberUpdatedCSI-Proc-r13 INTEGER (5..32) OPTIONAL,
  pucch-FeedbackMode-r13 ENUMERATED {supported} OPTIONAL,
  pucch-Format4-r13 ENUMERATED {supported} OPTIONAL,
  pucch-Format5-r13 ENUMERATED {supported} OPTIONAL,
  supportedBlindDecoding-r13 SEQUENCE {
    supportedBlindDecoding-r13 ENUMERATED {supported} OPTIONAL,
  }
  pdcch-CandidateReductions-r13 ENUMERATED {supported} OPTIONAL,
  skipMonitoringDCI-Format0-1A-r13 ENUMERATED {supported} OPTIONAL,
  uci-PUSCH-Ext-r13 ENUMERATED {supported} OPTIONAL,
  csi-InterfMitigationTM10-r13 ENUMERATED {supported} OPTIONAL,
  pdisch-CollisionHandling-r13 ENUMERATED {supported} OPTIONAL
}

PhyLayerParameters-v1320 ::= SEQUENCE {
  mimo-UE-Parameters-r13 MIMO-UE-Parameters-r13 OPTIONAL
}

PhyLayerParameters-v1330 ::= SEQUENCE {
  cch-InterfMitigation-RefRecTypeA-r13 ENUMERATED {supported} OPTIONAL,
  cch-InterfMitigation-RefRecTypeB-r13 ENUMERATED {supported} OPTIONAL,
  cch-InterfMitigation-MaxNumCCs-r13 INTEGER (1..maxServCell-r13) OPTIONAL,
  csi-InterfMitigationTMtoTM9-r13 INTEGER (1..maxServCell-r13) OPTIONAL
}

MIMO-UE-Parameters-r13 ::= SEQUENCE {
  paramsTM9-r13 MIMO-UE-ParametersPerTM-r13 OPTIONAL,
  paramsTM1-r13 MIMO-UE-ParametersPerTM-r13 OPTIONAL,
  srs-EnhancementsTDD-r13 ENUMERATED {supported} OPTIONAL,
}
MIMO-UE-ParametersPerTM-r13 ::= SEQUENCE {
  nonPrecoded-r13      MIMO-NonPrecodedCapabilities-r13 OPTIONAL,
  beamformed-r13       MIMO-UE-BeamformedCapabilities-r13 OPTIONAL,
  channelMeasRestriction-r13 ENUMERATED [supported] OPTIONAL,
  dmrs-Enhancements-r13 ENUMERATED [supported] OPTIONAL,
  csi-RS-EnhancementsTDD-r13 ENUMERATED [supported] OPTIONAL
}

MIMO-CA-ParametersPerBoBC-r13 ::= SEQUENCE {
  parametersTM9-r13    MIMO-CA-ParametersPerBoBCPerTM-r13 OPTIONAL,
  parametersTM10-r13   MIMO-CA-ParametersPerBoBCPerTM-r13 OPTIONAL
}

MIMO-CA-ParametersPerBoBCPerTM-r13 ::= SEQUENCE {
  nonPrecoded-r13      MIMO-NonPrecodedCapabilities-r13 OPTIONAL,
  beamformed-r13       MIMO-BeamformedCapabilityList-r13 OPTIONAL,
  dmrs-Enhancements-r13 ENUMERATED [different] OPTIONAL
}

MIMO-NonPrecodedCapabilities-r13 ::= SEQUENCE {
  config1-r13         ENUMERATED [supported] OPTIONAL,
  config2-r13         ENUMERATED [supported] OPTIONAL,
  config3-r13         ENUMERATED [supported] OPTIONAL,
  config4-r13         ENUMERATED [supported] OPTIONAL
}

MIMO-UE-BeamformedCapabilities-r13 ::= SEQUENCE {
  altCodebook-r13     ENUMERATED [supported] OPTIONAL,
  mimo-BeamformedCapabilities-r13 MIMO-BeamformedCapabilityList-r13
}

MIMO-BeamformedCapabilityList-r13 ::= SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF MIMO-BeamformedCapabilities-r13

NonContiguousUL-RA-WithinCC-List-r10 ::= SEQUENCE (SIZE (1..maxBands)) OF NonContiguousUL-RA-WithinCC-r10

NonContiguousUL-RA-WithinCC-r10 ::= SEQUENCE {
  nonContiguousUL-RA-WithinCC-Info-r10 ENUMERATED [supported] OPTIONAL
}

RF-Parameters ::= SEQUENCE {
  supportedBandListEUTRA    SupportedBandListEUTRA
}

RF-Parameters-v9e0 ::= SEQUENCE {
  supportedBandListEUTRA-v9e0 SupportedBandListEUTRA-v9e0 OPTIONAL
}

RF-Parameters-v1020 ::= SEQUENCE {
  supportedBandCombination-r10 SupportedBandCombination-r10
}

RF-Parameters-v1060 ::= SEQUENCE {
  supportedBandCombinationExt-r10 SupportedBandCombinationExt-r10
}

RF-Parameters-v1090 ::= SEQUENCE {
  supportedBandCombination-v1090 SupportedBandCombination-v1090 OPTIONAL
}

RF-Parameters-v10f0 ::= SEQUENCE {
  modifiedMPR-Behavior-r10 BIT STRING (SIZE (32)) OPTIONAL
}

RF-Parameters-v10i0 ::= SEQUENCE {
  supportedBandCombination-v10i0 SupportedBandCombination-v10i0 OPTIONAL
}
RF-Parameters-v10j0 ::= SEQUENCE {
  multiNS-Pmax-r10     ENUMERATED {supported}     OPTIONAL
}

RF-Parameters-v1130 ::= SEQUENCE {
  supportedBandCombination-v1130  SupportedBandCombination-v1130  OPTIONAL
}

RF-Parameters-v1180 ::= SEQUENCE {
  freqBandRetrieval-r11 ENUMERATED {supported}     OPTIONAL,
  requestedBands-r11      SEQUENCE (SIZE (1.. maxBands)) OF FreqBandIndicator-r11
    OPTIONAL,
  supportedBandCombinationAdd-r11 SupportedBandCombinationAdd-r11  OPTIONAL
}

RF-Parameters-v11d0 ::= SEQUENCE {
  supportedBandCombinationAdd-v11d0 SupportedBandCombinationAdd-v11d0  OPTIONAL
}

RF-Parameters-v1250 ::= SEQUENCE {
  supportedBandListEUTRA-v1250  SupportedBandListEUTRA-v1250  OPTIONAL,
  supportedBandCombination-v1250  SupportedBandCombination-v1250  OPTIONAL,
  supportedBandCombinationAdd-v1250 SupportedBandCombinationAdd-v1250  OPTIONAL,
  freqBandPriorityAdjustment-r12 ENUMERATED (supported)     OPTIONAL
}

RF-Parameters-v1270 ::= SEQUENCE {
  supportedBandCombination-v1270  SupportedBandCombination-v1270  OPTIONAL,
  supportedBandCombinationAdd-v1270 SupportedBandCombinationAdd-v1270  OPTIONAL
}

RF-Parameters-v1310 ::= SEQUENCE {
  eNB-RequestedParameters-r13      SEQUENCE {
    reducedIntNonContCombRequested-r13 ENUMERATED {true}      OPTIONAL,
    requestedCCsDL-r13 INTEGER (2..32)       OPTIONAL,
    requestedCCsUL-r13 INTEGER (2..32)       OPTIONAL,
    skipFallbackCombRequested-r13  ENUMERATED {true}      OPTIONAL
  }                    OPTIONAL,
  maximumCCsRetrieval-r13 ENUMERATED {supported}     OPTIONAL,
  skipFallbackCombinations-r13   ENUMERATED {supported}     OPTIONAL,
  reducedIntNonContComb-r13    ENUMERATED {supported}     OPTIONAL,
  supportedBandListEUTRA-v1310 SupportedBandListEUTRA-v1310  OPTIONAL,
  supportedBandCombinationReduced-r13 SupportedBandCombinationReduced-r13  OPTIONAL
}

RF-Parameters-v1320 ::= SEQUENCE {
  supportedBandListEUTRA-v1320  SupportedBandListEUTRA-v1320  OPTIONAL,
  supportedBandCombination-v1320  SupportedBandCombination-v1320  OPTIONAL,
  supportedBandCombinationAdd-v1320 SupportedBandCombinationAdd-v1320  OPTIONAL,
  supportedBandCombinationReduced-v1320 SupportedBandCombinationReduced-v1320  OPTIONAL
}

RF-Parameters-v1380 ::= SEQUENCE {
  supportedBandCombination-v1380  SupportedBandCombination-v1380  OPTIONAL,
  supportedBandCombinationAdd-v1380 SupportedBandCombinationAdd-v1380  OPTIONAL,
  supportedBandCombinationReduced-v1380 SupportedBandCombinationReduced-v1380  OPTIONAL
}

RF-Parameters-v1390 ::= SEQUENCE {
  supportedBandCombination-v1390  SupportedBandCombination-v1390  OPTIONAL,
  supportedBandCombinationAdd-v1390 SupportedBandCombinationAdd-v1390  OPTIONAL,
  supportedBandCombinationReduced-v1390 SupportedBandCombinationReduced-v1390  OPTIONAL
}

RF-Parameters-v12b0 ::= SEQUENCE {
  maxLayersMIMO-Indication-r12 ENUMERATED {supported}     OPTIONAL
}

SupportedBandCombination-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-r10

SupportedBandCombinationExt-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParametersExt-r10

SupportedBandCombination-v1090 ::= SEQUENCE (SIZE (1..maxBandComb-v1090)) OF BandCombinationParameters-v1090
SupportedBandCombination-v1010 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1010

SupportedBandCombination-v1130 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1130

SupportedBandCombination-v1250 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1250

SupportedBandCombination-v1270 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1270

SupportedBandCombination-v1320 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1320

SupportedBandCombination-v1380 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1380

SupportedBandCombinationAdd-r11 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-r11

SupportedBandCombinationAdd-v11d0 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v10i0

SupportedBandCombinationAdd-v1250 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1250

SupportedBandCombinationAdd-v1270 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1270

SupportedBandCombinationAdd-v1320 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1320

SupportedBandCombinationAdd-v1380 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1380

SupportedBandCombinationAdd-v1390 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1390

SupportedBandCombinationReduced-r13 ::= SEQUENCE (SIZE (1..maxSimultaneousBands-r13)) OF BandCombinationParameters-r13

SupportedBandCombinationReduced-v1320 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-v1320

SupportedBandCombinationReduced-v1380 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-v1380

SupportedBandCombinationReduced-v1390 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-v1390

BandCombinationParameters-r10 ::= SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-r10

BandCombinationParametersExt-r10 ::= SEQUENCE {
  supportedBandwidthCombinationSet-r10 SupportedBandwidthCombinationSet-r10 OPTIONAL
}

BandCombinationParameters-v1090 ::= SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v1090

BandCombinationParameters-v10i0 ::= SEQUENCE {
  bandParameterList-v10i0 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v10i0 OPTIONAL
}

BandCombinationParameters-v1130 ::= SEQUENCE {
  multipleTimingAdvance-r11 ENUMERATED (supported) OPTIONAL,
  simultaneousRx-Tx-r11 ENUMERATED (supported) OPTIONAL,
  bandParameterList-r11 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v1130 OPTIONAL,
  ...
}

BandCombinationParameters-r11 ::= SEQUENCE {
  supportedBandwidthCombinationSet-r11 SupportedBandwidthCombinationSet-r11 OPTIONAL
}
bandParameterList-r11 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF
BandParameters-r11,
supportedBandwidthCombinationSet-r11 SupportedBandwidthCombinationSet-r10 OPTIONAL,
multipleTimingAdvance-r11 ENUMERATED {supported} OPTIONAL,
simultaneousRx-Tx-r11 ENUMERATED {supported} OPTIONAL,
bandInfoEURAT-r11 BandInfoEURAT,
...}

BandCombinationParameters-v1250 ::= SEQUENCE {
dc-Support-r12 SEQUENCE {
asynchronous-r12 ENUMERATED {supported} OPTIONAL,
supportedCellGrouping-r12 CHOICE {
threeEntries-r12 BIT STRING (SIZE(3)),
fourEntries-r12 BIT STRING (SIZE(7)),
fiveEntries-r12 BIT STRING (SIZE(15))
} OPTIONAL,
supportedNAICS-2CRS-AP-r12 BIT STRING (SIZE (1..maxNAICS-Entries-r12)) OPTIONAL,
commSupportedBandsPerBC-r12 BIT STRING (SIZE (1.. maxBands)) OPTIONAL,
...}

BandCombinationParameters-v1270 ::= SEQUENCE {
bandParameterList-v1270 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF
BandParameters-v1270 OPTIONAL}

BandCombinationParameters-r13 ::= SEQUENCE {
differentFallbackSupported-r13 ENUMERATED {true} OPTIONAL,
bandParameterList-r13 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-r13,
supportedBandwidthCombinationSet-r13 SupportedBandwidthCombinationSet-r10 OPTIONAL,
multipleTimingAdvance-r13 ENUMERATED {supported} OPTIONAL,
simultaneousRx-Tx-r13 ENUMERATED {supported} OPTIONAL,
bandInfoEURAT-r13 BandInfoEURAT,
dc-Support-r13 SEQUENCE {
asynchronous-r13 ENUMERATED {supported} OPTIONAL,
supportedCellGrouping-r13 CHOICE {
threeEntries-r13 BIT STRING (SIZE(3)),
fourEntries-r13 BIT STRING (SIZE(7)),
fiveEntries-r13 BIT STRING (SIZE(15))
} OPTIONAL,
supportedNAICS-2CRS-AP-r13 BIT STRING (SIZE (1..maxNAICS-Entries-r12)) OPTIONAL,
commSupportedBandsPerBC-r13 BIT STRING (SIZE (1.. maxBands)) OPTIONAL}

BandCombinationParameters-v1320 ::= SEQUENCE {
bandParameterList-v1320 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF
BandParameters-v1320 OPTIONAL,
additionalRx-Tx-PerformanceReq-r13 ENUMERATED {supported} OPTIONAL}

BandCombinationParameters-v1380 ::= SEQUENCE {
bandParameterList-v1380 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF
BandParameters-v1380 OPTIONAL}

BandCombinationParameters-v1390 ::= SEQUENCE {
ue-CA-PowerClass-N-r13 ENUMERATED {class2} OPTIONAL}

SupportedBandwidthCombinationSet-r10 ::= BIT STRING (SIZE (1..maxBandwidthCombSet-r10))

BandParameters-r10 ::= SEQUENCE {
bandEURA-r10 FreqBandIndicator,
bandParametersUL-r10 BandParametersUL-r10 OPTIONAL,
bandParametersDL-r10 BandParametersDL-r10 OPTIONAL}

BandParameters-v1090 ::= SEQUENCE {
bandEURA-v1090 FreqBandIndicator-v9e0 OPTIONAL,
...}

BandParameters-v1010 ::= SEQUENCE {
BandParametersDL-v10i0 ::= SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersDL-v10i0
}

BandParameters-v1130 ::= SEQUENCE {
supportedCSI-Proc-r11 ENUMERATED (n1, n3, n4)
}

BandParameters-r11 ::= SEQUENCE {
bandEUTRA-r11 FreqBandIndicator-r11,
bandParametersUL-r11 BandParametersUL-r10 OPTIONAL,
bandParametersDL-r11 BandParametersDL-r10 OPTIONAL,
supportedCSI-Proc-r11 ENUMERATED (n1, n3, n4) OPTIONAL
}

BandParameters-v1270 ::= SEQUENCE {
bandParametersDL-v1270 SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersDL-v1270
}

BandParameters-r13 ::= SEQUENCE {
bandEUTRA-r13 FreqBandIndicator-r11,
bandParametersUL-r13 BandParametersUL-r13 OPTIONAL,
bandParametersDL-r13 BandParametersDL-r13 OPTIONAL,
supportedCSI-Proc-r13 ENUMERATED (n1, n3, n4) OPTIONAL
}

BandParameters-v1320 ::= SEQUENCE {
bandParametersDL-v1320 MIMO-CA-ParametersPerBoBC-r13
}

BandParameters-v1380 ::= SEQUENCE {
txAntennaSwitchDL-r13 INTEGER (1..32) OPTIONAL,
txAntennaSwitchUL-r13 INTEGER (1..32) OPTIONAL
}

BandParametersUL-r10 ::= SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersUL-r10

BandParametersUL-r13 ::= CA-MIMO-ParametersUL-r10

CA-MIMO-ParametersUL-r10 ::= SEQUENCE {
ca-BandwidthClassUL-r10 CA-BandwidthClass-r10,
supportedMIMO-CapabilityUL-r10 MIMO-CapabilityUL-r10 OPTIONAL
}

BandParametersDL-r10 ::= SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersDL-r10

BandParametersDL-r13 ::= CA-MIMO-ParametersDL-r13

CA-MIMO-ParametersDL-r10 ::= SEQUENCE {
ca-BandwidthClassDL-r10 CA-BandwidthClass-r10,
supportedMIMO-CapabilityDL-r10 MIMO-CapabilityDL-r10 OPTIONAL
}

CA-MIMO-ParametersDL-v10i0 ::= SEQUENCE {
fourLayerTM3-TM4-r10 ENUMERATED {supported} OPTIONAL
}

CA-MIMO-ParametersDL-v1270 ::= SEQUENCE {
intraBandContiguousCC-InfoList-r12 SEQUENCE (SIZE (1..maxServCell-r10)) OF IntraBandContiguousCC-Info-r12
}

CA-MIMO-ParametersDL-r13 ::= SEQUENCE {
ca-BandwidthClassDL-r13 CA-BandwidthClass-r10,
supportedMIMO-CapabilityDL-r13 MIMO-CapabilityDL-r10 OPTIONAL,
fourLayerTM3-TM4-r13 ENUMERATED {supported} OPTIONAL,
intraBandContiguousCC-InfoList-r13 SEQUENCE (SIZE (1..maxServCell-r13)) OF IntraBandContiguousCC-Info-r12
}

CA-BandwidthClass-r10 ::= ENUMERATED {a, b, c, d, e, f, ...}
MIMO-CapabilityUL-r10 ::= ENUMERATED {twoLayers, fourLayers}
MIMO-CapabilityDL-r10 ::= ENUMERATED {twoLayers, fourLayers, eightLayers}

SupportedBandListEUTRA ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA
SupportedBandListEUTRA-v9e0 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v9e0
SupportedBandListEUTRA-v1250 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v1250
SupportedBandListEUTRA-v1310 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v1310
SupportedBandListEUTRA-v1320 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v1320

SupportedBandEUTRA ::= SEQUENCE {
  bandEUTRA      FreqBandIndicator,
  halfDuplex     BOOLEAN
}

SupportedBandEUTRA-v9e0 ::= SEQUENCE {
  bandEUTRA-v9e0      FreqBandIndicator-v9e0  OPTIONAL
}

SupportedBandEUTRA-v1250 ::= SEQUENCE {
  dl-256QAM-r12      ENUMERATED {supported}  OPTIONAL,
  ul-64QAM-r12       ENUMERATED {supported}  OPTIONAL
}

SupportedBandEUTRA-v1310 ::= SEQUENCE {
  ue-PowerClass-5-r13   ENUMERATED {supported}  OPTIONAL
}

SupportedBandEUTRA-v1320 ::= SEQUENCE {
  intraFreq-CE-NeedForGaps-r13  ENUMERATED {supported}  OPTIONAL,
  ue-PowerClass-N-r13   ENUMERATED {class1, class2, class4}  OPTIONAL
}

MeasParameters ::= SEQUENCE {
  bandListEUTRA      BandListEUTRA
}

MeasParameters-v1020 ::= SEQUENCE {
  bandCombinationListEUTRA-r10   BandCombinationListEUTRA-r10
}

MeasParameters-v1130 ::= SEQUENCE {
  rsrqMeasWideband-r11          ENUMERATED {supported}  OPTIONAL
}

MeasParameters-v11a0 ::= SEQUENCE {
  benefitsFrom Interruption-r11 ENUMERATED {true}    OPTIONAL
}

MeasParameters-v1250 ::= SEQUENCE {
  timerT312-r12      ENUMERATED {supported}  OPTIONAL,
  alternativeTimeToTrigger-r12  ENUMERATED {supported}  OPTIONAL,
  incMonEUTRA-r12    ENUMERATED {supported}  OPTIONAL,
  incMonUTRA-r12     ENUMERATED {supported}  OPTIONAL,
  extendedMaxMeasId-r12 ENUMERATED {supported}  OPTIONAL,
  extendedRSRQ-LowerRange-r12  ENUMERATED {supported}  OPTIONAL,
  rsrc-OnAllSymbols-r12  ENUMERATED {supported}  OPTIONAL,
  crs-DiscoverySignalsMeas-r12  ENUMERATED {supported}  OPTIONAL,
  csi-RD-DiscoverySignalsMeas-r12  ENUMERATED {supported}  OPTIONAL
}

MeasParameters-v1310 ::= SEQUENCE {
  rs-SINR-Meas-r13       ENUMERATED {supported}  OPTIONAL,
  whiteCellList-r13     ENUMERATED {supported}  OPTIONAL,
  extendedMaxObjectId-r13  ENUMERATED {supported}  OPTIONAL,
  ul-PDCP-Delay-r13     ENUMERATED {supported}  OPTIONAL,
  extendedFreqPriorities-r13  ENUMERATED {supported}  OPTIONAL,
  multiBandInfoReport-r13  ENUMERATED {supported}  OPTIONAL,
  rssi-AndChannelOccupancyReporting-r13  ENUMERATED {supported}  OPTIONAL
}

BandListEUTRA ::= SEQUENCE (SIZE (1..maxBands)) OF BandInfoEUTRA
BandCombinationListEUTRA-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandInfoEUTRA
### BandInfoEUTRA

```plaintext
BandInfoEUTRA ::= SEQUENCE {
    interFreqBandList     InterFreqBandList,
    interRAT-BandList     InterRAT-BandList  OPTIONAL
}
```

### InterFreqBandList

```plaintext
InterFreqBandList ::= SEQUENCE (SIZE (1..maxBands)) OF InterFreqBandInfo
```

### InterFreqBandInfo

```plaintext
InterFreqBandInfo ::= SEQUENCE {
    interFreqNeedForGaps    BOOLEAN
}
```

### InterRAT-BandList

```plaintext
InterRAT-BandList ::= SEQUENCE (SIZE (1..maxBands)) OF InterRAT-BandInfo
```

### InterRAT-BandInfo

```plaintext
InterRAT-BandInfo ::= SEQUENCE {
    interRAT-NeedForGaps    BOOLEAN
}
```

### IRAT-ParametersUTRA-FDD

```plaintext
IRAT-ParametersUTRA-FDD ::= SEQUENCE {
    supportedBandListUTRA-FDD  SupportedBandListUTRA-FDD
}
```

### IRAT-ParametersUTRA-v920

```plaintext
IRAT-ParametersUTRA-v920 ::= SEQUENCE {
    e-RedirectionUTRA-r9    ENUMERATED {supported}
}
```

### IRAT-ParametersUTRA-v9c0

```plaintext
IRAT-ParametersUTRA-v9c0 ::= SEQUENCE {
    voiceOverPS-HS-UTRA-FDD-r9      ENUMERATED {supported}  OPTIONAL,
    srcvcc-FromUTRA-FDD-ToUTRA-FDD-r9 ENUMERATED {supported}  OPTIONAL,
    srcvcc-FromUTRA-FDD-ToGERAN-r9   ENUMERATED {supported}  OPTIONAL,
    srcvcc-FromUTRA-TDD128-ToUTRA-TDD128-r9 ENUMERATED {supported}  OPTIONAL,
    srcvcc-FromUTRA-TDD128-ToGERAN-r9 ENUMERATED {supported}  OPTIONAL
}
```

### IRAT-ParametersUTRA-v9h0

```plaintext
IRAT-ParametersUTRA-v9h0 ::= SEQUENCE {
    mfb1-UTRA-r9      ENUMERATED {supported}
}
```

### SupportedBandListUTRA-FDD

```plaintext
SupportedBandListUTRA-FDD ::= ENUMERATED {
    bandI, bandII, bandIII, bandIV, bandV, bandVI,
    bandVII, bandVIII, bandIX, bandX, bandXI,
    bandXII, bandXIII, bandXIV, bandXV, bandXVI, ...,
    bandXVII-8a0, bandXVIII-8a0, bandXIX-8a0, bandXX-8a0,
    bandXXI-8a0, bandXXII-8a0, bandXXIII-8a0, bandXXIV-8a0,
    bandXXV-8a0, bandXXVI-8a0, bandXXVII-8a0, bandXXVIII-8a0,
    bandXXIX-8a0, bandXXX-8a0, bandXXXI-8a0, bandXXXII-8a0,
    bandXXXIII-8a0, bandXXXIV-8a0, bandXXXV-8a0, bandXXXVI-8a0
}
```

### SupportedBandListUTRA-TDD128

```plaintext
SupportedBandListUTRA-TDD128 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD128
```

### SupportedBandListUTRA-TDD384

```plaintext
SupportedBandListUTRA-TDD384 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD384
```

### SupportedBandListUTRA-TDD768

```plaintext
SupportedBandListUTRA-TDD768 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD768
```
IRAT-ParametersUTRA-TDD-v1020 ::= SEQUENCE {
  e-RedirectUTRA-TDD-r10 ENUMERATED {supported}
}

IRAT-ParametersGERAN ::= SEQUENCE {
  supportedBandListGERAN SupportedBandListGERAN,
  interRAT-PS-HO-ToGERAN BOOLEAN
}

IRAT-ParametersGERAN-v920 ::= SEQUENCE {
  dtm-r9 ENUMERATED {supported} OPTIONAL,
  e-RedirectGERAN-r9 ENUMERATED {supported} OPTIONAL
}

SupportedBandListGERAN ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandGERAN

SupportedBandGERAN ::= ENUMERATED {
  gsm450, gsm480, gsm710, gsm750, gsm810, gsm850,
  gsm900P, gsm900E, gsm900R, gsm1800, gsm1900,
  spare5, spare4, spare3, spare2, spare1, ...
}

IRAT-ParametersCDMA2000-HRPD ::= SEQUENCE {
  supportedBandListHRPD SupportedBandListHRPD,
  tx-ConfigHRPD ENUMERATED {single, dual},
  rx-ConfigHRPD ENUMERATED {single, dual}
}

SupportedBandListHRPD ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandclassCDMA2000

IRAT-ParametersCDMA2000-1XRTT ::= SEQUENCE {
  supportedBandList1XRTT SupportedBandList1XRTT,
  tx-Config1XRTT ENUMERATED {single, dual},
  rx-Config1XRTT ENUMERATED {single, dual}
}

IRAT-ParametersCDMA2000-1XRTT-v920 ::= SEQUENCE {
  e-CSFB-1XRTT-r9 ENUMERATED {supported},
  e-CSFB-ConcPS-Mobil1XRTT-r9 ENUMERATED {supported} OPTIONAL
}

IRAT-ParametersCDMA2000-1XRTT-v1020 ::= SEQUENCE {
  e-CSFB-dual-1XRTT-r10 ENUMERATED {supported}
}

IRAT-ParametersCDMA2000-v1130 ::= SEQUENCE {
  cdma2000-NW-Sharing-r11 ENUMERATED {supported} OPTIONAL
}

SupportedBandList1XRTT ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandclassCDMA2000

IRAT-ParametersWLAN-r13 ::= SEQUENCE {
  supportedBandListWLAN-r13 SupportedBandListWLAN-r13
}

CSG-ProximityIndicationParameters-r9 ::= SEQUENCE {
  intraFreqProximityIndication-r9 ENUMERATED {supported} OPTIONAL,
  interFreqProximityIndication-r9 ENUMERATED {supported} OPTIONAL,
  utran-ProximityIndication-r9 ENUMERATED {supported} OPTIONAL
}

NeighCellSI-AcquisitionParameters-r9 ::= SEQUENCE {
  intraFreqSI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL,
  interFreqSI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL,
  utran-SI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL
}

SON-Parameters-r9 ::= SEQUENCE {
  rach-Report-r9 ENUMERATED {supported} OPTIONAL
}

UE-BasedNetwPerfMeasParameters-r10 ::= SEQUENCE {
  loggedMeasurementsIdle-r10 ENUMERATED {supported} OPTIONAL,
  standaloneGNSS-Location-r10 ENUMERATED {supported} OPTIONAL
}
UE-BasedNetwPerfMeasParameters-v1250 ::= SEQUENCE {
    loggedMBSFNMeasurments-r12 ENUMERATED {supported} }

OTDOA-PositioningCapabilities-r10 ::= SEQUENCE {
    otdoa-UE-Assisted-r10 ENUMERATED {supported},
    interFreqRSTD-Measurement-r10 ENUMERATED {supported} OPTIONAL }

Other-Parameters-r11 ::= SEQUENCE {
    inDeviceCoexInd-r11 ENUMERATED {supported} OPTIONAL,
    powerPrefInd-r11 ENUMERATED {supported} OPTIONAL,
    ue-Rx-TxTimeDiffMeasurements-r11 ENUMERATED {supported} OPTIONAL }

Other-Parameters-v11d0 ::= SEQUENCE {
    inDeviceCoexInd-UL-CA-r11 ENUMERATED {supported} OPTIONAL }

Other-Parameters-v1360 ::= SEQUENCE {
    inDeviceCoexInd-HardwareSharingInd-r13 ENUMERATED {supported} OPTIONAL }

MBMS-Parameters-r11 ::= SEQUENCE {
    mbms-SCell-r11 ENUMERATED {supported} OPTIONAL,
    mbms-NonServingCell-r11 ENUMERATED {supported} OPTIONAL }

MBMS-Parameters-v1250 ::= SEQUENCE {
    mbms-AsyncDC-r12 ENUMERATED {supported} OPTIONAL }

SCPTM-Parameters-r13 ::= SEQUENCE {
    scptm-ParallelReception-r13 ENUMERATED {supported} OPTIONAL,
    scptm-SCell-r13 ENUMERATED {supported} OPTIONAL,
    scptm-NonServingCell-r13 ENUMERATED {supported} OPTIONAL,
    scptm-AsyncDC-r13 ENUMERATED {supported} OPTIONAL }

CE-Parameters-r13 ::= SEQUENCE {
    ce-ModeA-r13 ENUMERATED {supported} OPTIONAL,
    ce-ModeB-r13 ENUMERATED {supported} OPTIONAL }

CE-Parameters-v1320 ::= SEQUENCE {
    intraFreqA3-CE-ModeA-r13 ENUMERATED {supported} OPTIONAL,
    intraFreqA3-CE-ModeB-r13 ENUMERATED {supported} OPTIONAL,
    intraFreqHO-CE-ModeA-r13 ENUMERATED {supported} OPTIONAL,
    intraFreqHO-CE-ModeB-r13 ENUMERATED {supported} OPTIONAL }

CE-Parameters-v1350 ::= SEQUENCE {
    unicastFrequencyHopping-r13 ENUMERATED {supported} OPTIONAL }

CE-Parameters-v1370 ::= SEQUENCE {
    tm9-CE-ModeA-r13 ENUMERATED {supported} OPTIONAL,
    tm9-CE-ModeB-r13 ENUMERATED {supported} OPTIONAL }

CE-Parameters-v1380 ::= SEQUENCE {
    tm6-CE-ModeA-r13 ENUMERATED {supported} OPTIONAL }

LAA-Parameters-r13 ::= SEQUENCE {
    crossCarrierSchedulingLAA-DL-r13 ENUMERATED {supported} OPTIONAL,
    csi-RS-DRS-RRM-MeasurementsLAA-r13 ENUMERATED {supported} OPTIONAL,
    downlinkLAA-r13 ENUMERATED {supported} OPTIONAL,
    endingDwPTS-r13 ENUMERATED {supported} OPTIONAL,
    secondSlotStartingPosition-r13 ENUMERATED {supported} OPTIONAL,
    tm9-LAA-r13 ENUMERATED {supported} OPTIONAL,
    tm10-LAA-r13 ENUMERATED {supported} OPTIONAL }

WLAN-IW-Parameters-r12 ::= SEQUENCE {
    wlan-IW-RAN-Rules-r12 ENUMERATED {supported} OPTIONAL,
    wlan-IW-ANDSF-Policies-r12 ENUMERATED {supported} OPTIONAL}
LWA-Parameters-r13 ::= SEQUENCE {
  lwa-r13 ENUMERATED {supported} OPTIONAL,
  lwa-SplitBearer-r13 ENUMERATED {supported} OPTIONAL,
  wlan-MAC-Address-r13 OCTET STRING (SIZE (6)) OPTIONAL,
  lwa-BufferSize-r13 ENUMERATED {supported} OPTIONAL
}

WLAN-IW-Parameters-v1310 ::= SEQUENCE {
  rcliwi-r13 ENUMERATED {supported} OPTIONAL
}

LWIP-Parameters-r13 ::= SEQUENCE {
  lwip-r13 ENUMERATED {supported} OPTIONAL
}

NAICS-Capability-List-r12 ::= SEQUENCE (SIZE (1..maxNAICS-Entries-r12)) OF NAICS-Capability-Entry-r12

NAICS-Capability-Entry-r12 ::= SEQUENCE {
  numberOfNAICS-CapableCC-r12 INTEGER(1..5),
  numberOfAggregatedPRB-r12 ENUMERATED {
    n50, n75, n100, n125, n150, n175,
    n200, n225, n250, n275, n300, n350,
    n400, n450, n500, spare},
  ...
}

SL-Parameters-r12 ::= SEQUENCE {
  commSimultaneousTx-r12 ENUMERATED {supported} OPTIONAL,
  commSupportedBands-r12 FreqBandIndicatorListEUTRA-r12 OPTIONAL,
  discSupportedBands-r12 SupportedBandInfoList-r12 OPTIONAL,
  discScheduledResourceAlloc-r12 ENUMERATED {supported} OPTIONAL,
  disc-UE-SelectedResourceAlloc-r12 ENUMERATED {supported} OPTIONAL,
  disc-SLSS-r12 ENUMERATED {supported} OPTIONAL,
  discSupportedProc-r12 ENUMERATED {n50, n400} OPTIONAL
}

SL-Parameters-v1310 ::= SEQUENCE {
  discSysInfoReporting-r13 ENUMERATED {supported} OPTIONAL,
  commMultipleTx-r13 ENUMERATED {supported} OPTIONAL,
  discInterFreqTx-r13 ENUMERATED {supported} OPTIONAL,
  discPeriodicSLSS-r13 ENUMERATED {supported} OPTIONAL
}

SupportedBandInfoList-r12 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandInfo-r12

SupportedBandInfo-r12 ::= SEQUENCE {
  support-r12 ENUMERATED {supported} OPTIONAL
}

FreqBandIndicatorListEUTRA-r12 ::= SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicator-r11

-- ASN1STOP
<table>
<thead>
<tr>
<th>UE-EUTRA-Capability field descriptions</th>
<th>FDD/ TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>accessStratumRelease</td>
<td>Set to rel13 in this version of the specification. NOTE 7.</td>
</tr>
<tr>
<td>additionalRx-Tx-PerformanceReq</td>
<td></td>
</tr>
<tr>
<td>alternativeTBS-Indices</td>
<td>Indicates whether the UE supports alternative TBS indices for hBS 26 and 33 as specified in TS 36.213 [23].</td>
</tr>
<tr>
<td>alternativeTimeToTrigger</td>
<td>Indicates whether the UE supports alternativeTimeToTrigger.</td>
</tr>
<tr>
<td>aperiodicCSI-Reporting</td>
<td>No</td>
</tr>
<tr>
<td>BandCombinationListEUTRA</td>
<td>One entry corresponding to each supported band combination listed in the same order as in supportedBandCombination.</td>
</tr>
<tr>
<td>BandCombinationParameters-v1090, BandCombinationParameters-v10i0, BandCombinationParameters-v1270</td>
<td></td>
</tr>
<tr>
<td>BandCombinationParameters-v1130</td>
<td>The field is applicable to each supported CA bandwidth class combination (i.e. CA configuration in TS 36.101 [42, Section 5.6A.1]) indicated in the corresponding band combination. If included, the UE shall include the same number of entries, and listed in the same order, as in BandCombinationParameters-r10.</td>
</tr>
<tr>
<td>bandEUTRA</td>
<td>E-UTRA band as defined in TS 36.101 [42]. In case the UE includes bandEUTRA-v9e0 or bandEUTRA-v1090, the UE shall set the corresponding entry of bandEUTRA (i.e. without suffix) or bandEUTRA-r10 respectively to maxFBI.</td>
</tr>
<tr>
<td>bandListEUTRA</td>
<td>One entry corresponding to each supported E-UTRA band listed in the same order as in supportedBandListEUTRA.</td>
</tr>
<tr>
<td>bandParameterList-v1380</td>
<td>If included, the UE shall include the same number of entries listed in the same order as the band entries in the corresponding band combination.</td>
</tr>
<tr>
<td>bandParametersUL, bandParametersDL</td>
<td>Indicates the supported parameters for the band. Each of CA-MIMO-ParametersUL and CA-MIMO-ParametersDL can be included only once for one band in a single band combination entry.</td>
</tr>
<tr>
<td>beamformed (in MIMO-CA-ParametersPerBoBCPerTM)</td>
<td>If signalled, the field indicates for a particular transmission mode, the UE capabilities concerning beamformed EBF/ FD-MIMO operation (class B) applicable for the concerned band combination.</td>
</tr>
<tr>
<td>beamformed (in MIMO-UE-ParametersPerTM)</td>
<td>Indicates for a particular transmission mode, the UE capabilities concerning beamformed EBF/ FD-MIMO operation (class B) applicable for band combinations for which the concerned capabilities are not signalled.</td>
</tr>
<tr>
<td>benefitsFromInterruption</td>
<td>Indicates whether the UE power consumption would benefit from being allowed to cause interruptions to serving cells when performing measurements of deactivated SCell carriers for measCycleSCell of less than 640ms, as specified in TS 36.133 [16].</td>
</tr>
<tr>
<td>ce-ModeA, ce-ModeB</td>
<td>Indicates whether the UE supports operation in CE mode A and/or B, as specified in TS 36.211 [21] and TS 36.213 [23].</td>
</tr>
<tr>
<td>CA-BandwidthClass</td>
<td>The CA bandwidth class supported by the UE as defined in TS 36.101 [42, Table 5.6A-1]. The UE explicitly includes all the supported CA bandwidth class combinations in the band combination signalling. Support for one CA bandwidth class does not implicitly indicate support for another CA bandwidth class.</td>
</tr>
<tr>
<td>UE-EUTRA-Capability field descriptions</td>
<td>FDD/ TDD diff</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>cch-InterMitigation-RefRecTypeA, cch-InterMitigation-RefRecTypeB, cch-InterMitigation-MaxNumCCs</td>
<td>-</td>
</tr>
<tr>
<td>The field cch-InterMitigation-RefRecTypeA defines whether the UE supports Type A downlink control channel interference mitigation (CCH-IM) receiver &quot;LMMSE-IRC + CRS-IC&quot; for PDCCH/PCFICH/PHICH/EPDCCH receive processing (Enhanced downlink control channel performance requirements Type A in the TS 36.101 [6]). The field cch-InterMitigation-RefRecTypeB defines whether the UE supports Type B downlink CCH-IM receiver &quot;E-LMMSE-IRC + CRS-IC&quot; for PDCCH/PCFICH/PHICH receive processing in synchronous networks (Enhanced downlink control channel performance requirements Type B in the TS 36.101 [6]). The UE supporting the capability defined by cch-InterMitigation-RefRecTypeB-r13 shall also support the capability defined by cch-InterMitigation-RefRecTypeA-r13.</td>
<td></td>
</tr>
<tr>
<td>If the UE sets one or more of the fields cch-InterMitigation-RefRecTypeA and cch-InterMitigation-RefRecTypeB to &quot;supported&quot;, the UE shall include the parameter cch-InterMitigation-MaxNumCCs to indicate that the UE supports CCH-IM on at least one arbitrary downlink CC for up to cch-InterMitigation-MaxNumCCs downlink CC CA configuration. The UE shall not include the parameter cch-InterMitigation-MaxNumCCs if neither cch-InterMitigation-RefRecTypeA nor cch-InterMitigation-RefRecTypeB is present. The UE may not perform CCH-IM on more than 1 DL CCs. For example, the UE sets &quot;cch-InterMitigation-MaxNumCCs = 3&quot; to indicate that UE supports CCH-IM on at least one DL CC for supported non-CA, 2DL CA and 3DL CA configurations. For CA scenarios, the CCH-IM is guaranteed to be supported on at least one arbitrary component carrier.</td>
<td></td>
</tr>
<tr>
<td>cdma2000-NW-Sharing</td>
<td>Indicates whether the UE supports network sharing for CDMA2000.</td>
</tr>
<tr>
<td>channelMeasRestriction</td>
<td>Indicates for a particular transmission mode whether the UE supports channel measurement restriction.</td>
</tr>
<tr>
<td>codebook-HARQ-ACK</td>
<td>Indicates whether the UE supports determining HARQ ACK codebook size based on the DAI-based solution and/or the number of configured CCs. The first bit is set to &quot;1&quot; if the UE supports the DAI-based codebook size determination. The second bit is set to &quot;1&quot; if the UE supports the codebook determination based on the number of configured CCs.</td>
</tr>
<tr>
<td>commMultipleTx</td>
<td>Indicates whether the UE supports multiple transmissions of sidelink communication to different destinations in one SC period. If commMultipleTx-r13 is set to supported then the UE support 8 transmitting sidelink processes.</td>
</tr>
<tr>
<td>commSimultaneousTx</td>
<td>Indicates whether the UE supports simultaneous transmission of EUTRA and sidelink communication (on different carriers) in all bands for which the UE indicated sidelink support in a band combination (using commSupportedBandsPerBC).</td>
</tr>
<tr>
<td>commSupportedBands</td>
<td>Indicates the bands on which the UE supports sidelink communication, by an independent list of bands i.e. separate from the list of supported E-UTRA band, as indicated in supportedBandListEUTRA.</td>
</tr>
<tr>
<td>commSupportedBandsPerBC</td>
<td>Indicates, for a particular band combination, the bands on which the UE supports simultaneous reception of EUTRA and sidelink communication. If the UE indicates support simultaneous transmission (using commSimultaneousTx), it also indicates, for a particular band combination, the bands on which the UE supports simultaneous transmission of EUTRA and sidelink communication. The first bit refers to the first band included in commSupportedBands, with value 1 indicating sidelink is supported.</td>
</tr>
<tr>
<td>configN (in MIMO-CA-ParametersPerBoBCPerTM)</td>
<td>If signalled, the field indicates for a particular transmission mode whether the UE supports non-precoded EBF/ FD-MIMO (class A) related configuration N for the concerned band combination.</td>
</tr>
<tr>
<td>configN (in MIMO-UE-ParametersPerTM)</td>
<td>Indicates for a particular transmission mode whether the UE supports non-precoded EBF/ FD-MIMO (class A) related configuration N for band combinations for which the concerned capabilities are not signalled.</td>
</tr>
<tr>
<td>crossCarrierScheduling</td>
<td>Yes</td>
</tr>
<tr>
<td>crossCarrierScheduling-BSC</td>
<td>Indicates whether the UE supports cross carrier scheduling beyond 5 DL CCs.</td>
</tr>
<tr>
<td>crossCarrierSchedulingLAA-DL</td>
<td>Indicates whether the UE supports cross-carrier scheduling from a licensed carrier for LAA cell(s) for downlink. This field can be included only if downlinkLAA is included.</td>
</tr>
<tr>
<td>Field Description</td>
<td>FDD/TDD differently</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td><strong>UE-EUTRA-Capability field descriptions</strong></td>
<td></td>
</tr>
<tr>
<td><strong>crs-DiscoverySignalsMeas</strong></td>
<td>Indicates whether the UE supports CRS based discovery signals measurement, and PDSCH/EPDCCH RE mapping with zero power CSI-RS configured for discovery signals.</td>
</tr>
<tr>
<td><strong>crs-InterfHandl</strong></td>
<td>Indicates whether the UE supports CRS interference handling.</td>
</tr>
<tr>
<td><strong>crs-InterfMitigationTM10</strong></td>
<td>The field defines whether the UE supports CRS interference mitigation in transmission mode 10. The UE supporting the <code>crs-InterfMitigationTM10</code> capability shall also support the <code>crs-InterfHandl</code> capability.</td>
</tr>
<tr>
<td><strong>crs-InterfMitigationTM1toTM9</strong></td>
<td>Indicates whether the UE supports CRS interference mitigation (IM) while operating in the following transmission modes (TM): TM 1, TM 2, ..., TM 8 and TM 9. The UE shall not include the field if it does not support CRS IM in TM 1-9. If the field is present, the UE supports CRS-IM on at least one arbitrary downlink CC for up to <code>crs-InterfMitigationTM1toTM9-r13</code> downlink CC CA configuration. The UE signals <code>crs-InterfMitigationTM1toTM9-r13</code> value to indicate the maximum <code>crs-InterfMitigationTM1toTM9-r13</code> downlink CC CA configuration where UE may apply CRS IM. For example, the UE sets &quot;crs-InterfMitigationTM1toTM9-r13 = 3&quot; to indicate that the UE supports CRS-IM on at least one DL CC for supported non-CA, 2DL CA and 3DL CA configurations. The UE supporting the <code>crs-InterfMitigationTM1toTM9-r13</code> capability shall also support the <code>crs-InterfHandl-r11</code> capability.</td>
</tr>
<tr>
<td><strong>csi-RS-DiscoverySignalsMeas</strong></td>
<td>Indicates whether the UE supports CSI-RS based discovery signals measurement. If this field is included, the UE shall also include <code>csi-RS-DiscoverySignalsMeas</code>.</td>
</tr>
<tr>
<td><strong>csi-RS-DRS-RRM-MeasurementsLAA</strong></td>
<td>Indicates whether the UE supports performing RRM measurements on LAA cell(s) based on CSI-RS-based DRS. This field can be included only if <code>downlinkLAA</code> is included.</td>
</tr>
<tr>
<td><strong>csi-RS-EnhancementsTDD</strong></td>
<td>Indicates for a particular transmission mode whether the UE supports CSI-RS enhancements applicable for TDD.</td>
</tr>
<tr>
<td><strong>csi-SubframeSet</strong></td>
<td>Indicates whether the UE supports REL-12 DL CSI subframe set configuration, REL-12 DL CSI subframe set dependent CSI measurement/feedback, configuration of up to 2 CSI-IM resources for a CSI process with no more than 4 CSI-IM resources for all CSI processes of one frequency if the UE supports tm10, configuration of two ZP-CSI-RS for tm1 to tm9, PDSCH RE mapping with two ZP-CSI-RS configurations, and EPDCCH RE mapping with two ZP-CSI-RS configurations if the UE supports EPDCCH. This field is only applicable for UEs supporting TDD.</td>
</tr>
<tr>
<td><strong>dc-Support</strong></td>
<td>Including this field indicates that the UE supports synchronous DC and power control mode 1. Including this field for a band combination entry comprising of single band entry indicates that the UE supports intra-band contiguous DC. Including this field for a band combination entry comprising of two or more band entries, indicates that the UE supports DC for these bands and that the serving cells corresponding to a band entry shall belong to one cell group (i.e. MCG or SCG). Including field asynchronous indicates that the UE supports asynchronous DC and power control mode 2. Including this field for a TDD/FDD band combination indicates that the UE supports TDD/FDD DC for this band combination.</td>
</tr>
<tr>
<td><strong>deviceType</strong></td>
<td>UE may set the value to &quot;noBenFromBatConsumpOpt&quot; when it does not foresee to particularly benefit from NW-based battery consumption optimisation. Absence of this value means that the device does benefit from NW-based battery consumption optimisation.</td>
</tr>
<tr>
<td><strong>differentFallbackSupported</strong></td>
<td>Indicates that the UE supports different capabilities for at least one fallback case of this band combination.</td>
</tr>
<tr>
<td><strong>disclInterFreqTx</strong></td>
<td>Indicates whether the UE support sidelink discovery announcements either a) on the primary frequency only or b) on other frequencies also, regardless of the UE configuration (e.g. CA, DC). The UE may set <code>disclInterFreqTx</code> to supported when having a separate transmitter or if it can request sidelink discovery transmission gaps.</td>
</tr>
<tr>
<td><strong>discoverySignalsInDeactSCell</strong></td>
<td>Indicates whether the UE supports the behaviour on DL signals and physical channels when SCell is deactivated and discovery signals measurement is configured as specified in TS 36.211 [21, 6.1.1A]. This field is included only if UE supports carrier aggregation and includes <code>crs-DiscoverySignalsMeas</code>.</td>
</tr>
<tr>
<td>UE-EUTRA-Capability field descriptions</td>
<td>FDD/TDD diff</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>discPeriodicSLSS</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports periodic (i.e. not just one time before sidelink discovery announcement) Sidelink Synchronization Signal (SLSS) transmission and reception for sidelink discovery.</td>
<td></td>
</tr>
<tr>
<td><strong>discScheduledResourceAlloc</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports transmission of discovery announcements based on network scheduled resource allocation.</td>
<td></td>
</tr>
<tr>
<td><strong>disc-UE-SelectedResourceAlloc</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports transmission of discovery announcements based on UE autonomous resource selection.</td>
<td></td>
</tr>
<tr>
<td><strong>disc-SLSS</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports Sidelink Synchronization Signal (SLSS) transmission and reception for sidelink discovery.</td>
<td></td>
</tr>
<tr>
<td><strong>discSupportedBands</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates the bands on which the UE supports sidelink discovery. One entry corresponding to each supported E-UTRA band, listed in the same order as in supportedBandListEUTRA.</td>
<td></td>
</tr>
<tr>
<td><strong>discSupportedProc</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates the number of processes supported by the UE for sidelink discovery.</td>
<td></td>
</tr>
<tr>
<td><strong>discSysInfoReporting</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports reporting of system information for inter-frequency/PLMN sidelink discovery.</td>
<td></td>
</tr>
<tr>
<td><strong>dl-256QAM</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports 256QAM in DL on the band.</td>
<td></td>
</tr>
<tr>
<td><strong>dmrs-Enhancements (in MIMO-CA-ParametersPerBoBCPerTM)</strong></td>
<td>-</td>
</tr>
<tr>
<td>If signalled, the field indicates for a particular transmission mode, that for the concerned band combination the DMRS enhancements are different than the value indicated by field dmrs-Enhancements in MIMO-UE-ParametersPerTM.</td>
<td></td>
</tr>
<tr>
<td><strong>dmrs-Enhancements (in MIMO-UE-ParametersPerTM)</strong></td>
<td>TBD</td>
</tr>
<tr>
<td>Indicates for a particular transmission mode whether the UE supports DMRS enhancements for the indicated transmission mode.</td>
<td></td>
</tr>
<tr>
<td><strong>downlinkLAA</strong></td>
<td>-</td>
</tr>
<tr>
<td>Presence of the field indicates that the UE supports downlink LAA operation including identification of downlink transmissions on LAA cell(s) for full downlink subframes, decoding of common downlink control signalling on LAA cell(s), CSI feedback for LAA cell(s), RRM measurements on LAA cell(s) based on CRS-based DRS.</td>
<td></td>
</tr>
<tr>
<td><strong>drb-TypeSCG</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports SCG bearer.</td>
<td></td>
</tr>
<tr>
<td><strong>drb-TypeSplit</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports split bearer except for PDCP data transfer in UL.</td>
<td></td>
</tr>
<tr>
<td><strong>dtm</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports DTM in GERAN.</td>
<td></td>
</tr>
<tr>
<td><strong>e-CSFB-1xRTT</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports enhanced CS fallback to CDMA2000 1xRTT or not.</td>
<td></td>
</tr>
<tr>
<td><strong>e-CSFB-ConcPS-Mob1xRTT</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports concurrent enhanced CS fallback to CDMA2000 1xRTT and PS handover/ redirection to CDMA2000 HRPD.</td>
<td></td>
</tr>
<tr>
<td><strong>e-CSFB-dual-1xRTT</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports enhanced CS fallback to CDMA2000 1xRTT for dual Rx/Tx configuration. This bit can only be set to supported if tx-Config1XRTT and rx-Config1XRTT are both set to dual.</td>
<td></td>
</tr>
<tr>
<td><strong>e-HARQ-Pattern-FDD</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports enhanced HARQ pattern for TTI bundling operation for FDD.</td>
<td></td>
</tr>
<tr>
<td><strong>endingDwPTS</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports reception ending with a subframe occupied for a DwPTS-duration as described in TS 36.211 [21] and TS 36.213 [23]. This field can be included only if downlinkLAA is included.</td>
<td></td>
</tr>
<tr>
<td><strong>Enhanced-4TxCodebook</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports enhanced 4Tx codebook.</td>
<td></td>
</tr>
<tr>
<td><strong>enhancedDualLayerTDD</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports enhanced dual layer (PDSCH transmission mode 8) for TDD or not.</td>
<td></td>
</tr>
<tr>
<td><strong>ePDCCH</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE can receive DCI on UE specific search space on Enhanced PDCCH.</td>
<td></td>
</tr>
<tr>
<td><strong>e-RedirectionUTRA</strong></td>
<td>Yes</td>
</tr>
</tbody>
</table>

**ETSI**
### UE-EUTRA-Capability field descriptions

<table>
<thead>
<tr>
<th><strong>Field</strong></th>
<th><strong>Description</strong></th>
<th><strong>FDD/TDD diff</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>e-RedirectionUtraTdd</td>
<td>Indicates whether the UE supports enhanced redirection to UTRA TDD to multiple carrier frequencies both with and without using related SIB provided by RRCConnectionRelease or not.</td>
<td>Yes</td>
</tr>
<tr>
<td>extendedFreqPriorities</td>
<td>Indicates whether the UE supports extended E-UTRA frequency priorities indicated by cellReselectionSubPriority field.</td>
<td>-</td>
</tr>
<tr>
<td>extendedLongDRX</td>
<td>Indicates whether the UE supports extended long DRX cycle values of 5.12s and 10.24s in RRC_CONNECTED.</td>
<td>-</td>
</tr>
<tr>
<td>extendedMACLengthField</td>
<td>Indicates whether the UE supports the MAC header with L field of size 16 bits as specified in TS 36.321 [6, 6.2.1].</td>
<td>-</td>
</tr>
<tr>
<td>extendedMaxMeasId</td>
<td>Indicates whether the UE supports extended number of measurement identities as defined by maxMeasId-r12.</td>
<td>No</td>
</tr>
<tr>
<td>extendedMaxObjectId</td>
<td>Indicates whether the UE supports extended number of measurement object identities as defined by maxObjectId-r13.</td>
<td>No</td>
</tr>
<tr>
<td>extendedRlcLlField</td>
<td>Indicates whether the UE supports 15 bit RLC length indicator.</td>
<td>-</td>
</tr>
<tr>
<td>extendedRlcSnSoField</td>
<td>Indicates whether the UE supports 16 bits of RLC sequence number and segmentation offset.</td>
<td>-</td>
</tr>
<tr>
<td>extendedRsrqLowerRange</td>
<td>Indicates whether the UE supports the extended RSRQ lower value range from -34dB to -19.5dB in measurement configuration and reporting as specified in TS 36.133 [16].</td>
<td>No</td>
</tr>
<tr>
<td>fdd-Harq-TimingTdd</td>
<td>Indicates whether UE supports FDD HARQ timing for TDD SCell when configured with TDD PCell.</td>
<td>Yes</td>
</tr>
<tr>
<td>featureGroupIndicators, featureGroupIndRel9Add, featureGroupIndRel10</td>
<td>The definitions of the bits in the bit string are described in Annex B.1 (for featureGroupIndicators and featureGroupIndRel9Add) and in Annex C.1.(for featureGroupIndRel10)</td>
<td>Yes</td>
</tr>
<tr>
<td>fourLayerTM3-TM4</td>
<td>Indicates whether the UE supports 4-layer spatial multiplexing for TM3 and TM4.</td>
<td>-</td>
</tr>
<tr>
<td>fourLayerTM3-TM4-perCC</td>
<td>Indicates whether the UE supports 4-layer spatial multiplexing for TM3 and TM4 for the component carrier.</td>
<td>-</td>
</tr>
<tr>
<td>freqBandPriorityAdjustment</td>
<td>Indicates whether the UE supports the prioritization of frequency bands in multiBandInfoList over the band in freqBandIndicator as defined by freqBandIndicatorPriority-r12.</td>
<td>-</td>
</tr>
<tr>
<td>freqBandRetrieval</td>
<td>Indicates whether the UE supports reception of requestedFrequencyBands.</td>
<td>-</td>
</tr>
<tr>
<td>halfDuplex</td>
<td>If halfDuplex is set to true, only half duplex operation is supported for the band, otherwise full duplex operation is supported.</td>
<td>-</td>
</tr>
<tr>
<td>incMonEutra</td>
<td>Indicates whether the UE supports increased number of E-UTRA carrier monitoring in RRC_IDLE and RRC_CONNECTED, as specified in TS 36.133 [16].</td>
<td>No</td>
</tr>
<tr>
<td>incMonUtra</td>
<td>Indicates whether the UE supports increased number of UTRA carrier monitoring in RRC_IDLE and RRC_CONNECTED, as specified in TS 36.133 [16].</td>
<td>No</td>
</tr>
<tr>
<td>inDeviceCoexInd</td>
<td>Indicates whether the UE supports in-device coexistence indication as well as autonomous denial functionality.</td>
<td>Yes</td>
</tr>
<tr>
<td>inDeviceCoexInd-UL-CA</td>
<td>Indicates whether the UE supports UL CA related in-device coexistence indication. This field can be included only if inDeviceCoexInd is included. The UE supports inDeviceCoexInd-UL-CA in the same duplexing modes as it supports inDeviceCoexInd.</td>
<td>-</td>
</tr>
<tr>
<td><strong>UE-EUTRA-Capability field descriptions</strong></td>
<td><strong>FDD/ TDD diff</strong></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td><strong>interBandTDD-CA-WithDifferentConfig</strong></td>
<td>Inter-band TDD carrier aggregation with different UL/DL configuration combinations. The first bit indicates UE supports the configuration combination of SCell DL subframes are a subset of PCell and PSCell by SIB1 configuration and the configuration combination of SCell DL subframes are a superset of PCell and PSCell by SIB1 configuration; the second bit indicates UE supports the configuration combination of SCell DL subframes are neither superset nor subset of PCell and PSCell by SIB1 configuration. This field is included only if UE supports inter-band TDD carrier aggregation.</td>
<td></td>
</tr>
<tr>
<td><strong>interferenceMeasRestriction</strong></td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td><strong>interFreqBandList</strong></td>
<td>One entry corresponding to each supported E-UTRA band listed in the same order as in supportedBandListEUTRA.</td>
<td></td>
</tr>
<tr>
<td><strong>interFreqNeedForGaps</strong></td>
<td>Indicates need for measurement gaps when operating on the E-UTRA band given by the entry in bandListEUTRA or on the E-UTRA band combination given by the entry in bandCombinationListEUTRA and measuring on the E-UTRA band given by the entry in interFreqBandList.</td>
<td></td>
</tr>
<tr>
<td><strong>interFreqProximityIndication</strong></td>
<td>Indicates whether the UE supports proximity indication for inter-frequency E-UTRAN CSG member cells.</td>
<td></td>
</tr>
<tr>
<td><strong>interFreqRSTD-Measurement</strong></td>
<td>Indicates whether the UE supports inter-frequency RSTD measurements for OTDOA positioning [54].</td>
<td></td>
</tr>
<tr>
<td><strong>interFreqSI-AcquisitionForHO</strong></td>
<td>Indicates whether the UE supports, upon configuration of si-RequestForHO by the network, acquisition and reporting of relevant information using autonomous gaps by reading the SI from a neighbouring inter-frequency cell.</td>
<td></td>
</tr>
<tr>
<td><strong>interRAT-BandList</strong></td>
<td>One entry corresponding to each supported band of another RAT listed in the same order as in the interRAT-Parameters.</td>
<td></td>
</tr>
<tr>
<td><strong>interRAT-NeedForGaps</strong></td>
<td>Indicates need for DL measurement gaps when operating on the E-UTRA band given by the entry in bandListEUTRA or on the E-UTRA band combination given by the entry in bandCombinationListEUTRA and measuring on the inter-RAT band given by the entry in the interRAT-BandList.</td>
<td></td>
</tr>
<tr>
<td><strong>interRAT-ParametersWLAN</strong></td>
<td>Indicates whether the UE supports WLAN measurements configured by MeasObjectWLAN with corresponding quantity and report configuration in the supported WLAN bands.</td>
<td></td>
</tr>
<tr>
<td><strong>interRAT-PS-HO-ToGERAN</strong></td>
<td>Indicates whether the UE supports inter-RAT PS handover to GERAN or not.</td>
<td></td>
</tr>
<tr>
<td><strong>intraBandContiguousCC-InfoList</strong></td>
<td>Indicates, per serving carrier of which the corresponding bandwidth class includes multiple serving carriers (i.e. bandwidth class B, C, D and so on), the maximum number of supported layers for spatial multiplexing in DL and the maximum number of CSI processes supported. The number of entries is equal to the number of component carriers in the corresponding bandwidth class. The UE shall support the setting indicated in each entry of the list regardless of the order of entries in the list. The UE shall include the field only if it supports 4-layer spatial multiplexing in transmission mode 3/4 for a subset of component carriers in the corresponding bandwidth class, or if the maximum number of supported layers for at least one component carrier is higher than supportedMIMO-CapabilityDL-r10 in the corresponding bandwidth class, or if the number of CSI processes for at least one component carrier is higher than supportedCSI-Proc-r11 in the corresponding band. This field may also be included for bandwidth class A but in such a case without including any sub-fields in intraBandContiguousCC-Info-r12 (see NOTE 6).</td>
<td></td>
</tr>
<tr>
<td><strong>intraFreqA3-CE-ModeA</strong></td>
<td>Indicates whether the UE when operating in CE Mode A supports eventA3 for intra-frequency neighbouring cells.</td>
<td></td>
</tr>
<tr>
<td><strong>intraFreqA3-CE-ModeB</strong></td>
<td>Indicates whether the UE when operating in CE Mode B supports eventA3 for intra-frequency neighbouring cells.</td>
<td></td>
</tr>
<tr>
<td><strong>intraFreqA3-CE-NeedForGaps</strong></td>
<td>Indicates need for measurement gaps when operating in CE on the E-UTRA band given by the entry in supportedBandListEUTRA.</td>
<td></td>
</tr>
<tr>
<td><strong>intraFreqHO-CE-ModeA</strong></td>
<td>Indicates whether the UE when operating in CE Mode A supports intra-frequency handover.</td>
<td></td>
</tr>
<tr>
<td>UE-EUTRA-Capability field descriptions</td>
<td>FDD/ TDD diff</td>
<td></td>
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<tr>
<td>--------------------------------------------------------------------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td><strong>intraFreqHo-Ce-ModeB</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE when operating in CE Mode B supports intra-frequency handover.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>intraFreqProximityIndication</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports proximity indication for intra-frequency E-UTRAN CSG member cells.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>intraFreqS1-AcquisitionForHo</strong></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports, upon configuration of si-RequestForHo by the network, acquisition and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>reporting of relevant information using autonomous gaps by reading the SI from a neighbouring intra-frequency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cell.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>k-Max (in Mimo-ca-ParametersPerBoBcPerTM)</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>If signalled, the field indicates for a particular transmission mode the maximum number of NZP CSI RS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>resource configurations supported within a CSI process applicable for the concerned band combination.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>k-Max (in Mimo-ue-ParametersPerTM)</strong></td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>Indicates for a particular transmission mode the maximum number of NZP CSI RS resource configurations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>supported within a CSI process applicable for band combinations for which the concerned capabilities are</td>
<td></td>
<td></td>
</tr>
<tr>
<td>not signalled.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>inDeviceCoexInd-HardwareSharingInd</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports indicating hardware sharing problems when sending the InDeviceCoexIndication,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>as well as omitting the TDM assistance information. A UE that supports hardware sharing indication shall also</td>
<td></td>
<td></td>
</tr>
<tr>
<td>indicate support of LAA operation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>loggedMBSFNMeasurements</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports logged measurements for MBSFN. A UE indicating support for logged</td>
<td></td>
<td></td>
</tr>
<tr>
<td>measurements for MBSFN shall also indicate support for logged measurements in Idle mode.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>loggedMeasurementsIdle</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports logged measurements in Idle mode.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>logicalChannelSr-ProhibitTimer</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports the logicalChannelSr-ProhibitTimer as defined in TS 36.321 [6].</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>longDRX-Command</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports Long DRX Command MAC Control Element.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>lwa</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports LTE-WLAN Aggregation (LWA). The UE which supports LWA shall also</td>
<td></td>
<td></td>
</tr>
<tr>
<td>indicate support of interRAT-ParametersWLAN-r13.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>lwa-BufferSize</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports the layer 2 buffer sizes for &quot;with support for split bearers&quot; as</td>
<td></td>
<td></td>
</tr>
<tr>
<td>defined in Table 4.1-3 and 4.1A-3 of TS 36.306 [5] for LWA.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>lwa-SplitBearer</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports the split LWA bearer (as defined in TS 36.300 [9]).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>lwip</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports LTE/WLAN Radio Level Integration with IPsec Tunnel (LWIP). The UE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>which supports LWIP shall also indicate support of interRAT-ParametersWLAN-r13.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>maximumCCsRetrieval</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether UE supports reception of requestedMaxCCsDL and requestedMaxCCsUL.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>maxLayersMIMO-Indication</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports the network configuration of maxLayersMIMO. If the UE supports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fourLayerTM3-TM4 or intraBandContiguousCC-InfoList, UE supports the configuration of maxLayersMIMO for</td>
<td></td>
<td></td>
</tr>
<tr>
<td>these two cases regardless of indicating maxLayersMIMO-Indication.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>maxNumberDecoding</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Indicates the maximum number of blind decodes in UE-specific search space per UE in one subframe for</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CA with more than 5 CCs as defined in TS 36.213 [23] which is supported by the UE. The number of blind</td>
<td></td>
<td></td>
</tr>
<tr>
<td>decodes supported by the UE is the field value * 32. Only values 5 to 32 can be used in this version of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the specification.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>maxNumberROHC-ContextSessions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set to the maximum number of concurrently active ROHC contexts supported by the UE, excluding context</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sessions that leave all headers uncompressed. cs2 corresponds with 2 (context sessions), cs4 corresponds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with 4 and so on. The network ignores this field if the UE supports none of the ROHC profiles in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>supportedROHC-Profiles.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>maxNumberUpdatedCSI-Proc</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Indicates the maximum number of CSI processes to be updated across CCs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UE-EUTRA-Capability field descriptions</strong></td>
<td><strong>FDD/ TDD diff</strong></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td><strong>mbms-AsyncDC</strong></td>
<td>Indicates whether the UE in RRC_CONNECTED supports MBMS reception via MRB on a frequency indicated in an MBMSInterestIndication message, where (according to supportedBandCombination) the carriers that are or can be configured as serving cells in the MCG and the SCG are not synchronized. If this field is included, the UE shall also include mbms-SCell and mbms-NonServingCell. The field indicates that the UE supports the feature for xDD if mbms-SCell and mbms-NonServingCell are supported for xDD.</td>
<td></td>
</tr>
<tr>
<td><strong>mbms-NonServingCell</strong></td>
<td>Indicates whether the UE in RRC_CONNECTED supports MBMS reception via MRB on a frequency indicated in an MBMSInterestIndication message, where (according to supportedBandCombination and to network synchronization properties) a serving cell may be additionally configured. If this field is included, the UE shall also include the mbms-SCell field.</td>
<td></td>
</tr>
<tr>
<td><strong>mbms-SCell</strong></td>
<td>Indicates whether the UE in RRC_CONNECTED supports MBMS reception via MRB on a frequency indicated in an MBMSInterestIndication message, when an SCCell is configured on that frequency (regardless of whether the SCCell is activated or deactivated).</td>
<td></td>
</tr>
<tr>
<td><strong>mfbi-UTRA</strong></td>
<td>It indicates if the UE supports the signalling requirements of multiple radio frequency bands in a UTRA FDD cell, as defined in TS 25.307 [65].</td>
<td></td>
</tr>
<tr>
<td><strong>MIMO-BeamformedCapabilityList</strong></td>
<td>A list of pairs of (k-Max, n-MaxList) values with the n&lt;sup&gt;th&lt;/sup&gt; entry indicating the values that the UE supports for each CSI process in case n CSI processes would be configured.</td>
<td></td>
</tr>
<tr>
<td><strong>MIMO-CapabilityDL</strong></td>
<td>The number of supported layers for spatial multiplexing in DL. The field may be absent for category 0 and category 1 UE in which case the number of supported layers is 1.</td>
<td></td>
</tr>
<tr>
<td><strong>MIMO-CapabilityUL</strong></td>
<td>The number of supported layers for spatial multiplexing in UL. Absence of the field means that the number of supported layers is 1.</td>
<td></td>
</tr>
<tr>
<td><strong>MIMO-CA-ParametersPerBoBC</strong></td>
<td>A set of MIMO parameters provided per band of a band combination. In case a subfield is absent, the concerned capabilities are the same as indicated at the per UE level (i.e. by MIMO-UE-ParametersPerTM).</td>
<td></td>
</tr>
<tr>
<td><strong>modifiedMPR-Behavior</strong></td>
<td>Field encoded as a bit map, where at least one bit N is set to “1” if UE supports modified MPR/A-MPR behaviour N, see TS 36.101 [42]. All remaining bits of the field are set to “0”. The leading / leftmost bit (bit 0) corresponds to modified MPR/A-MPR behaviour 0, the next bit corresponds to modified MPR/A-MPR behaviour 1 and so on. Absence of this field means that UE does not support any modified MPR/A-MPR behaviour.</td>
<td></td>
</tr>
<tr>
<td><strong>multiACK-CSI-reporting</strong></td>
<td>Indicates whether the UE supports multi-cell HARQ ACK and periodic CSI reporting and SR on PUCCH format 3.</td>
<td></td>
</tr>
<tr>
<td><strong>multiBandInfoReport</strong></td>
<td>Indicates whether the UE supports the acquisition and reporting of multi band information for reportCGi.</td>
<td></td>
</tr>
<tr>
<td><strong>multiClusterPUSCH-WithinCC</strong></td>
<td>Indicates whether the UE supports the mechanisms defined for cells broadcasting NS-PmaxList.</td>
<td></td>
</tr>
<tr>
<td><strong>multipleTimingAdvance</strong></td>
<td>Indicates whether the UE supports multiple timing advances for each band combination listed in supportedBandCombination. If the band combination comprised of more than one band entry (i.e., inter-band or intra-band non-contiguous band combination), the field indicates that the same or different timing advances on different band entries are supported. If the band combination comprised of one band entry (i.e., intra-band contiguous band combination), the field indicates that the same or different timing advances across component carriers of the band entry are supported.</td>
<td></td>
</tr>
<tr>
<td>Field Description</td>
<td>FDD/TDD diff</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td><strong>naics-Capability-List</strong></td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
| Indicates that UE supports NAICS, i.e., receiving assistance information from serving cell and using it to cancel or suppress interference of neighbouring cell(s) for at least one band combination. If not present, UE does not support NAICS for any band combination. The field numberOfNAICS-CapableCC indicates the number of component carriers where the NAICS processing is supported and the field numberOfAggregatedPRB indicates the maximum aggregated bandwidth across these of component carriers (expressed as a number of PRBs) with the restriction that NAICS is only supported over the full carrier bandwidth. The UE shall indicate the combination of (numberOfNAICS-CapableCC, numberOfNAICS-CapableCC) for every supported numberOfNAICS-CapableCC, e.g., if a UE supports {x CC, y PRBs} and {x-n CC, y-m PRBs} where n >= 1 and m > 0, the UE shall indicate both.  
   - For numberOfNAICS-CapableCC = 1, UE signals one value for numberOfAggregatedPRB from the range (50, 75, 100);  
   - For numberOfNAICS-CapableCC = 2, UE signals one value for numberOfAggregatedPRB from the range (50, 75, 100, 125, 150, 175, 200);  
   - For numberOfNAICS-CapableCC = 3, UE signals one value for numberOfAggregatedPRB from the range (50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300);  
   - For numberOfNAICS-CapableCC = 4, UE signals one value for numberOfAggregatedPRB from the range (50, 100, 150, 200, 250, 300, 350, 400);  
   - For numberOfNAICS-CapableCC = 5, UE signals one value for numberOfAggregatedPRB from the range (50, 100, 150, 200, 250, 300, 350, 400, 450, 500); |
| **n-MaxList (in MIMO-UE-ParametersPerTM)**                                        | TBD          |
| Indicates for a particular transmission mode the maximum number of NZP CSI RS ports supported within a CSI process applicable for band combinations for which the concerned capabilities are not signalled. For k-Max values exceeding 1, the UE shall include the field and signal k-Max minus 1 bits. The first bit indicates n-Max2, with value 0 indicating 8 and value 1 indicating 16. The second bit indicates n-Max3, with value 0 indicating 8 and value 1 indicating 16. The third bit indicates n-Max4, with value 0 indicating 8 and value 1 indicating 32. The fourth bit indicates n-Max5, with value 0 indicating 16 and value 1 indicating 32. The fifth bit indicates n-Max6, with value 0 indicating 16 and value 1 indicating 32. The sixth bit indicates n-Max7, with value 0 indicating 16 and value 1 indicating 32. The seventh bit indicates n-Max8, with value 0 indicating 16 and value 1 indicating 64. |
| **n-MaxList (in MIMO-CA-ParametersPerBoBCPerTM)**                                  | No           |
| If signalled, the field indicates for a particular transmission mode the maximum number of NZP CSI RS ports supported within a CSI process applicable for the concerned combination. Further details are as indicated for n-MaxList in MIMO-UE-ParametersPerTM. |
| **NonContiguousUL-RA-WithinCC-List**                                              | No           |
| One entry corresponding to each supported E-UTRA band listed in the same order as in supportedBandListEUTRA. |
| **nonPrecoded (in MIMO-UE-ParametersPerTM)**                                      | TBD          |
| Indicates for a particular transmission mode the UE capabilities concerning non-precoded EBF/ FD-MIMO operation (class A) for band combinations for which the concerned capabilities are not signalled. |
| **nonPrecoded (in MIMO-CA-ParametersPerBoBCPerTM)**                                | -            |
| If signalled, the field indicates for a particular transmission mode, the UE capabilities concerning non-precoded EBF/ FD-MIMO operation (class A) applicable for the concerned band combination. |
| **noResourceRestrictionForTTIBundling**                                           | No           |
| Indicate whether the UE supports TTI bundling operation without resource allocation restriction. |
| **otdoa-UE-Assisted**                                                             | Yes          |
| Indicates whether the UE supports UE-assisted OTDOA positioning [54]. |
| **pdch-CandidateReductions**                                                      | No           |
| Indicates whether the UE supports PDCCH candidate reduction on UE specific search space as specified in TS 36.213 [23, 9.1.1]. |
| **pdcp-SN-Extension**                                                             | -            |
| Indicates whether the UE supports 15 bit length of PDCP sequence number. |
| **pdcp-SN-Extension-18bits**                                                      | -            |
| Indicates whether the UE supports 18 bit length of PDCP sequence number. |
| **pdcp-TransferSplitUL**                                                          | -            |
| Indicates whether the UE supports PDCP data transfer split in UL for the drb-TypeSplit as specified in TS 36.323 [8]. |
| **pdsch-CollisionHandling**                                                       | No           |
| Indicates whether the UE supports PDSCH collision handling as specified in TS 36.213 [23]. |
### UE-EUTRA-Capability field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>phy-TDD-ReConfig-FDD-PCell</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports TDD UL/DL reconfiguration for TDD serving cell(s) via monitoring PDCCH with elMTA-RNTI on a FDD PCell, and HARQ feedback according to UL and DL HARQ reference configurations. This bit can only be set to supported only if the UE supports FDD PCell and phy-TDD-ReConfig-TDD-PCell is set to supported.</td>
<td></td>
</tr>
<tr>
<td><strong>phy-TDD-ReConfig-TDD-PCell</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports TDD UL/DL reconfiguration for TDD serving cell(s) via monitoring PDCCH with elMTA-RNTI on a TDD PCell, and HARQ feedback according to UL and DL HARQ reference configurations, and PUCCH format 3.</td>
<td></td>
</tr>
<tr>
<td><strong>pmi-Disabling</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports power preference indication.</td>
<td></td>
</tr>
<tr>
<td><strong>powerPrefInd</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>pucch-Format4</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports PUCCH format 4.</td>
<td></td>
</tr>
<tr>
<td><strong>pucch-Format5</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports PUCCH format 5.</td>
<td></td>
</tr>
<tr>
<td><strong>pucch-SCell</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports PUCCH on SCell.</td>
<td></td>
</tr>
<tr>
<td><strong>pucch-FeedbackMode</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports PUSCH feedback mode 3-2.</td>
<td></td>
</tr>
<tr>
<td><strong>pusch-SRS-PowerControl-SubframeSet</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports subframe set dependent UL power control for PUSCH and SRS. This field is only applicable for UEs supporting TDD.</td>
<td></td>
</tr>
<tr>
<td><strong>rach-Report</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports delivery of rachReport.</td>
<td></td>
</tr>
<tr>
<td><strong>rclwi</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports RCLWI, i.e. reception of rclwi-Configuration. The UE which supports RLCWI shall also indicate support of interRAT-ParametersWLAN-r13. The UE which supports RCLWI and wlan-IV-RAN-Rules shall also support applying WLAN identifiers received in rclwi-Configuration for the access network selection and traffic steering rules when in RRC_IDLE.</td>
<td></td>
</tr>
<tr>
<td><strong>reducedIntNonContComb</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE receives requestReducedIntNonContComb that requests the UE to exclude supported intra-band non-contiguous CA band combinations other than included in capability signalling as specified in TS 36.306 [5, 4.3.5.21].</td>
<td></td>
</tr>
<tr>
<td><strong>reducedIntNonContCombRequested</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates that the UE excluded supported intra-band non-contiguous CA band combinations other than included in capability signalling as specified in TS 36.306 [5, 4.3.5.21].</td>
<td></td>
</tr>
<tr>
<td><strong>requestedBands</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates the frequency bands requested by E-UTRAN.</td>
<td></td>
</tr>
<tr>
<td><strong>requestedCCsDL, requestedCCsUL</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates the maximum number of CCs requested by E-UTRAN.</td>
<td></td>
</tr>
<tr>
<td><strong>rsrqMeasWideband</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE can perform RSRQ measurements with wider bandwidth.</td>
<td></td>
</tr>
<tr>
<td><strong>rsrq-OnAllSymbols</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE can perform RSRQ measurement on all OFDM symbols and also support the extended RSRQ upper value range from -3dB to 2.5dB in measurement configuration and reporting as specified in TS 36.214 [16].</td>
<td></td>
</tr>
<tr>
<td><strong>rs-SINR-Meas</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE can perform RS-SINR measurements in RRC_CONNECTED as specified in TS 36.214 [48].</td>
<td></td>
</tr>
<tr>
<td><strong>rssi-AndChannelOccupancyReporting</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports performing measurements and reporting of RSSI and channel occupancy. This field can be included only if downlinkLAA is included.</td>
<td></td>
</tr>
<tr>
<td><strong>scptm-AsycncDC</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE in RRC_CONNECTED supports MBMS reception via SC-MRB on a frequency indicated in an MBMSInterestIndication message, where (according to supportedBandCombination) the carriers that are or can be configured as serving cells in the MCG and the SCG are not synchronized. If this field is included, the UE shall also include scptm-SCell and scptm-NonServingCell.</td>
<td></td>
</tr>
<tr>
<td><strong>scptm-NonServingCell</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE in RRC_CONNECTED supports MBMS reception via SC-MRB on a frequency indicated in an MBMSInterestIndication message, where (according to supportedBandCombination and to network synchronization properties) a serving cell may be additionally configured. If this field is included, the UE shall also include the scptm-SCell field.</td>
<td></td>
</tr>
</tbody>
</table>
### UE-EUTRA-Capability field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>scptm-Parameters</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Presence of the field indicates that the UE supports SC-PTM reception as specified in TS 36.306 [5].</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>scptm-SCell</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE in RRC_CONNECTED supports MBMS reception via SC-MRB on a frequency indicated in an MBMSInterestIndication message, when an SCell is configured on that frequency (regardless of whether the SCell is activated or deactivated).</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>scptm-ParallelReception</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE in RRC_CONNECTED supports parallel reception in the same subframe of DL-SCH transport blocks transmitted using C-RNTI/Semi-Persistent Scheduling C-RNTI and using SC-RNTI/G-RNTI as specified in TS 36.306 [5].</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>secondSlotStartingPosition</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports reception of subframes with second slot starting position as described in TS 36.211 [21] and TS 36.213 [23]. This field can be included only if downlinkLAA is included.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>simultaneousPUCCH-PUSCH</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports simultaneous reception and transmission on different bands for each band combination listed in supportedBandCombination. This field is only applicable for inter-band TDD band combinations. A UE indicating support of simultaneousRx-Tx and dc-Support-v12 shall support different UL/DL configurations between PCell and PSCell.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>skipFallbackCombinations</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether UE supports receiving of requestSkipFallbackComb that requests UE to exclude fallback band combinations from capability signalling.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>skipMonitoringDCI-Format0-1A</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether UE supports blind decoding reduction on UE specific search space by not monitoring DCI Format 0 and 1A as specified in TS 36.213 [23, 9.1.1].</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>spatialBundling-HARQ-ACK</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether UE supports HARQ-ACK spatial bundling on PUCCH or PUSCH as specified in TS 36.213 [23, 7.3.1 and 7.3.2].</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>srs-Enhancements</strong></td>
<td>TBD</td>
</tr>
<tr>
<td>Indicates whether the UE supports SRS enhancements.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>srs-EnhancementsTDD</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports TDD specific SRS enhancements.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>srvcc-FromUTRA-FDD-ToGERAN</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether UE supports SRVCC handover from UTRA FDD PS HS to GERAN CS.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>srvcc-FromUTRA-FDD-ToUTRA-FDD</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether UE supports SRVCC handover from UTRA FDD PS HS to UTRA FDD CS.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>srvcc-FromUTRA-TDD128-ToGERAN</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether UE supports SRVCC handover from UTRA TDD 1.28Mcps PS HS to GERAN CS.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>srvcc-FromUTRA-TDD128-ToUTRA-TDD128</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether UE supports SRVCC handover from UTRA TDD 1.28Mcps PS HS to UTRA TDD 1.28Mcps CS.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>ss-CCH-InterHand</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports synchronisation signal and common channel interference handling.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>standaloneGNSS-Location</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE is equipped with a standalone GNSS receiver that may be used to provide detailed location information in RRC measurement report and logged measurements.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>supportedBandCombination</strong></td>
<td>-</td>
</tr>
<tr>
<td>Includes the supported CA band combinations, if any, and may include all the supported non-CA bands.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>supportedBandCombinationAdd-v11d0</strong></td>
<td>-</td>
</tr>
<tr>
<td>Includes additional supported CA band combinations in case maximum number of CA band combinations of supportedBandCombination is exceeded.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>supportedBandCombinationAdd-v1250</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>supportedBandCombinationAdd-v1270</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>supportedBandCombinationAdd-v1320</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>supportedBandCombinationAdd-v1380</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>supportedBandCombinationAdd-v1390</strong></td>
<td>-</td>
</tr>
<tr>
<td>If included, the UE shall include the same number of entries, and listed in the same order, as in SupportedBandCombinationAdd-v11d0.</td>
<td>Yes</td>
</tr>
</tbody>
</table>
**SupportedBandCombinationExt, SupportedBandCombination-v1090, SupportedBandCombination-v1010, SupportedBandCombination-v1130, SupportedBandCombination-v1250, SupportedBandCombination-v1270, SupportedBandCombination-v1320, SupportedBandCombination-v1380, SupportedBandCombination-v1390**

If included, the UE shall include the same number of entries, and listed in the same order, as in supportedBandCombination-r10.

**supportedBandCombinationReduced**

Includes the supported CA band combinations, and may include the fallback CA combinations specified in TS 36.101 [42, 4.3A]. This field also indicates whether the UE supports reception of requestReducedFormat.

**SupportedBandCombinationReduced-v1320, SupportedBandCombinationReduced-v1380, SupportedBandCombinationReduced-v1390**

If included, the UE shall include the same number of entries, and listed in the same order, as in supportedBandCombinationReduced-r13.

**SupportedBandGERAN**

GERAN band as defined in TS 45.005 [20].

**SupportedBandList1XRTT**

One entry corresponding to each supported CDMA2000 1xRTT band class.

**SupportedBandListEUTRA**

Includes the supported E-UTRA bands. This field shall include all bands which are indicated in BandCombinationParameters.

**SupportedBandListEUTRA-v9e0, SupportedBandListEUTRA-v1250, SupportedBandListEUTRA-v1310, SupportedBandListEUTRA-v1320**

If included, the UE shall include the same number of entries, and listed in the same order, as in supportedBandListEUTRA (i.e. without suffix).

**SupportedBandListGERAN**

No

**SupportedBandListHRPD**

One entry corresponding to each supported CDMA2000 HRPD band class.

**supportedBandListWLAN**

Indicates the supported WLAN bands by the UE.

**SupportedBandUTRA-FDD**

UTRA band as defined in TS 25.101 [17].

**SupportedBandUTRA-TDD128**

UTRA band as defined in TS 25.102 [18].

**SupportedBandUTRA-TDD384**

UTRA band as defined in TS 25.102 [18].

**SupportedBandUTRA-TDD768**

UTRA band as defined in TS 25.102 [18].

**supportedBandwidthCombinationSet**

The supportedBandwidthCombinationSet indicated for a band combination is applicable to all bandwidth classes indicated by the UE in this band combination. Field encoded as a bit map, where bit N is set to “1” if UE support Bandwidth Combination Set N for this band combination, see 36.101 [42]. The leading / leftmost bit (bit 0) corresponds to the Bandwidth Combination Set 0, the next bit corresponds to the Bandwidth Combination Set 1 and so on. The UE shall neither include the field for a non-CA band combination, nor for a CA band combination for which the UE only supports Bandwidth Combination Set 0.

**supportedCellGrouping**

This field indicates for which mapping of serving cells to cell groups (i.e. MCG or SCG) the UE supports asynchronous DC. This field is only present for a band combination with more than two but less than six band entries where the UE supports asynchronous DC. If this field is not present but asynchronous operation is supported, the UE supports all possible mappings of serving cells to cell groups for the band combination. The bitmap size is selected based on the number of entries in the combinations, i.e., in case of three entries, the bitmap corresponding to threeEntries is selected and so on. A bit in the bit string set to 1 indicates that the UE supports asynchronous DC for the cell grouping option represented by the concerned bit position. Each bit position represents a different cell grouping option, as illustrated by a table, see NOTE 5. A cell grouping option is represented by a number of bits, each representing a particular band entry in the band combination with the left-most bit referring to the band listed first in the band combination, etc. Value 0 indicates that the carriers of the corresponding band entry are mapped to a first cell group, while value 1 indicates that the carriers of the corresponding band entry are mapped to a second cell group. It is noted that the mapping table does not include entries with all bits set to the same value (0 or 1) as this does not represent a DC scenario (i.e. indicating that the UE supports that all carriers of the corresponding band entry are in one cell group).
<table>
<thead>
<tr>
<th><strong>UE-EUTRA-Capability field descriptions</strong></th>
<th><strong>FDD/ TDD diff</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>supportedCSI-Proc</strong>&lt;br&gt;Indicates the maximum number of CSI processes supported on a component carrier within a band. Value n1 corresponds to 1 CSI process, value n3 corresponds to 3 CSI processes, and value n4 corresponds to 4 CSI processes. If this field is included, the UE shall include the same number of entries listed in the same order as in BandParameters. If the UE supports at least 1 CSI process on any component carrier, then the UE shall include this field in all bands in all band combinations.</td>
<td>-</td>
</tr>
<tr>
<td><strong>supportedNAICS-2CRS-AP</strong>&lt;br&gt;If included, the UE supports NAICS for the band combination. The UE shall include a bitmap of the same length, and in the same order, as in naics-Capability-List, to indicate 2 CRS AP NAICS capability of the band combination. The first/ leftmost bit points to the first entry of naics-Capability-List, the second bit points to the second entry of naics-Capability-List, and so on. For band combinations with a single component carrier, UE is only allowed to indicate (numberOfNAICS-CapableCC, numberOfAggregatedPRB) = (1, 100) if NAICS is supported.</td>
<td>-</td>
</tr>
<tr>
<td><strong>supportRohcContextContinue</strong>&lt;br&gt;Indicates whether the UE supports ROHC context continuation operation where the UE does not reset the current ROHC context upon handover.</td>
<td>-</td>
</tr>
<tr>
<td><strong>tdd-SpecialSubframe</strong>&lt;br&gt;Indicates whether the UE supports TDD special subframe defined in TS 36.211 [21].</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>tdd-FDD-CA-PCellDuplex</strong>&lt;br&gt;The presence of this field indicates that the UE supports TDD/FDD CA in any supported band combination including at least one FDD band with bandParametersUL and at least one TDD band with bandParametersUL. The first bit is set to &quot;1&quot; if UE supports the TDD PCell. The second bit is set to &quot;1&quot; if UE supports FDD PCell. This field is included only if the UE supports band combination including at least one FDD band with bandParametersUL and at least one TDD band with bandParametersUL. If this field is included, the UE shall set at least one of the bits as &quot;1&quot;. If this field is included with DC, then it is applicable within a CG, and the presence of this field indicates the capability of the UE to support TDD/FDD CA with at least one FDD band and at least one TDD band in the same CG, with the value indicating the support for TDD/FDD PCell (PSCell).</td>
<td>No</td>
</tr>
<tr>
<td><strong>timerT312</strong>&lt;br&gt;Indicates whether the UE supports T312.</td>
<td>No</td>
</tr>
<tr>
<td><strong>tm5-FDD</strong>&lt;br&gt;Indicates whether the UE supports the PDSCH transmission mode 5 in FDD.</td>
<td>-</td>
</tr>
<tr>
<td><strong>tm5-TDD</strong>&lt;br&gt;Indicates whether the UE supports the PDSCH transmission mode 5 in TDD.</td>
<td>-</td>
</tr>
<tr>
<td><strong>tm6-CE-ModeA</strong>&lt;br&gt;Indicates whether the UE supports tm6 operation in CE mode A, see TS 36.213 [23, 7.2.3]. This field can be included only if ce-ModeA is included.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>tm9-CE-ModeA</strong>&lt;br&gt;Indicates whether the UE supports tm9 operation in CE mode A, see TS 36.213 [23, 7.2.3]. This field can be included only if ce-ModeA is included.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>tm9-CE-ModeB</strong>&lt;br&gt;Indicates whether the UE supports tm9 operation in CE mode B, see TS 36.213 [23, 7.2.3]. This field can be included only if ce-ModeB is included.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>tm9-LAA</strong>&lt;br&gt;Indicates whether the UE supports tm9 operation on LAA cell(s). This field can be included only if downlinkLAA is included.</td>
<td>-</td>
</tr>
<tr>
<td><strong>tm9-With-8Tx-FDD</strong>&lt;br&gt;Indicates whether the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports for FDD when not operating in CE mode.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>tm10-LAA</strong>&lt;br&gt;Indicates whether the UE supports tm10 operation on LAA cell(s). This field can be included only if downlinkLAA is included.</td>
<td>-</td>
</tr>
<tr>
<td><strong>twoAntennaPortsForPUCCH</strong>&lt;br&gt;The presence of txAntennaSwitchUL indicates the UE supports transmit antenna selection for this UL band in the band combination as described in TS 36.213 [23, 8.2 and 8.7]. The field txAntennaSwitchDL indicates the entry number of the first-listed band with UL in the band combination that affects this DL. The field txAntennaSwitchUL indicates the entry number of the first-listed band with UL in the band combination that switches together with this UL. Value 1 means first entry, value 2 means second entry and so on. All DL and UL that switch together indicate the same entry number.</td>
<td>-</td>
</tr>
</tbody>
</table>

**END**
### UE-EUTRA-Capability field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>txDiv-PUCCH1b-ChSelect</td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports transmit diversity for PUCCH format 1b with channel selection.</td>
<td></td>
</tr>
<tr>
<td>uci-PUSCH-Ext</td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports an extension of UCI delivering more than 22 HARQ-ACK bits on PUSCH as specified in TS 36.212 [22, 5.2.2.6] and TS 36.213 [23, 8.6.3].</td>
<td></td>
</tr>
<tr>
<td>ue-Category</td>
<td>-</td>
</tr>
<tr>
<td>UE category as defined in TS 36.306 [5]. Set to values 1 to 12 in this version of the specification.</td>
<td></td>
</tr>
<tr>
<td>ue-CategoryDL</td>
<td>-</td>
</tr>
<tr>
<td>UE DL category as defined in TS 36.306 [5]. Value n17 corresponds to UE category 17, value m1 corresponds to UE category M1, value oneBis corresponds to UE category 1bis. For ASN.1 compatibility, a UE indicating DL category 0 or m1 shall also indicate any of the categories (1..5) in ue-Category (without suffix), which is ignored by the eNB, and a UE indicating UE category oneBis shall also indicate UE category 1 in ue-Category (without suffix). The field ue-CategoryDL is set to values m1, 0, oneBis, 4, 6, 7, 9 to 16, n17, 18, 19 in this version of the specification.</td>
<td></td>
</tr>
<tr>
<td>ue-CategoryUL</td>
<td>-</td>
</tr>
<tr>
<td>UE UL category as defined in TS 36.306 [5]. Value n14 corresponds to UE category 14, value m1 corresponds to UE category M1, value oneBis corresponds to UE category 1bis. The field ue-CategoryUL is set to values m1, 0, oneBis, 3, 5, 7, 8, 13, n14 or 15 in this version of the specification.</td>
<td></td>
</tr>
<tr>
<td>ue-CA-PowerClass-N</td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports UE power class N in the E-UTRA band combination, see TS 36.101 [42] and TS 36.307 [78]. If ue-CA-PowerClass-N is not included, UE supports the default UE power class in the E-UTRA band combination, see TS 36.101 [42].</td>
<td></td>
</tr>
<tr>
<td>ue-CE-NeedULGaps</td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE needs uplink gaps during continuous uplink transmission in FDD as specified in TS 36.211 [21] and TS 36.306 [5].</td>
<td></td>
</tr>
<tr>
<td>ue-PowerClass-N, ue-PowerClass-5</td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports UE power class 1, 2, 4 or 5 in the E-UTRA band, see TS 36.101 [42] and TS 36.307 [78]. UE includes either ue-PowerClass-N or ue-PowerClass-5. If neither ue-PowerClass-N nor ue-PowerClass-5 is included, UE supports the default UE power class in the E-UTRA band, see TS 36.101 [42].</td>
<td></td>
</tr>
<tr>
<td>ue-Rx-TxTimeDiffMeasurements</td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports Rx - Tx time difference measurements.</td>
<td></td>
</tr>
<tr>
<td>ue-SpecificRefSigsSupported</td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports SSTD measurements between the PCell and the PSCell as specified in TS 36.214 [48] and TS 36.133 [16].</td>
<td></td>
</tr>
<tr>
<td>ue-TxAntennaSelectionSupported</td>
<td>-</td>
</tr>
<tr>
<td>Except for the supported band combinations for which bandParameterList-v1380 is included, TRUE indicates that the UE is capable of supporting UE transmit antenna selection such that all the supported bands in the band combination are affected by transmit antenna switching, as described in TS 36.213 [23, 8.2 and 8.7]. E-UTRAN ignores this field for band combinations for which bandParameterList-v1380 is included.</td>
<td></td>
</tr>
<tr>
<td>ul-CoMP</td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports UL Coordinated Multi-Point operation.</td>
<td></td>
</tr>
<tr>
<td>utran-ProximityIndication</td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports proximity indication for UTRAN CSG member cells.</td>
<td></td>
</tr>
<tr>
<td>ul-64QAM</td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports 64QAM in UL on the band. This field is only present when the field ue-CategoryUL is set to 5, 8, 13, n14 or 15. If the field is present for one band, the field shall be present for all bands including downlink only bands.</td>
<td></td>
</tr>
<tr>
<td>ul-PDCP-Delay</td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports UL PDCP Packet Delay per QCI measurement as specified in TS 36.314 [71].</td>
<td></td>
</tr>
<tr>
<td>unicastFrequencyHopping</td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports frequency hopping for unicast MPDCCH/PDSCH (configured by mpdcch-pdsch-HoppingConfig) and unicast PUSCH (configured by pusch-HoppingConfig).</td>
<td></td>
</tr>
<tr>
<td>utran-SI-AcquisitionForHO</td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports, upon configuration of si-RequestForHO by the network, acquisition and reporting of relevant information using autonomous gaps by reading the SI from a neighbouring UMTS cell.</td>
<td></td>
</tr>
</tbody>
</table>
**NOTE 1:** The IE \textit{UE-EUTRA-Capability} does not include AS security capability information, since these are the same as the security capabilities that are signalled by NAS. Consequently, AS need not provide "man-in-the-middle" protection for the security capabilities.

**NOTE 2:** The column FDD/ TDD diff indicates if the UE is allowed to signal, as part of the additional capabilities for an XDD mode i.e. within \textit{UE-EUTRA-CapabilityAddXDD-Mode-xNM}, a different value compared to the value signalled elsewhere within \textit{UE-EUTRA-Capability} (i.e. the common value, supported for both XDD modes). A '-' is used to indicate that it is not possible to signal different values (used for fields for which the field description is provided for other reasons). Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a capability for which it indicates support within the capability signalling.

**NOTE 3:** The \textit{BandCombinationParameters} for the same band combination can be included more than once.

**NOTE 4:** UE CA and measurement capabilities indicate the combinations of frequencies that can be configured as serving frequencies.

**NOTE 5:** The grouping of the cells to the first and second cell group, as indicated by \textit{supportedCellGrouping}, is shown in the table below. The leading / leftmost bit of \textit{supportedCellGrouping} corresponds to the Bit String Position 1.
<table>
<thead>
<tr>
<th>Nr of Band Entries:</th>
<th>5</th>
<th>4</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Bit-String:</td>
<td>15</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit String Position</th>
<th>Cell grouping option (0= first cell group, 1= second cell group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>00001</td>
</tr>
<tr>
<td>2</td>
<td>00010</td>
</tr>
<tr>
<td>3</td>
<td>00011</td>
</tr>
<tr>
<td>4</td>
<td>00100</td>
</tr>
<tr>
<td>5</td>
<td>00101</td>
</tr>
<tr>
<td>6</td>
<td>00110</td>
</tr>
<tr>
<td>7</td>
<td>00111</td>
</tr>
<tr>
<td>8</td>
<td>01000</td>
</tr>
<tr>
<td>9</td>
<td>01001</td>
</tr>
<tr>
<td>10</td>
<td>01010</td>
</tr>
<tr>
<td>11</td>
<td>01011</td>
</tr>
<tr>
<td>12</td>
<td>01100</td>
</tr>
<tr>
<td>13</td>
<td>01101</td>
</tr>
<tr>
<td>14</td>
<td>01110</td>
</tr>
<tr>
<td>15</td>
<td>01111</td>
</tr>
</tbody>
</table>

NOTE 6: UE includes the intraBandContiguousCC-InfoList-r12 also for bandwidth class A because of the presence conditions in BandCombinationParameters-v1270. For example, if UE supports CA_1A_41D band combination, if UE includes the field intraBandContiguousCC-InfoList-r12 for band 41, the UE includes intraBandContiguousCC-InfoList-r12 also for band 1.

NOTE 7: For a UE that indicates release X in field accessStratumRelease but supports a feature specified in release X+ N (i.e. early UE implementation), the ASN.1 comprehension requirement are specified in Annex E.

-- UE-RadioPagingInfo

The UE-RadioPagingInfo IE contains UE capability information needed for paging.

**UE-RadioPagingInfo** information element

```asn1
UE-RadioPagingInfo-r12 ::= SEQUENCE {
  ue-Category-v1250       INTEGER (0)   OPTIONAL,
  ...,
  [ ue-CategoryDL-v1310   ENUMERATED {ml}   OPTIONAL,
    ce-ModeA-r13          ENUMERATED {true} OPTIONAL,
    ce-ModeB-r13          ENUMERATED {true} OPTIONAL
  ]
}
```

**UE-RadioPagingInfo** field descriptions

- **ce-ModeA, ce-ModeB**
  Indicates whether the UE supports operation in CE mode A and/or B, as specified in TS 36.211 [21] and TS 36.213 [23].

- **ue-Category, ue-CategoryDL**
  UE category as defined in TS 36.306 [5].
-- **UE-TimersAndConstants**

The IE *UE-TimersAndConstants* contains timers and constants used by the UE in either RRC_CONNECTED or RRC_IDLE.

**UE-TimersAndConstants** information element

```plaintext
-- ASN1START

UE-TimersAndConstants ::= SEQUENCE {
t300        ENUMERATED {
  ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
  ms2000},
t301        ENUMERATED {
  ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
  ms2000},
t310        ENUMERATED {
  ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
n310        ENUMERATED {
  n1, n2, n3, n4, n6, n8, n10, n20},
t311        ENUMERATED {
  ms1000, ms3000, ms5000, ms10000, ms15000,
  ms20000, ms30000},
n311        ENUMERATED {
  n1, n2, n3, n4, n5, n6, n8, n10},
  ...
}[[ t300-v1310      ENUMERATED {
  ms2500, ms3000, ms3500, ms4000, ms5000, ms6000, ms8000,
  ms10000}  OPTIONAL, -- Need OR
  t301-v1310      ENUMERATED {
  ms2500, ms3000, ms3500, ms4000, ms5000, ms6000, ms8000,
  ms10000}  OPTIONAL -- Need OR
  ]],
[ [ t310-v1330       ENUMERATED {ms4000, ms6000}  OPTIONAL -- Need OR
  ]]
}
-- ASN1STOP
```

**UE-TimersAndConstants** field descriptions

| n3xy | Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on. |
| t3xy | Timers are described in section 7.3. Value ms0 corresponds with 0 ms, ms50 corresponds with 50 ms and so on. EUTRAN includes an extended value t3xy-v1310 and t3xy-v1330 only in the Bandwidth Reduced (BR) version of the SIB. UEs that support Coverage Enhancement (CE) mode B shall use the extended values t3xy-v1310 and t3xy-v1330, if present, and ignore the value signaled by t3xy (without the suffix). |

-- **VisitedCellInfoList**

The IE *VisitedCellInfoList* includes the mobility history information of maximum of 16 most recently visited cells or time spent outside E-UTRA. The most recently visited cell is stored first in the list. The list includes cells visited in RRC_IDLE and RRC_CONNECTED states.

**VisitedCellInfoList** information element

```plaintext
-- ASN1START

VisitedCellInfoList-r12 ::= SEQUENCE (SIZE (1..maxCellHistory-r12)) OF VisitedCellInfo-r12

VisitedCellInfo-r12 ::= SEQUENCE {
  visitedCellId-r12     CHOICE {
    cellGlobalId-r12      CellGlobalIdEUTRA,
    pci-arfcn-r12         SEQUENCE {
      physCellId-r12       PhysCellId,
      carrierFreq-r12      ARFCN-ValueEUTRA-r9
    }                OPTIONAL,
  }                OPTIONAL,
  timeSpent-r12      INTEGER (0..4095),
  ...
}
-- ASN1STOP
```
**VisitedCellInfoList field descriptions**

**timeSpent**
This field indicates the duration of stay in the cell or outside E-UTRA approximated to the closest second. If the duration of stay exceeds 4095s, the UE shall set it to 4095s.

---

**WLAN-OffloadConfig**

The IE **WLAN-OffloadConfig** includes information for traffic steering between E-UTRAN and WLAN. The fields are applicable to both RAN-assisted WLAN interworking based on access network selection and traffic steering rules and RAN-assisted WLAN interworking based on ANDSF policies unless stated otherwise in the field description.

**WLAN-OffloadConfig** information element

```asn1
WLAN-OffloadConfig-r12 ::= SEQUENCE {
  thresholdRSRP-r12      SEQUENCE {
    thresholdRSRP-Low-r12  RSRP-Range,
    thresholdRSRP-High-r12 RSRP-Range
  } OPTIONAL, -- Need OR
  thresholdRSRQ-r12      SEQUENCE {
    thresholdRSRQ-Low-r12  RSRQ-Range,
    thresholdRSRQ-High-r12 RSRQ-Range
  } OPTIONAL, -- Need OR
  thresholdRSRQ-OnAllSymbolsWithWB-r12 SEQUENCE {
    thresholdRSRQ-OnAllSymbolsWithWB-Low-r12 RSRQ-Range,
    thresholdRSRQ-OnAllSymbolsWithWB-High-r12 RSRQ-Range
  } OPTIONAL, -- Need OR
  thresholdRSRQ-OnAllSymbols-r12 SEQUENCE {
    thresholdRSRQ-OnAllSymbolsLow-r12  RSRQ-Range,
    thresholdRSRQ-OnAllSymbolsHigh-r12 RSRQ-Range
  } OPTIONAL, -- Need OR
  thresholdRSRQ-WB-r12    SEQUENCE {
    thresholdRSRQ-WB-Low-r12  RSRQ-Range,
    thresholdRSRQ-WB-High-r12 RSRQ-Range
  } OPTIONAL, -- Need OR
  thresholdChannelUtilization-r12 SEQUENCE {
    thresholdChannelUtilizationLow-r12 INTEGER (0..255),
    thresholdChannelUtilizationHigh-r12 INTEGER (0..255)
  } OPTIONAL, -- Need OR
  thresholdBackhaul-Bandwidth-r12 SEQUENCE {
    thresholdBackhaulDL-BandwidthLow-r12  WLAN-backhaulRate-r12,
    thresholdBackhaulDL-BandwidthHigh-r12 WLAN-backhaulRate-r12,
    thresholdBackhaulUL-BandwidthLow-r12  WLAN-backhaulRate-r12,
    thresholdBackhaulUL-BandwidthHigh-r12 WLAN-backhaulRate-r12
  } OPTIONAL, -- Need OR
  thresholdWLAN-RSSI-r12  SEQUENCE {
    thresholdWLAN-RSSI-Low-r12  INTEGER (0..255),
    thresholdWLAN-RSSI-High-r12 INTEGER (0..255)
  } OPTIONAL, -- Need OR
  offloadPreferenceIndicator-r12  BIT STRING (SIZE (16)) OPTIONAL, -- Need OR
  t-SteeringWLAN-r12      T-Reselection OPTIONAL, -- Need OR
...}

WLAN-backhaulRate-r12 ::= ENUMERATED
  {r0, r4, r8, r16, r32, r64, r128, r256, r512,
   r1024, r2048, r4096, r8192, r16384, r32768, r65536, r131072,
   r262144, r524288, r1048576, r2097152, r4194304, r8388608,
   r16777216, r33554432, r67108864, r134217728, r268435456,
   r536870912, r1073741824, r2147483648, r4294967296}
```

---

---
### WLAN-OffloadConfig field descriptions

**offloadPreferenceIndicator**
- Indicates the offload preference indicator. Parameter: OPI in TS 24.312 [66]. Only applicable to RAN-assisted WLAN interworking based on ANDSF policies.

**thresholdBackhaulDLBandwidth-High**
- Indicates the backhaul available downlink bandwidth threshold used by the UE for traffic steering to WLAN. Parameter: ThreshBackhaulRateDLWLAN, High in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N kbps.

**thresholdBackhaulDLBandwidth-Low**
- Indicates the backhaul available downlink bandwidth threshold used by the UE for traffic steering to E-UTRAN. Parameter: ThreshBackhaulRateDLWLAN, Low in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N kbps.

**thresholdBackhaulULBandwidth-High**
- Indicates the backhaul available uplink bandwidth threshold used by the UE for traffic steering to WLAN. Parameter: ThreshBackhaulRateULWLAN, High in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N kbps.

**thresholdBackhaulULBandwidth-Low**
- Indicates the backhaul available uplink bandwidth threshold used by the UE for traffic steering to E-UTRAN. Parameter: ThreshBackhaulRateULWLAN, Low in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N kbps.

**thresholdChannelUtilization-High**
- Indicates the WLAN channel utilization (BSS load) threshold used by the UE for traffic steering to E-UTRAN. Parameter: ThreshCHUtilWLAN, High in TS 36.304 [4].

**thresholdChannelUtilization-Low**
- Indicates the WLAN channel utilization (BSS load) threshold used by the UE for traffic steering to WLAN. Parameter: ThreshCHUtilWLAN, Low in TS 36.304 [4].

**thresholdRSRP-High**
- Indicates the RSRP threshold (in dBm) used by the UE for traffic steering to E-UTRAN. Parameter: ThreshServingOffloadWLAN, HighP in TS 36.304 [4].

**thresholdRSRP-Low**
- Indicates the RSRP threshold (in dBm) used by the UE for traffic steering to WLAN. Parameter: ThreshServingOffloadWLAN, LowP in TS 36.304 [4].

**thresholdRSRQ-High, thresholdRSRQ-OnAllSymbolsHigh, thresholdRSRQ-WB-High, thresholdRSRQ-OnAllSymbolsWithWB-High**
- Indicates the RSRQ threshold (in dB) used by the UE for traffic steering to E-UTRAN. Parameter: ThreshServingOffloadWLAN, HighQ in TS 36.304 [4]. The UE shall only apply one of threshold values of thresholdRSRQ-OnAllSymbolsWithWB-High, thresholdRSRQ-OnAllSymbolsHigh, thresholdRSRQ-WB-High and thresholdRSRQ-High as present in wlan-OffloadConfigCommon and forward this to upper layer. NOTE 1.

**thresholdRSRQ-Low, thresholdRSRQ-OnAllSymbolsLow, thresholdRSRQ-WB-Low, thresholdRSRQ-OnAllSymbolsWithWB-Low**
- Indicates the RSRQ threshold (in dB) used by the UE for traffic steering to WLAN. Parameter: ThreshServingOffloadWLAN, LowQ in TS 36.304 [4]. The UE shall only apply one of threshold values of thresholdRSRQ-OnAllSymbolsWithWB-Low, thresholdRSRQ-OnAllSymbolsLow, thresholdRSRQ-WB-Low and thresholdRSRQ-Low as present in wlan-OffloadConfigCommon and forward this to upper layer. NOTE 1.

**thresholdWLAN-RSSI-High**
- Indicates the WLAN RSSI threshold used by the UE for traffic steering to WLAN. Parameter: ThreshWLANRSSI, High in TS 36.304 [4]. Value 0 corresponds to -128dBm, 1 corresponds to -127dBm and so on.

**thresholdWLAN-RSSI-Low**
- Indicates the WLAN RSSI threshold used by the UE for traffic steering to E-UTRAN. Parameter: ThreshWLANRSSI, Low in TS 36.304 [4]. Value 0 corresponds to -128dBm, 1 corresponds to -127dBm and so on.

**t-SteeringWLAN**
- Indicates the timer value during which the rules should be fulfilled before starting traffic steering between E-UTRAN and WLAN. Parameter: TsteeringWLAN in TS 36.304 [4]. Only applicable to RAN-assisted WLAN interworking based on access network selection and traffic steering rules.

**NOTE 1:** Within SIB17, E-UTRAN includes the fields corresponding to same RSRQ types as included in SIB1. E.g. if E-UTRAN includes q-QualMinRSRQ-OnAllSymbols in SIB1 it also includes thresholdRSRQ-OnAllSymbols in SIB17. Within the RRCConnectionReconfiguration message E-UTRAN only includes thresholdRSRQ, setting the value according to the RSRQ type used for E-UTRAN. The UE shall apply the RSRQ fields (RSRQ threshold, high and low) corresponding to one RSRQ type i.e. the same as it applies for E-UTRAN.

### 6.3.7 MBMS information elements
The IE MBMS-NotificationConfig specifies the MBMS notification related configuration parameters, that are applicable for all MBSFN areas.

**MBMS-NotificationConfig information element**

<table>
<thead>
<tr>
<th>Field Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>notificationOffset</td>
</tr>
<tr>
<td>Indicates, together with the notificationRepetitionCoeff, the radio frames in which the MCCH information change notification is scheduled i.e. the MCCH information change notification is scheduled in radio frames for which: SFN mod notification repetition period = notificationOffset.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>notificationRepetitionCoeff</td>
</tr>
<tr>
<td>Actual change notification repetition period common for all MCCHs that are configured= shortest modification period/ notificationRepetitionCoeff. The 'shortest modification period' corresponds with the lowest value of mcch-ModificationPeriod of all MCCHs that are configured. Value n2 corresponds to coefficient 2, and so on.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>notificationSF-Index</td>
</tr>
<tr>
<td>Indicates the subframe used to transmit MCCH change notifications on PDCCH. FDD: Value 1, 2, 3, 4, 5 and 6 correspond with subframe #1, #2, #3, #6, #7, and #8 respectively. TDD: Value 1, 2, 3, 4, and 5 correspond with subframe #3, #4, #7, #8, and #9 respectively.</td>
</tr>
</tbody>
</table>

The IE MBMS-ServiceList provides the list of MBMS services which the UE is receiving or interested to receive.

**MBMS-ServiceList information element**

<table>
<thead>
<tr>
<th>Field Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>tmgi</td>
</tr>
</tbody>
</table>

The IE MBSFN-Areald identifies an MBSFN area by means of a locally unique value at lower layers i.e. it concerns parameter NIDMBSFN in TS 36.211 [21, 6.10.2.1].

**MBSFN-Areald information element**

<table>
<thead>
<tr>
<th>Field Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTEGER (0..255)</td>
</tr>
</tbody>
</table>

The IE MBSFN-ArealInfoList contains the information required to acquire the MBMS control information associated with one or more MBSFN areas.
MBSFN-AreaInfoList information element

```
-- ASN1START
MBSFN-AreaInfoList-r9 ::= SEQUENCE (SIZE(1..maxMBSFN-Area)) OF MBSFN-AreaInfo-r9
MBSFN-AreaInfo-r9 ::= SEQUENCE {
  mbsfn-AreaId-r9              MBSFN-AreaId-r12,
  non-MBSFNregionLength       ENUMERATED {s1, s2},
  notificationIndicator-r9     INTEGER {0..7},
  mcch-Config-r9              SEQUENCE {
    mcch-RepetitionPeriod-r9    ENUMERATED {rf32, rf64, rf128, rf256},
    mcch-Offset-r9             INTEGER {0..10},
    mcch-ModificationPeriod-r9 ENUMERATED {rf512, rf1024},
    sf-AllocInfo-r9             BIT STRING (SIZE(6)),
    signallingMCS-r9           ENUMERATED {n2, n7, n13, n19}
  },
  ...
}
-- ASN1STOP
```

**MBSFN-AreaInfoList field descriptions**

- **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.

- **mcch-Offset**
  Indicates, together with the mcch-RepetitionPeriod, the radio frames in which MCCH is scheduled i.e. MCCH is scheduled in radio frames for which: SFN mod mcch-RepetitionPeriod = mcch-Offset.

- **mcch-RepetitionPeriod**
  Defines the interval between transmissions of MCCH information, in radio frames. Value rf32 corresponds to 32 radio frames, rf64 corresponds to 64 radio frames and so on.

- **non-MBSFNregionLength**
  Indicates how many symbols from the beginning of the subframe constitute the non-MBSFN region. This value applies in all subframes of the MBSFN area used for PMCH transmissions as indicated in the MSI. The values s1 and s2 correspond with 1 and 2 symbols, respectively: see TS 36.211 [21, Table 6.7-1].

- **notificationIndicator**
  Indicates which PDCCH bit is used to notify the UE about change of the MCCH applicable for this MBSFN area. Value 0 corresponds with the least significant bit as defined in TS 36.212 [22, 5.3.3.1] and so on.

- **sf-AllocInfo**
  Indicates the subframes of the radio frames indicated by the mcch-RepetitionPeriod and the mcch-Offset, that may carry MCCH. Value "1" indicates that the corresponding subframe is allocated. The following mapping applies:
  FDD: The first/ leftmost bit defines the allocation for subframe #1 of the radio frame indicated by mcch-RepetitionPeriod and mcch-Offset, the second bit for #2, the third bit for #3, the fourth bit for #6, the fifth bit for #7 and the sixth bit for #8.
  TDD: The first/leftmost bit defines the allocation for subframe #3 of the radio frame indicated by mcch-RepetitionPeriod and mcch-Offset, the second bit for #4, third bit for #7, fourth bit for #8, fifth bit for #9. Uplink subframes are not allocated. The last bit is not used.

- **signallingMCS**
  Indicates the MCS applicable for the subframes indicated by the field sf-AllocInfo and for each (P)MCH that is configured for this MBSFN area, for the first subframe allocated to the (P)MCH within each MCH scheduling period (which may contain the MCH scheduling information provided by MAC). Value n2 corresponds with the value 2 for parameter M in TS 36.213 [23, Table 7.1.7.1-1], and so on.

---

**MBSFN-SubframeConfig**

The IE MBSFN-SubframeConfig defines subframes that are reserved for MBSFN in downlink.

```
-- ASN1START
MBSFN-SubframeConfig ::= SEQUENCE {
  radioframeAllocationPeriod   ENUMERATED {n1, n2, n4, n8, n16, n32},
  radioframeAllocationOffset   INTEGER {0..7},
  subframeAllocation           CHOICE {
    oneFrame                    BIT STRING (SIZE(6)),
    fourFrames                  BIT STRING (SIZE(24))
  }
}
-- ASN1STOP
```
MBSFN-SubframeConfig field descriptions

fourFrames
A bit-map indicating MBSFN subframe allocation in four consecutive radio frames, "1" denotes that the corresponding subframe is allocated for MBSFN. The bitmap is interpreted as follows:
FDD: Starting from the first radioframe and from the first/lefmost bit in the bitmap, the allocation applies to subframes #1, #2, #3, #6, #7, and #8 in the sequence of the four radio-frames.
TDD: Starting from the first radioframe and from the first/lefmost bit in the bitmap, the allocation applies to subframes #3, #4, #7, #8, and #9 in the sequence of the four radio-frames. The last four bits are not used. E-UTRAN allocates uplink subframes only if eimta-MainConfig is configured.

oneFrame
"1" denotes that the corresponding subframe is allocated for MBSFN. The following mapping applies:
FDD: The first/lefmost bit defines the MBSFN allocation for subframe #1, the second bit for #2, third bit for #3, fourth bit for #6, fifth bit for #7, sixth bit for #8.
TDD: The first/lefmost bit defines the allocation for subframe #3, the second bit for #4, third bit for #7, fourth bit for #8, fifth bit for #9. E-UTRAN allocates uplink subframes only if eimta-MainConfig is configured. The last bit is not used.

goFrameAllocationPeriod, radioFrameAllocationOffset
Radio-frames that contain MBSFN subframes occur when equation SFN mod goFrameAllocationPeriod = radioFrameAllocationOffset is satisfied. Value n1 for goFrameAllocationPeriod denotes value 1, n2 denotes value 2, and so on. When fourFrames is used for subframeAllocation, the equation defines the first radio frame referred to in the description below. Values n1 and n2 are not applicable when fourFrames is used.

subframeAllocation
Defines the subframes that are allocated for MBSFN within the radio frame allocation period defined by the goFrameAllocationPeriod and the radioFrameAllocationOffset.

PMCH-InfoList
The IE PMCH-InfoList specifies configuration of all PMCHs of an MBSFN area, while IE PMCH-InfoListExt includes additional PMCHs, i.e. extends the PMCH list using the general principles specified in 5.1.2. The information provided for an individual PMCH includes the configuration parameters of the sessions that are carried by the concerned PMCH. For all PMCH that E-UTRAN includes in PMCH-InfoList, the list of ongoing sessions has at least one entry.

PMCH-InfoList information element

-- ASN1START
PMCH-InfoList-r9 ::= SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF PMCH-Info-r9
PMCH-InfoListExt-r12 ::= SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF PMCH-InfoExt-r12
PMCH-Info-r9 ::= SEQUENCE {
  pmch-Config-r9  PMCH-Config-r9,
  mbms-SessionInfoList-r9  MBMS-SessionInfoList-r9,
  ...
}
PMCH-InfoExt-r12 ::= SEQUENCE {
  pmch-Config-r12  PMCH-Config-r12,
  mbms-SessionInfoList-r12  MBMS-SessionInfoList-r9,
  ...
}
MBMS-SessionInfoList-r9 ::= SEQUENCE (SIZE (0..maxSessionPerPMCH)) OF MBMS-SessionInfo-r9
MBMS-SessionInfo-r9 ::= SEQUENCE {
  tmgi-r9        TMGI-r9,
  sessionId-r9      OCTET STRING (SIZE (1)) OPTIONAL, -- Need OR
  logicalChannelIdentity-r9   INTEGER (0..maxSessionPerPMCH-1),
  ...
}
PMCH-Config-r9 ::= SEQUENCE {
  sf-AllocEnd-r9      INTEGER (0..1535),
  dataMCS-r9       INTEGER (0..28),
  mch-SchedulingPeriod-r9   ENUMERATED {
    rf8, rf16, rf32, rf64, rf128, rf256, rf512, rf1024},
  ...
}
PMCH-Config-r12 ::= SEQUENCE {
    sf-AllocEnd-r12       INTEGER (0..1535),
dataMCS-r12           CHOICE {
    normal-r12       INTEGER (0..28),
higerOrder-r12      INTEGER (0..27)
},
mch-SchedulingPeriod-r12 ENUMERATED {
    rf4, rf8, rf16, rf32, rf64, rf128, rf256, rf512, rf1024},
...}

TMGI-r9 ::= SEQUENCE {
    plmn-Id-r9       CHOICE {
    plmn-Index-r9      INTEGER (1..maxPLMN-r11),
    explicitValue-r9     PLMN-Identity
},
    serviceId-r9      OCTET STRING (SIZE (3))
}

-- ASN1STOP

PMCH-InfoList field descriptions

dataMCS
Indicates the value for parameter \( I_{MCS} \) in TS 36.213 [23], which defines the MCS applicable for the subframes of this (P)MCH as indicated by the field commonSF-Alloc. Value \( \text{normal} \) corresponds to Table 7.1.7.1-1 and value \( \text{higherOrder} \) corresponds to Table 7.1.7.1-1A. The MCS does however neither apply to the subframes that may carry MCCH i.e. the subframes indicated by the field sf-AllocInfo within SystemInformationBlockType13 nor for the first subframe allocated to this (P)MCH within each MCH scheduling period (which may contain the MCH scheduling information provided by MAC).
mch-SchedulingPeriod
Indicates the MCH scheduling period i.e. the periodicity used for providing MCH scheduling information at lower layers (MAC) applicable for an MCH. Value \( \text{rf8} \) corresponds to 8 radio frames, \( \text{rf16} \) corresponds to 16 radio frames and so on. The mch-SchedulingPeriod starts in the radio frames for which: SFN mod mch-SchedulingPeriod = 0. E-UTRAN configures mch-SchedulingPeriod of the (P)MCH listed first in PMCH-InfoList to be smaller than or equal to mch-RepetitionPeriod.

plmn-Index
Index of the entry in field plmn-IdentityList within SystemInformationBlockType1.

sessionIId
Indicates the optional MBMS Session Identity, which together with TMGI identifies a transmission or a possible retransmission of a specific MBMS session: see TS 29.061 [51, Sections 20.5, 17.7.11, 17.7.15]. The field is included whenever upper layers have assigned a session identity i.e. one is available for the MBMS session in E-UTRAN.

serviceId
Uniquely identifies the identity of an MBMS service within a PLMN. The field contains octet 3-5 of the IE Temporary Mobile Group Identity (TMGI) as defined in TS 24.008 [49]. The first octet contains the third octet of the TMGI, the second octet contains the fourth octet of the TMGI and so on.
sf-AllocEnd
Indicates the last subframe allocated to this (P)MCH within a period identified by field commonSF-AllocPeriod. The subframes allocated to (P)MCH corresponding with the \( n \)th entry in pmch-InfoList are the subsequent subframes starting from either the next subframe after the subframe identified by sf-AllocEnd of the \( (n-1) \)th listed (P)MCH or, for \( n=1 \), the first subframe defined by field commonSF-Alloc, through the subframe identified by sf-AllocEnd of the \( n \)th listed (P)MCH. Value 0 corresponds with the first subframe defined by field commonSF-Alloc.

6.3.7a SC-PTM information elements

SC-MTCH-InfoList
The IE SC-MTCH-InfoList provides the list of ongoing MBMS sessions transmitted via SC-MRB and for each MBMS session, the associated G-RNTI and scheduling information.

SC-MTCH-InfoList information element

-- ASN1START
SC-MTCH-InfoList-r13 ::= SEQUENCE (SIZE (0..maxSC-MTCH-r13)) OF SC-MTCH-Info-r13

-- ASN1STOP
SC-MTCH-Info-r13 ::= SEQUENCE {
    mbmsSessionInfo-r13 MBMSSessionInfo-r13,
    g-RNTI-r13        BIT STRING(SIZE(16)),
    sc-mtch-schedulingInfo-r13 SC-MTCH-SchedulingInfo-r13 OPTIONAL, -- Need OP
    sc-mtch-neighbourCell-r13 BIT STRING(SIZE(maxNeighCell-SCPTM-r13)) OPTIONAL, -- Need OP
    ...,
    [p-a-r13 ENUMERATED {
        dB-6, dB-4.77, dB-3, dB-1.77,
        dB0, dB1, dB2, dB3} OPTIONAL -- Need ON
    }]
}

MBMSSessionInfo-r13 ::= SEQUENCE {
    tmgi-r13        TMGI-r9,
    sessionId-r13       OCTET STRING (SIZE (1))  OPTIONAL -- Need OR
}

SC-MTCH-SchedulingInfo-r13 ::= SEQUENCE {
    onDurationTimerSCPTM-r13   ENUMERATED {
        psf1, psf2, psf3, psf4, psf5, psf6,
        psf8, psf10, psf20, psf30, psf40,
        psf50, psf60, psf80, psf100,
        psf200},
    drx-InactivityTimerSCPTM-r13 ENUMERATED {
        psf0, psf1, psf2, psf4, psf8,
        psf10, psf20, psf40,
        psf80, psf160, psf320,
        psf640, psf960,
        psf1280, psf1920, psf2560},
    schedulingPeriodStartOffsetSCPTM-r13 CHOICE {
        sf10 INTEGER(0..9),
        sf20 INTEGER(0..19),
        sf32 INTEGER(0..31),
        sf40 INTEGER(0..39),
        sf64 INTEGER(0..63),
        sf80 INTEGER(0..79),
        sf128 INTEGER(0..127),
        sf160 INTEGER(0..159),
        sf256 INTEGER(0..255),
        sf320 INTEGER(0..319),
        sf512 INTEGER(0..511),
        sf1024 INTEGER(0..1023),
        sf2048 INTEGER(0..2048),
        sf4096 INTEGER(0..4096),
        sf8192 INTEGER(0..8192)
    },
    ...,
} -- ASN1STOP
**SC-MTCH-InfoList field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mbmsSessionInfo</td>
<td>Indicates the ongoing MBMS session in a SC-MTCH.</td>
</tr>
<tr>
<td>g-RNTI</td>
<td>G-RNTI used to scramble the scheduling and transmission of a SC-MTCH.</td>
</tr>
<tr>
<td>sc-mtch-schedulingInfo</td>
<td>DRX information for the SC-MTCH. If this field is absent, the SC-MTCH may be scheduled in any subframe.</td>
</tr>
<tr>
<td>onDurationTimerSCPTM</td>
<td>Timer for SC-MTCH reception in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on.</td>
</tr>
<tr>
<td>drx-InactivityTimerSCPTM</td>
<td>Timer for SC-MTCH in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf0 corresponds to 0 PDCCH sub-frame, psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on.</td>
</tr>
<tr>
<td>schedulingPeriodStartOffsetSCPTM</td>
<td>SC-MTCH-SchedulingCycle and SC-MTCH-SchedulingOffset in TS 36.321 [6]. The value of SC-MTCH-SchedulingCycle is in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. The value of SC-MTCH-SchedulingOffset is in number of sub-frames. The E-UTRAN does not configure a maximum value 2048 for sf2048, 4096 for sf4096 or 8192 for sf8192.</td>
</tr>
<tr>
<td>sc-mtch-neighbourCell</td>
<td>Indicates neighbour cells which also provide this service on SC-MTCH. The first bit is set to 1 if the service is provided on SC-MTCH in the first cell in scptmNeighbourCellList, otherwise it is set to 0. The second bit is set to 1 if the service is provided on SC-MTCH in the second cell in scptmNeighbourCellList, and so on. If this field is absent, the UE shall assume that this service is not available on SC-MTCH in any neighbour cell.</td>
</tr>
</tbody>
</table>

---

**SCPTM-NeighbourCellList**

The **SCPTM-NeighbourCellList** indicates a list of neighbour cells where ongoing MBMS sessions provided via SC-MR and SC-MR in the current cells are also provided.

---

```asn1
SCPTM-NeighbourCellList-r13 ::= SEQUENCE {SIZE (1..maxNeighCell-SCPTM-r13)} OF PCI-ARFCN-r13
PCI-ARFCN-r13 ::= SEQUENCE {
    physCellId-r13      PhysCellId,
    carrierFreq-r13      ARFCN-ValueEUTRA-r9  OPTIONAL
}
```

**SCPTM-NeighbourCellList field description**

- carrierFreq
  - Indicates the frequency of the neighbour cell indicated by physCellId. Absence of the IE means that the neighbour cell is on the same frequency as the current cell.

---

### 6.3.8 Sidelink information elements

#### SL-CommConfig

The **SL-CommConfig** specifies the dedicated configuration information for sidelink communication. In particular it concerns the transmission resource configuration for sidelink communication on the primary frequency.

---

```asn1
SL-CommConfig-r12 ::= SEQUENCE {
    commTxResources-r12       CHOICE {
        release        NULL,
    }
}
```
setup        CHOICE {
  scheduled-r12     SEQUENCE {
    sl-RNTI-r12     C-RNTI,
    mac-MainConfig-r12    MAC-MainConfigSL-r12,
    sc-CommTxConfig-r12    SL-CommResourcePool-r12,
    mcs-r12       INTEGER (0..28)    OPTIONAL -- Need OP
  },
  ue-Selected-r12     SEQUENCE {
    -- Pool for normal usage
    commTxPoolNormalDedicated-r12    SL-TxPoolToReleaseList-r12 OPTIONAL, -- Need
ON
    poolToReleaseList-r12    SL-TxPoolToReleaseList-r12 OPTIONAL, -- Need
ON
    poolToAddModList-r12    SL-CommTxPoolToAddModList-r12 OPTIONAL -- Need
ON
    }
  }
}

LogicalChGroupInfoList-r13 ::=  SEQUENCE (SIZE (1..maxLCG-r13)) OF SL-PriorityList-r13
SL-CommTxPoolToAddModList-r12 ::=  SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-
CommTxPoolToAddMod-r12
SL-CommTxPoolToAddModListExt-r13 ::= SEQUENCE (SIZE (1..maxSL-TxPool-v1310)) OF SL-
CommTxPoolToAddModExt-r13
SL-CommTxPoolToAddMod-r12 ::=  SEQUENCE {
  poolIdentity-r12     SL-TxPoolIdentity-r12,
  pool-r12       SL-CommResourcePool-r12
}
SL-CommTxPoolToAddModExt-r13 ::= SEQUENCE {
  poolIdentity-v1310     SL-TxPoolIdentity-v1310,
  pool-r13       SL-CommResourcePool-r12
}
MAC-MainConfigSL-r12 ::=  SEQUENCE {
  periodic-BSR-TimerSL     PeriodicBSR-Timer-r12 OPTIONAL, -- Need ON
  retx-BSR-TimerSL      RetxBSR-Timer-r12
}
-- ASN1STOP
### SL-CommConfig field descriptions

**commTxAllowRelayDedicated**
Indicates whether the UE is allowed to transmit relay related sidelink communication using the configured dedicated transmission resources i.e. either via scheduled or via UE selected resources.

**commTxPoolNormalDedicated**
Indicates a pool of transmission resources the UE is allowed to use while in RRC_CONNECTED.

**logicalChGroupInfoList**
Indicates for each logical channel group the list of associated priorities, used as specified in TS 36.321 [6], in order of increasing logical channel group identity.

**mcs**
Indicates the MCS as defined in TS 36.212 [23, 14.2.1]. If not configured, the selection of MCS is up to UE implementation.

**multipleTx**
Indicates whether the UE should perform multiple transmissions to different destinations in one SC period in accordance with TS 36.321 [6, 5.14.1.1]. Value TRUE indicates that multiple transmissions should be performed.

**sc-CommConfig**
Indicates a pool of resources for SC when E-UTRAN schedules Tx resources (i.e. when indices included in DCI format 5 indicate the actual data resources to be used as specified in TS 36.212 [22, 5.3.3.1.9]).

**scheduled**
Indicates the configuration for the case E-UTRAN schedules the transmission resources based on sidelink specific BSR from the UE.

**ue-Selected**
Indicates the configuration for the case the UE selects the transmission resources from a pool of resources configured by E-UTRAN.

---

**SL-CommResourcePool**

The IE **SL-CommResourcePool** specifies the configuration information for an individual pool of resources for sidelink communication. The IE covers the configuration of both the sidelink control information and the data.

### SL-CommResourcePool information element

```asn1
-- ASN1START
SL-CommTxPoolList-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-CommResourcePool-r12
SL-CommTxPoolListExt-v1310 ::= SEQUENCE (SIZE (1..maxSL-TxPool-v1310)) OF SL-CommResourcePool-r12
SL-CommRxPoolList-r12 ::= SEQUENCE (SIZE (1..maxSL-RxPool-r12)) OF SL-CommResourcePool-r12
SL-CommResourcePool-r12 ::= SEQUENCE {
   sc-CP-Len-r12   SL-CP-Len-r12,
   sc-Period-r12   SL-PeriodComm-r12,
   sc-TF-ResourceConfig-r12   SL-TF-ResourceConfig-r12,
   data-CP-Len-r12   SL-CP-Len-r12,
   dataHoppingConfig-r12    SL-HoppingConfigComm-r12,
   ue-SelectedResourceConfig-r12   SEQUENCE {
      data-TF-ResourceConfig-r12    SL-TF-ResourceConfig-r12,
      trpt-Subset-r12   SL-TRPT-Subset-r12 OPTIONAL -- Need OR
   } OPTIONAL, -- Need OR
   rxParametersNCell-r12   SEQUENCE {
      tdd-Config-r12   TDD-Config OPTIONAL, -- Need OR
      syncConfigIndex-r12   INTEGER (0..15) OPTIONAL, -- Need OR
   } OPTIONAL, -- Need OR
   txParameters-r12   SEQUENCE {
      sc-TxParameters-r12   SL-TxParameters-r12,
      dataTxParameters-r12   SL-TxParameters-r12
   } OPTIONAL, -- Cond Tx
   ...,
   [ [ priorityList-r13   SL-PriorityList-r13 OPTIONAL -- Cond Tx
      ] ]
}
SL-TRPT-Subset-r12 ::= BIT STRING (SIZE (3..5))
-- ASN1STOP
```
**SL-CommResourcePool field descriptions**

### sc-Period
Indicates the period over which resources are allocated in a cell for SC and over which scheduled and UE selected data transmissions occur, see PSCCH period in TS 36.213 [23]. Value in number of subframes. Value sf40 corresponds to 40 subframes, sf80 corresponds to 80 subframes and so on. E-UTRAN configures values sf40, sf80, sf160 and sf320 for FDD and for TDD config 1 to 5, values sf70, sf140 and sf280 for TDD config 0, and finally values sf60, sf120 and sf240 for TDD config 6.

### syncConfigIndex
Indicates the synchronisation configuration that is associated with a reception pool, by means of an index to the corresponding entry of commSyncConfig in SystemInformationBlockType18.

### tdd-Config
TDD configuration associated with the reception pool of the cell indicated by syncConfigIndex. Absence of the field indicates the same duplex mode as the cell providing this field and the same UL/DL configuration as indicated by subframeAssignment in SystemInformationBlockType1 in case of TDD.

### trpt-Subset
Indicates the subset of T-RPT available (see TS 36.213 [23, 14.1.1.1.1]). Consists of a bitmap which is used to indicate the set of available 'k' values to be used for sidelink communication (see TS 36.213 [23, 14.1.1.3]). If T-RPT subset configuration is not signaled/ preconfigured then UE assumes the whole T-RPT set is available.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx</td>
<td>The field is mandatory present when included in commTxPoolNormalDedicated, commTxPoolNormalDedicatedExt, commTxPoolNormalCommon, commTxPoolNormalCommonExt, commTxPoolExceptional or sc-CommTxConfig. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

---

**SL-CP-Len**

The IE *SL-CP-Len* indicates the cyclic prefix length, see TS 36.211 [21].

**SL-CP-Len information element**

```
-- ASN1START
SL-CP-Len-r12 ::= ENUMERATED {normal, extended}
-- ASN1STOP
```

---

**SL-DiscConfig**

The IE *SL-DiscConfig* specifies the dedicated configuration information for sidelink discovery.

**SL-DiscConfig information element**

```
-- ASN1START
SL-DiscConfig-r12 ::= SEQUENCE {
  discTxResources-r12          CHOICE {
    release         NULL,
    setup          SEQUENCE {
      scheduled-r12      SEQUENCE {
        discTxConfig-r12   SL-DiscResourcePool-r12 OPTIONAL, -- Need ON
        discTF-IndexList-r12 SL-TF-IndexPairList-r12 OPTIONAL, -- Need ON
        discHoppingConfig-r12 SL-HoppingConfigDisc-r12 OPTIONAL -- Need ON
      }
      ue-Selected-r12      SEQUENCE {
        poolToReleaseList-r12     SL-TxPoolToReleaseList-r12 OPTIONAL, -- Need ON
        poolToAddModList-r12      SL-DiscTxPoolToAddModList-r12 OPTIONAL -- Need ON
      }
    }
  }
  scheduled exhaustive list
}
```

[...]

```
} [[ discTF-IndexList-v1260 CHOICE {
  release         NULL,
}]]
```
setup        SEQUENCE {
  discTF-IndexList-r12b          SL-TF-IndexPairList-r12b
}               OPTIONAL -- Need ON
}],
[[ discTxResourcesPS-r13        CHOICE {
  release        NULL,
  setup          CHOICE {
    scheduled-r13          SL-DiscTxConfigScheduled-r13,
    ue-Selected-r13        SL-DiscTxPoolPS-Dedicated-r13
  }
}               OPTIONAL, -- Need ON
}
]
[
  discTxInterFreqInfo-r13       CHOICE {
    release        NULL,
    setup          SEQUENCE {
      discTxCarrierFreq-r13          ARFCN-ValueEUTRA-r9    OPTIONAL, -- Need OR
      discTxRefCarrierDedicated-r13  SL-DiscTxRefCarrierDedicated-r13 OPTIONAL, -- Need OR
    }
}               OPTIONAL, -- Need ON
}
]
[
  gapRequestsAllowedDedicated-r13 BOOLEAN          OPTIONAL, -- Need ON
  discRxGapConfig-r13           CHOICE {
    release        NULL,
    setup          SL-GapConfig-r13
}               OPTIONAL, -- Need ON
}
[
  discSysInfoToReportConfig-r13 CHOICE {
    release        NULL,
    setup          SL-DiscSysInfoToReportFreqList-r13
}               OPTIONAL -- Need ON
}
]

SL-DiscSysInfoToReportFreqList-r13 ::= SEQUENCE (SIZE (1..maxFreq)) OF ARFCN-ValueEUTRA-r9

SL-DiscTxInfoInterFreqListAdd-r13 ::= SEQUENCE {
  discTxFreqToAddModList-r13    SEQUENCE (SIZE (1..maxFreq)) OF SL-DiscTxResourceInfoPerFreq-r13 OPTIONAL, -- Need ON
  discTxFreqToReleaseList-r13   SEQUENCE (SIZE (1..maxFreq)) OF ARFCN-ValueEUTRA-r9 OPTIONAL, -- Need ON
  ...
}

SL-DiscTxResourceInfoPerFreq-r13 ::= SEQUENCE {
  discTxCarrierFreq-r13        ARFCN-ValueEUTRA-r9,
  discTxResources-r13          SL-DiscTxResource-r13 OPTIONAL, -- Need OR
  discTxResourcesPS-r13        SL-DiscTxResource-r13 OPTIONAL, -- Need OR
  discTxRefCarrierDedicated-r13 SL-DiscTxRefCarrierDedicated-r13 OPTIONAL, -- Need OR
  discCellSelectionInfo-r13    CellSelectionInfoNFreq-r13 OPTIONAL, -- Need OR
  ...
}

SL-DiscTxResource-r13 ::= CHOICE {
  release        NULL,
  setup          CHOICE {
    scheduled-r13          SL-DiscTxConfigScheduled-r13,
    ue-Selected-r13        SL-DiscTxPoolDedicated-r13
  }
}

SL-DiscTxPoolToAddModList-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-DiscTxPoolToAddMod-r12

SL-DiscTxPoolToAddMod-r12 ::= SEQUENCE {
  poolIdentity-r12          SL-TxPoolIdentity-r12,
  pool-r12                  SL-DiscResourcePool-r12
}
**SL-DiscTxConfigScheduled-r13** ::= SEQUENCE {
    discTxConfig-r13  SL-DiscResourcePool-r12 OPTIONAL, -- Need ON
    discTF-IndexList-r13  SL-TF-IndexPairList-r12b OPTIONAL, -- Need ON
    discHoppingConfig-r13  SL-HoppingConfigDisc-r12 OPTIONAL, -- Need ON
    ...
}

**SL-DiscTxPoolDedicated-r13** ::= SEQUENCE {
    poolToReleaseList-r13  SL-TxPoolToReleaseList-r12 OPTIONAL, -- Need ON
    poolToAddModList-r13  SL-DiscTxPoolToAddModList-r12 OPTIONAL -- Need ON
}

**SL-TF-IndexPairList-r12** ::= SEQUENCE (SIZE (1..maxSL-TF-IndexPair-r12)) OF SL-TF-IndexPair-r12

**SL-TF-IndexPair-r12** ::= SEQUENCE {
    discSF-Index-r12  INTEGER (1.. 200) OPTIONAL, -- Need ON
    discPRB-Index-r12  INTEGER (1.. 50) OPTIONAL -- Need ON
}

**SL-TF-IndexPairList-r12b** ::= SEQUENCE (SIZE (1..maxSL-TF-IndexPair-r12b)) OF SL-TF-IndexPair-r12b

**SL-TF-IndexPair-r12b** ::= SEQUENCE {
    discSF-Index-r12b  INTEGER (0..209) OPTIONAL, -- Need ON
    discPRB-Index-r12b  INTEGER (0..49) OPTIONAL -- Need ON
}

**SL-DiscTxRefCarrierDedicated-r13** ::= CHOICE {
    pCell  NULL,
    sCell  SCellIndex-r10
}

---

**SL-DiscConfig field descriptions**

- **discCellSelectionInfo**
  Parameters that may be used by the UE to select/ reselect a cell on the concerned non serving frequency. If absent, the UE acquires the information from the target cell on the concerned frequency. See TS 36.304 [4, 11.4].

- **discSysInfoToReportConfig**
  Indicates the request to start a SidelinkUEInformation procedure for reporting system information acquired during an inter-frequency discovery procedure.

- **discTF-IndexList**
  A list of time-frequency resource indices pair where each pair of indices corresponds to one discovery message. E-UTRAN only configures discTF-IndexList-r12b when configuring the UE with scheduled SL discovery Tx resources. When receiving discTF-IndexList-r12b, the UE shall only consider this field (and hence ignore discTF-IndexList-r12, if included or previously configured).

- **discTxConfig**
  Indicates the configuration used when E-UTRAN schedules Tx resources (i.e. the fields discSF-Index and discPRB-Index indicate the actual resources to be used).

- **discTxInterFreqInfo**
  Indicates frequency applicable for the resources indicated by discTxResources-r12 (i.e. original resource field may cover first inter-frequency), and possibly resource allocations on additional frequencies as may be indicated by field discTxInfoInterFreqListAdd.

- **discTxRefCarrierDedicated**
  Indicates if the PCell or an SCell is to be used as reference for DL measurements and synchronization, instead of the DL frequency paired with the one used to transmit sidelink discovery announcements on, see TS 36.213 [23, 14.3.1].

- **discTxResources**
  Indicates the resources assigned to the UE for discovery announcements, which can either be a pool from which the UE may select or a set of resources specifically assigned for use by the UE.

- **discTxResourcesPS**
  Indicates the resources assigned to the UE for PS discovery announcements, which can either be a pool from which the UE may select or a set of resources specifically assigned for use by the UE.

- **SL-TF-IndexPair**
  A pair of indices, one for the time domain and one for the frequency domain, indicating the start of resources within the pool covered by discTxConfig, see TS 36.211 [21, 9.5.6] for one discovery message. The upper limits of discSF-Index and discPRB-Index are defined in TS 36.213 [23, 14.3.1].
### SL-DiscResourcePool

The IE **SL-DiscResourcePool** specifies the configuration information for an individual pool of resources for sidelink discovery.

#### SL-DiscResourcePool information element

```asn1
SL-DiscRxPoolList-r12 ::= SEQUENCE (SIZE (1..maxSL-RxPool-r12)) OF SL-DiscResourcePool-r12
SL-DiscTxPoolList-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-DiscResourcePool-r12

SL-DiscResourcePool-r12 ::= SEQUENCE {
    cp-Len-r12      SL-CP-Len-r12,
    discPeriod-r12    ENUMERATED {rf32, rf64, rf128, rf256, rf512, rf1024, rf16-v1310, spare},
    numRetx-r12     INTEGER (0..3),
    numRepetition-r12    INTEGER (1..50),
    tf-ResourceConfig-r12   SL-TF-ResourceConfig-r12,
    txParameters-r12    SEQUENCE {
        txParametersGeneral-r12  SL-TxParameters-r12,
        ue-SelectedResourceConfig-r12 SEQUENCE {
            poolSelection-r12    CHOICE {
                rsrpBased-r12     SL-PoolSelectionConfig-r12,
                random-r12      NULL
            },
            txProbability-r12   ENUMERATED {p25, p50, p75, p100}
        } OPTIONAL  -- Need OR
    },
    rxParameters-r12    SEQUENCE {
        tdd-Config-r12     TDD-Config OPTIONAL, -- Need OR
        syncConfigIndex-r12   INTEGER (0..15)
    } OPTIONAL, -- Need OR
}

PhysCellIdList-r13 ::= SEQUENCE (SIZE (1.. maxSL-DiscCells-r13)) OF PhysCellId
```
SL-PoolSelectionConfig-r12 ::= SEQUENCE {
    threshLow-r12       RSRP-RangeSL2-r12,
    threshHigh-r12       RSRP-RangeSL2-r12
} -- ASN1STOP

**SL-DiscResourcePool** field descriptions

- **discPeriod**
  Indicates the period over which resources are allocated in a cell for discovery message transmission/reception, see PSDCH period in TS 36.213 [23]. Value in number of radio frames. Value rf32 corresponds to 32 radio frames, rf64 corresponds to 64 radio frames and so on. The extended values apply for PS discovery (not only for sidelink relaying). When broadcasting an extended value, E-UTRAN sets the original field to spare to ensure legacy UEs ignore the concerned pool entry.

- **numRepetition**
  Indicates the number of times subframeBitmap is repeated for mapping to subframes that occurs within a discPeriod. The highest value E-UTRAN uses is value 5 for FDD and TDD configuration 0, value 13 for TDD configuration 1, value 25 for TDD configuration 2, value 17 for TDD configuration 3, value 50 for TDD configuration 4, value 25 for TDD configuration 5 and value 7 for TDD configuration 6. E-UTRAN configures numRepetition and subframeBitmap such that the mapped subframes do not exceed the discPeriod.

- **poolSelection**
  Indicates the mechanism for selecting a (transmission) pool when multiple candidates are provided. E-UTRAN configures the same value (i.e. a pool selection method) for all candidate pools within one pool list (discTxPoolCommon or discTxPoolDedicated) but the pool selection method in different pool lists may or may not be the same.

- **syncConfigIndex**
  Indicates the synchronisation configuration that is associated with a reception or transmission pool, by means of an index to the corresponding entry of discSyncConfig in SystemInformationBlockType19.

- **threshLow, threshHigh**
  Specifies the thresholds used to select a resource pool in RSRP based pool selection. The E-UTRAN should configure threshLow and threshHigh such that the UE selects only one resource pool upon RSRP based pool selection.

- **txProbability**
  Indicates the probability of transmitting announcement in a discovery period when configured with a pool of resources, see TS 36.321 [6].

---

**Conditional presence**

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDD-OR</td>
<td>The field is optional present for TDD, need OR; it is not present for FDD.</td>
</tr>
<tr>
<td>Tx</td>
<td>The field is mandatory present when included in discTxPoolDedicated or discTxPoolCommon. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

---

**SL-DiscTxPowerInfo**

The IE **SL-DiscTxPowerInfo** specifies power control parameters for one or more power classes.

**SL-DiscTxPowerInfo** information element

```
-- ASN1START
SL-DiscTxPowerInfoList-r12 ::= SEQUENCE (SIZE (maxSL-DiscPowerClass-r12)) OF SL-DiscTxPowerInfo-r12
SL-DiscTxPowerInfo-r12 ::= SEQUENCE {
    discMaxTxPower-r12       P-Max,
    ...                     }
-- ASN1STOP
```

**SL-DiscTxPowerInfo** field descriptions

- **discMaxTxPower**
  Indicates the P-Max parameter used to calculate the maximum transmit power a UE configured with the concerned range class, see TS 24.333 [70, 4.2.11]. The first entry in **SL-DiscTxPowerInfoList** corresponds to UE range class 'short', the second entry corresponds to 'medium' and the third entry corresponds to 'long'.

---
-- **SL-GapConfig**

The IE *SL-GapConfig* indicates the gaps, requested or assigned, to enable the UE to receive or transmit sidelink discovery, intra or inter frequency (including inter-PLMN).

**SL-GapConfig information element**

```asn1
SL-GapConfig-r13 ::= SEQUENCE {
  gapPatternList-r13    SL-GapPatternList-r13
}
SL-GapPatternList-r13 ::= SEQUENCE {
  gapPattern-r13     SEQUENCE {
    gapPeriod-r13      ENUMERATED {sf40, sf60, sf70, sf80, sf120, sf140, sf160, sf240, sf280, sf320, sf640, sf1280, sf2560, sf5120, sf10240},
    gapOffset-r12      SL-OffsetIndicator-r12,
    gapSubframeBitmap-r13    BIT STRING (SIZE (1..10240)),
    ...
  }
}
```

**SL-GapConfig field descriptions**

- **gapOffset**
  Indicates the offset from the start of SFN 0 to the start of the first *gapPeriod*. If the SFN period is not an integer multiple of *gapPeriod*, no subframes within this period (i.e. from SFN 0 to offset) are considered part of the gap.

- **gapPeriod**
  Indicates the period by which *gapSubframeBitmap* is repeated.

- **gapSubframeBitmap**
  Indicates the subframes of one or more individual gaps, not only covering the subframes of the associated discovery resources but also including e.g. re-tuning and synchronisation delays. The UE and E-UTRAN signal bit strings of valid sizes only i.e. sizes equal to or less than *gapPeriod*. Value 1 indicates that the UE is allowed to use the subframe for sidelink discovery.

-- **SL-GapRequest**

The IE *SL-GapRequest* indicates the gaps requested by the UE to receive or transmit sidelink discovery, intra or inter frequency (including inter-PLMN).

**SL-GapRequest information element**

```asn1
SL-GapRequest-r13 ::= SEQUENCE (SIZE (1..maxFreq)) OF SL-GapFreqInfo-r13
SL-GapFreqInfo-r13 ::= SEQUENCE {
  carrierFreq-r13     ARFCN-ValueEUTRA-r9     OPTIONAL,
  gapPatternList-r13    SL-GapPatternList-r13
}
```

-- **SL-HoppingConfig**

The IE *SL-HoppingConfig* indicates the hopping configuration used for sidelink.

**SL-HoppingConfig information element**

```asn1
SL-HoppingConfigComm-r12 ::= SEQUENCE {
  hoppingParameter-r12    INTEGER (0..504),
  numSubbands-r12     ENUMERATED {ns1, ns2, ns4},
  rb-Offset-r12        INTEGER (0..110)
}
```
SL-HoppingConfigDisc-r12 ::= SEQUENCE {
  a-r12         INTEGER (1..200),
  b-r12         INTEGER (1..10),
  c-r12         ENUMERATED {n1, n5}
}

-- ASN1STOP

**SL-HoppingConfig field descriptions**

**a**
Per cell parameter: $N_{PSDCH}^{(1)}$ see TS 36.213 [23, 14.3.1].

**b**
Per UE parameter: $N_{PSDCH}^{(2)}$ see TS 36.213 [23, 14.3.1].

**c**
Per cell parameter: $N_{PSDCH}^{(3)}$ see TS 36.213 [23, 14.3.1]

**hoppingParameter**
Affects the hopping performed as specified in TS 36.213 [23, 14.1.1.2 and 14.1.1.4]. In case value 504 is received, the value used by the UE is 510.

**numSubbands**
Parameter: $N_{RB}$ see TS 36.211 [21, 9.3.6].

**rb-Offset**
Parameter: $N_{RB}^{HO}$, see TS 36.211 [21, 9.3.6].

---

**SL-OffsetIndicator**

The IE **SL-OffsetIndicator** indicates the offset of the pool of resources relative to SFN 0 of the cell from which it was obtained or, when out of coverage, relative to DFN 0.

**SL-OffsetIndicator information element**

```
-- ASN1START

SL-OffsetIndicator-r12 ::= CHOICE {
  small-r12        INTEGER (0..319),
  large-r12        INTEGER (0..10239)
}

SL-OffsetIndicatorSync-r12 ::= INTEGER (0..39)

-- ASN1STOP
```

**SL-OffsetIndicator field descriptions**

In **sc-TF-ResourceConfig**, it indicates the offset of the first period of pool of resources within a SFN cycle. For **data-TF-ResourceConfig**, it corresponds to the **offsetIndicator** as defined in TS 36.213 [23, 14.1.3].

**SL-OffsetIndicatorSync**
Synchronisation resources are present in those SFN and subframes which satisfy the relation: ($SFN*10+$ Subframe Number) mod 40 = **SL-OffsetIndicatorSync**.

---

**SL-PeriodComm**

The IE **SL-PeriodComm** indicates the period over which resources allocated in a cell for sidelink communication.

**SL-PeriodComm information element**

```
-- ASN1START

SL-PeriodComm-r12 ::= ENUMERATED {sf40, sf60, sf70, sf80, sf120, sf140, sf160, sf240, sf280, sf320, spare6, spare5, spare4, spare3, spare2, spare}

-- ASN1STOP
```
---

**SL-Priority**

The IE *SL-Priority* indicates the one or more priorities of resource pool used for sidelink communication, or of a logical channel group used in case of scheduled sidelink communication resources, see TS 36.321 [6].

**SL-Priority information element**

```
-- ASN1START
SL-PriorityList-r13 ::=  SEQUENCE (SIZE (1..maxSL-Prio-r13)) OF SL-Priority-r13
SL-Priority-r13 ::=   INTEGER (1..8)
-- ASN1STOP
```

---

**SLSSID**

The IE *SLSSID* identifies a cell and is used by the receiving UE to detect asynchronous neighbouring cells, and by transmitting UEs to extend the synchronisation signals beyond the cell’s coverage area.

**SLSSID information element**

```
-- ASN1START
SLSSID-r12 ::=     INTEGER (0..167)
-- ASN1STOP
```

---

**SL-SyncConfig**

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 and sidelink discovery.

**SL-SyncConfig information element**

```
-- ASN1START
SL-SyncConfigList-r12 ::=  SEQUENCE (SIZE (1..maxSL-SyncConfig-r12)) OF SL-SyncConfig-r12
SL-SyncConfig-r12 ::=     SEQUENCE {
    syncCP-Len-r12       SL-CP-Len-r12,
    syncOffsetIndicator-r12    SL-OffsetIndicatorSync-r12,
    slssid-r12        SLSSID-r12,
    txParameters-r12       SEQUENCE {
        syncTxParameters-r12    SL-TxParameters-r12,
        syncTxthreshIC-r12     RSRP-RangeSL-r12,
        syncInfoReserved-r12    BIT STRING (SIZE (19)) OPTIONAL -- Need OR
    }                 OPTIONAL, -- Need OR
    rxParamsNCell-r12      SEQUENCE {
        physCellId-r12       PhysCellId,
        discSyncWindow-r12    ENUMERATED {w1, w2}
    }                 OPTIONAL, -- Need OR
    ...,
    [[ syncTxPeriodic-r13     ENUMERATED {true} OPTIONAL -- Need OR
    ]]}
SL-SyncConfigListNFreq-r13 ::=  SEQUENCE (SIZE (1..maxSL-SyncConfig-r12)) OF SL-SyncConfigNFreq-r13
SL-SyncConfigNFreq-r13 ::=   SEQUENCE {
    asyncParameters-r13     SEQUENCE {
        syncCP-Len-r13       SL-CP-Len-r12,
        syncOffsetIndicator-r13    SL-OffsetIndicatorSync-r12,
        slssid-r13        SLSSID-r12
    }                 OPTIONAL, -- Need OR
    txParameters-r13       SEQUENCE {
        syncTxParameters-r13    SL-TxParameters-r12,
        ...,
    }                 OPTIONAL, -- Need OR
}
-- ASN1STOP
```
```plaintext
syncTxThreshIC-r13       RSRP-RangeSL-r12,
syncInfoReserved-r13     BIT STRING (SIZE (19))  OPTIONAL, -- Need OR
syncTxPeriodic-r13      ENUMERATED {true}      OPTIONAL, -- Need OR
}                OPTIONAL, -- Need OR
rxParameters-r13        SEQUENCE {
  discSyncWindow-r13     ENUMERATED {w1, w2}              OPTIONAL, -- Need OR
}                 OPTIONAL, -- Need OR
...                     
-- ASN1STOP
```
**SL-SyncConfig** field descriptions

**discSyncWindow**
Indicates the synchronization window over which the UE expects that SLSS or discovery resources indicated by the pool configuration (see TS 36.213 [23, 14.4]). The value \( w_1 \) denotes 5 milliseconds. The value \( w_2 \) denotes the length corresponding to normal cyclic prefix divided by 2.

**syncInfoReserved**
Reserved for future use.

**syncOffsetIndicator**
E-UTRAN should ensure \( \text{syncOffsetIndicator} \) is set to the same value as \( \text{syncOffsetIndicator1} \) or \( \text{syncOffsetIndicator2} \) in \( \text{preconfigSync} \) within \( \text{SL-Preconfiguration} \), if configured.

**syncTxPeriodic**
Indicates whether in each discovery period in which UE transmits discovery, the UE transmits SLSS once or periodically (i.e. every 40ms). In the latter case (periodic) the UE also transmits the \( \text{MasterInformationBlock-SL} \) message alongside. E-UTRAN configures this field only for synchronisation configurations applicable for PS discovery.

**syncTxThreshIC**
Indicates the threshold used while in coverage. In case the RSRP measurement of the cell chosen for transmission of sidelink communication/ discovery announcements, or of the cell used as reference for DL measurements and synchronization, is below the level indicated by this field, the UE may transmit SLSS (i.e. become synchronisation reference) when performing the corresponding sidelink transmission.

**txParameters**
Includes parameters relevant only for transmission. E-UTRAN includes the field in one entry per list, as included in \( \text{commSyncConfig} \) or \( \text{discSyncConfig} \).

---

**SL-DiscSysInfoReport**

The IE **SL-DiscSysInfoReport** contains the parameters related to sidelink discovery acquired from system information of inter-frequency cells (including inter-PLMN).

---

**SL-DiscSysInfoReport** information element

```asn1
-- ASN1START
SL-DiscSysInfoReport-r13 ::= SEQUENCE {
  plmn-IdentityList-r13   PLMN-IdentityList   OPTIONAL,
  cellIdentity-r13        CellIdentity        OPTIONAL,
  carrierFreqInfo-r13     ARFCN-ValueEUTRA-r9 OPTIONAL,
  discRxResources-r13     SL-DiscRxPoolList-r12 OPTIONAL,
  discTxPoolCommon-r13    SL-DiscTxPoolList-r12 OPTIONAL,
  discSyncConfig-r13      SL-SyncConfigNFreq-r13 OPTIONAL,
  discCellSelectionInfo-r13 SEQUENCE {
    q-RxLevMin-r13         Q-RxLevMin,
    q-RxLevMinOffset-r13   INTEGER (1..8)   OPTIONAL,
  } OPTIONAL,
  cellReselectionInfo-r13  SEQUENCE {
    q-Hyst-r13        ENUMERATED {
      dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
      dB12, dB14, dB16, dB18, dB20, dB22, dB24},
    q-RxLevMin-r13     Q-RxLevMin,
    t-ReselectionEUTRA-r13   T-Reselection
  } OPTIONAL,
  tdd-Config-r13     TDD-Config     OPTIONAL,
  freqInfo-r13        SEQUENCE {
    ul-CarrierFreq-r13    ARFCN-ValueEUTRA OPTIONAL,
    ul-Bandwidth-r13     ENUMERATED {n6, n15, n25, n50, n75, n100} OPTIONAL,
  } OPTIONAL,
  additionalSpectrumEmission-r13 AdditionalSpectrumEmission OPTIONAL,
  p-Max-r13      P-Max OPTIONAL,
  referenceSignalPower-r13 INTEGER (-60..50) OPTIONAL,
  ... |
  freqInfo-v1370 SEQUENCE {
    additionalSpectrumEmission-v1370 AdditionalSpectrumEmission-v1010
  } OPTIONAL
}
-- ASN1STOP
```
SL-DiscSysInfoReport field descriptions

- carrierFreqInfo
  Indicates the frequency of the cell from which the UE acquired the system information relevant for discovery

- cellIdentity
  Indicated the identity of the cell from which the UE acquired the system information relevant for discovery

- plmnIdentityList
  Indicates the list of PLMN identity of the cell from which the UE acquired the system information relevant for discovery

SL-TF-ResourceConfig

The IE SL-TF-ResourceConfig specifies a set of time/frequency resources used for sidelink.

SL-TF-ResourceConfig information element

---

SL-TF-ResourceConfig-r12 ::= SEQUENCE {
  prb-Num-r12        INTEGER (1..100),
  prb-Start-r12      INTEGER (0..99),
  prb-End-r12       INTEGER (0..99),
  offsetIndicator-r12     SL-OffsetIndicator-r12,
  subframeBitmap-r12     SubframeBitmapSL-r12
}

SubframeBitmapSL-r12 ::= CHOICE {
  bs4-r12         BIT STRING (SIZE (4)),
  bs8-r12         BIT STRING (SIZE (8)),
  bs12-r12        BIT STRING (SIZE (12)),
  bs16-r12        BIT STRING (SIZE (16)),
  bs30-r12        BIT STRING (SIZE (30)),
  bs40-r12        BIT STRING (SIZE (40)),
  bs42-r12        BIT STRING (SIZE (42))
}

---

SL-TF-ResourceConfig field descriptions

- prb-Start, prb-End, prb-Num
  Sidelink transmissions on a sub-frame can occur on PRB with index greater than or equal to prb-Start and less than prb-Start + prb-Num, and on PRB with index greater than prb-End - prb-Num and less than or equal to prb-End. Even for neighbouring cells, prb-Start and prb-End are relative to PRB #0 of the cell from which it was obtained. See TS 36.213 [23, 14.1.3, 14.2.3, 14.3.3].

- subframeBitmap
  Indicates the subframe bitmap indicating resources used for sidelink. E-UTRAN configures value bs40 for FDD and the following values for TDD: value bs42 for configuration0, value bs16 for configuration1, value bs8 for configuration2, value bs12 for configuration3, value bs8 for configuration4, value bs4 for configuration5 and value bs30 for configuration6.

SL-TxParameters

The IE SL-TxParameters identifies a set of parameters configured for sidelink transmission, used for communication, discovery and synchronisation.

SL-TxParameters information element

---

SL-TxParameters-r12 ::= SEQUENCE {
  alpha-r12        Alpha-r12,
  p0-r12         INTEGER (-126..31)
}

---
**SL-TxParameters** field descriptions

**alpha**
Parameter(s): $\alpha_{\text{PSSCH},1}$, $\alpha_{\text{PSSCH},2}$, $\alpha_{\text{PSCCH},1}$, $\alpha_{\text{PSCCH},2}$, $\alpha_{\text{PSDCH},1}$, $\alpha_{\text{PSSS}}$  
See TS 36.213 [23, 14.1.1.5, 14.2.1.2, 14.3.1, 14.4] where $\alpha_0$ corresponds to 0, $\alpha_{04}$ corresponds to value 0.4, $\alpha_{05}$ to 0.5, $\alpha_{06}$ to 0.6, $\alpha_{07}$ to 0.7, $\alpha_{08}$ to 0.8, $\alpha_{09}$ to 0.9 and $\alpha_1$ corresponds to 1. This field applies for sidelink power control.

**p0**
Parameter: $P_{O_{\text{PSSCH},1}}$, $P_{O_{\text{PSSCH},2}}$, $P_{O_{\text{PSCCH},1}}$, $P_{O_{\text{PSCCH},2}}$, $P_{O_{\text{PSDCH},1}}$, $P_{O_{\text{PSSS}}}$  
See TS 36.213 [23, 14.1.1.5, 14.2.1.2, 14.3.1, 14.4], unit dBm.

---

**SL-TxPoolIdentity**

The IE *SL-TxPoolIdentity* identifies an individual pool entry configured for sidelink transmission, used for communication and discovery.

**SL-TxPoolIdentity** information element

```
-- ASN1START
SL-TxPoolIdentity-r12 ::= INTEGER (1..maxSL-TxPool-r12)
SL-TxPoolIdentity-v1310 ::= INTEGER (maxSL-TxPool-r12Plus1-r13.. maxSL-TxPool-r13)
-- ASN1STOP
```

---

**SL-TxPoolToReleaseList**

The IE *SL-TxPoolToReleaseList* is used to release one or more individual pool entries used for sidelink transmission, for communication and discovery.

**SL-TxPoolToReleaseList** information element

```
-- ASN1START
SL-TxPoolToReleaseList-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-TxPoolIdentity-r12
SL-TxPoolToReleaseListExt-r13 ::= SEQUENCE (SIZE (1..maxSL-TxPool-v1310)) OF SL-TxPoolIdentity-v1310
-- ASN1STOP
```

---

6.4 RRC multiplicity and type constraint values

---

**Multiplicity and type constraint definitions**

```
-- ASN1START
maxACDC-Cat-r13 INTEGER ::= 16  -- Maximum number of ACDC categories (per PLMN)
maxAvailNarrowBands-r13 INTEGER ::= 16  -- Maximum number of narrowbands
maxBandComb-r10 INTEGER ::= 128  -- Maximum number of band combinations.
maxBandComb-r11 INTEGER ::= 256  -- Maximum number of additional band combinations.
maxBandComb-r13 INTEGER ::= 384  -- Maximum number of band combinations in Rel-13
maxBands INTEGER ::= 64  -- Maximum number of bands listed in EUTRA UE caps
maxBandwidthClass-r10 INTEGER ::= 16  -- Maximum number of supported CA BW classes per band
maxBandwidthCombSet-r10 INTEGER ::= 32  -- Maximum number of bandwidth combination sets per supported band combination
maxCDMA-BandClass INTEGER ::= 32  -- Maximum value of the CDMA band classes
maxCE-Level-r13 INTEGER ::= 4  -- Maximum number of CE levels
maxCellBlack INTEGER ::= 16  -- Maximum number of blacklisted physical cell identity ranges listed in SIB type 4 and 5
maxCellHistory-r12 INTEGER ::= 16  -- Maximum number of visited EUTRA cells reported
maxCellInfoGERAN-r9 INTEGER ::= 32  -- Maximum number of GERAN cells for which system information can be provided as redirection assistance
maxCellInfoUTRA-r9 INTEGER ::= 32  -- Maximum number of UTRA cells for which system information can be provided as redirection assistance
maxCombIDC-r11 INTEGER ::= 128  -- Maximum number of reported UL CA combinations
maxCSI-IM-r11 INTEGER ::= 3  -- Maximum number of CSI-IM configurations
```
maxCSI-IM-r12 INTEGER ::= 4 -- Maximum number of CSI-IM configurations (per carrier frequency)
minCSI-IM-r13 INTEGER ::= 5 -- Minimum number of CSI-IM configurations from which REL-13 extension is used (per carrier frequency)
maxCSI-IM-r13 INTEGER ::= 24 -- Maximum number of CSI-IM configurations (per carrier frequency)
maxCSI-IM-v1310 INTEGER ::= 20 -- Maximum number of additional CSI-IM configurations (per carrier frequency)
maxCSI-Proc-r11 INTEGER ::= 4 -- Maximum number of CSI processes (per carrier frequency)
maxCSI-RS-NZP-r11 INTEGER ::= 3 -- Maximum number of CSI RS resource configurations using non-zero Tx power (per carrier frequency)
minCSI-RS-NZP-r13 INTEGER ::= 4 -- Minimum number of CSI RS resource from which REL-13 extension is used (per carrier frequency)
maxCSI-RS-NZP-r13 INTEGER ::= 24 -- Maximum number of CSI RS resource configurations using non-zero Tx power (per carrier frequency)
maxCSI-RS-NZP-v1310 INTEGER ::= 21 -- Maximum number of additional CSI RS resource configurations using non-zero Tx power (per carrier frequency)
maxCSI-RS-ZP-r11 INTEGER ::= 4 -- Maximum number of CSI RS resource configurations using zero Tx power (per carrier frequency)
maxCQI-ProcExt-r11 INTEGER ::= 3 -- Maximum number of additional periodic CQI configurations (per carrier frequency)
maxFreqUTRA-TDD-r10 INTEGER ::= 6 -- Maximum number of UTRA TDD carrier frequencies for which system information can be provided as redirection assistance
maxCellInter INTEGER ::= 16 -- Maximum number of neighbouring inter-frequency cells listed in SIB type 5
maxCellIntra INTEGER ::= 16 -- Maximum number of neighbouring intra-frequency cells listed in SIB type 4
maxCellListGERAN INTEGER ::= 3 -- Maximum number of lists of GERAN cells
maxCellMeas INTEGER ::= 32 -- Maximum number of entries in each of the cell lists in a measurement object
maxCellReport INTEGER ::= 8 -- Maximum number of reported cells/CSI-RS resources in the CSI-RS list in a measurement object
maxCSI-RS-Meas-r12 INTEGER ::= 96 -- Maximum number of entries in the CSI-RS list in a measurement object
maxCQI-ProcExt-r11 INTEGER ::= 3 -- Maximum number of additional periodic CQI configurations (per carrier frequency)
maxFreqUTRA-TDD-r10 INTEGER ::= 6 -- Maximum number of UTRA TDD carrier frequencies for which system information can be provided as redirection assistance
maxCellReport INTEGER ::= 8 -- Maximum number of reported cells/CSI-RS resources in the CSI-RS list in a measurement object
maxDRB INTEGER ::= 11 -- Maximum number of Data Radio Bearers
maxDS-Duration-r12 INTEGER ::= 5 -- Maximum number of subframes in a discovery signals occasion
maxDS-ZTP-CSI-RS-r12 INTEGER ::= 5 -- Maximum number of zero transmission power CSI-RS for a serving cell concerning discovery signals
maxEARFCN INTEGER ::= 65535 -- Maximum value of EUTRA carrier frequency
maxEARFCN-Plus1 INTEGER ::= 65536 -- Lowest value extended EARFCN range
maxEARFCN2 INTEGER ::= 262143 -- Highest value extended EARFCN range
maxEPDCCH-Set-r11 INTEGER ::= 2 -- Maximum number of EPDCCH sets
maxFBI INTEGER ::= 64 -- Maximum value of frequency band indicator
maxFBI-Plus1 INTEGER ::= 65 -- Lowest value extended FBI range
maxFBI12 INTEGER ::= 256 -- Highest value extended FBI range
maxFreq INTEGER ::= 8 -- Maximum number of carrier frequencies
maxFreqIDC-r11 INTEGER ::= 32 -- Maximum number of carrier frequencies that are affected by the IDC problems
maxFreqMBMS-r11 INTEGER ::= 5 -- Maximum number of carrier frequencies for which an MBMS capable UE may indicate an interest
maxGERAN-SI INTEGER ::= 10 -- Maximum number of GERAN SI blocks that can be provided as part of NACC information
maxGNFG INTEGER ::= 16 -- Maximum number of GERAN neighbour freq groups
maxLCG-r13 INTEGER ::= 4 -- Maximum number of logical channel groups
maxLogMeasReport-r10 INTEGER ::= 520 -- Maximum number of logged measurement entries that can be reported by the UE in one message
maxMBFN-Allocations INTEGER ::= 8 -- Maximum number of MBFN frame allocations with different offset
maxMBSN-Area INTEGER ::= 8
maxMBSN-Area-1 INTEGER ::= 7
maxMBMS-ServiceListPerUE-r13 INTEGER ::= 15 -- Maximum number of services which the UE can include in the MBMS interest indication
maxMeasId INTEGER ::= 32
maxMeasId-Plus1 INTEGER ::= 33
maxMeasId-r12 INTEGER ::= 64
maxMultiBands INTEGER ::= 8 -- Maximum number of additional frequency bands that a cell belongs to
maxNS-Pmax-r10 INTEGER ::= 8 -- Maximum number of supported NS and P-Max values per band
maxNAICS-Entries-r12 INTEGER ::= 8 -- Maximum number of supported NAICS combination(s)
maxNeighborCell-r12 INTEGER ::= 8 -- Maximum number of neighbouring cells in NAICS configuration (per carrier frequency)
maxNeighCell-SCPTM-r13 INTEGER ::= 8  -- Maximum number of SCPTM neighbour cells
maxObject3d INTEGER ::= 32
maxObject3d-Plus1-r13 INTEGER ::= 33
maxObject3d-r13 INTEGER ::= 64
maxP-a-PerNeighCell-r12 INTEGER ::= 3  -- Maximum number of power offsets for a neighbour cell
   -- in NAICS configuration
maxPageRec INTEGER ::= 16
maxPhysCellIdRange-r9 INTEGER ::= 4  -- Maximum number of physical cell identity ranges
maxPLMN-r11 INTEGER ::= 6  -- Maximum number of PLMNs
maxPNonset INTEGER ::= 511  -- Maximum number of CDMA2000 PNoffsets
maxPMCH-PerMBSSFN INTEGER ::= 15
maxQCI-r13 INTEGER ::= 6  -- Maximum number of QCIs
maxRAT-Capabilities INTEGER ::= 8  -- Maximum number of interworking RATs (incl EUTRA)
maxRB-MappQCL-r11 INTEGER ::= 4  -- Maximum number of PDSCH RE Mapping configurations
   -- (per carrier frequency)
maxReportConfigId INTEGER ::= 32  -- Maximum number of frequency layers for RSTD
maxRSTD-Freq-r10 INTEGER ::= 3  -- Maximum number of measurements
maxSAI-MBMS-r11 INTEGER ::= 64  -- Maximum number of MBMS service area identities
   -- broadcast per carrier frequency
maxSCell-r10 INTEGER ::= 4  -- Maximum number of SCells
maxSCell-r13 INTEGER ::= 31  -- Highest value of extended number range of SCells
maxSC-MTC-r13 INTEGER ::= 1023  -- Maximum number of SC-MTCs in one cell
maxSL-CommRxPoolNPfreq-r13 INTEGER ::= 32  -- Maximum number of individual sidelink communication
   -- Rx resource pools on neighbouring freq
maxSL-CommRxPoolPreconf-v1310 INTEGER ::= 12  -- Maximum number of additional preconfigured
   -- sidelink communication Rx resource pool entries
maxSL-TxPool-r12Plus1-r13 INTEGER ::= 5  -- First additional individual sidelink
   -- Tx resource pool
maxSL-TxPool-v1310 INTEGER ::= 4  -- Maximum number of additional sidelink
   -- Tx resource pool entries
maxSL-TxPool-r13 INTEGER ::= 8  -- Maximum number of individual sidelink
   -- Tx resource pools
maxSL-Dest-r12 INTEGER ::= 16  -- Maximum number of additional preconfigured
   -- sidelink Tx resource pool entries
maxSL-DiscCells-r13 INTEGER ::= 16  -- Maximum number of cells with similar sidelink
   -- configurations
maxSL-DiscPowerClass-r12 INTEGER ::= 3  -- Maximum number of sidelink power classes
maxSL-DiscRxPoolPreconf-r13 INTEGER ::= 16  -- Maximum number of preconfigured sidelink
   -- discovery Rx resource pool entries
maxSL-DiscSysInfoReportFreq-r13 INTEGER ::= 8  -- Maximum number of frequencies to include in a
   -- SidelinkUEInformation for SI reporting
maxSL-DiscTxPoolPreconf-r13 INTEGER ::= 4  -- Maximum number of preconfigured sidelink
   -- discovery Tx resource pool entries
maxSL-GP-r13 INTEGER ::= 8  -- Maximum number of gap patterns that can be requested
   -- for a frequency or assigned
maxSL-RxPool-r12 INTEGER ::= 16  -- Maximum number of individual sidelink Rx resource
   -- pools
maxSL-SyncConfig-r12 INTEGER ::= 16  -- Maximum number of sidelink Sync configurations
maxSL-TF-IndexPair-r12 INTEGER ::= 64  -- Maximum number of sidelink Time Freq resource index
   -- pairs
maxSL-TxPool-r12 INTEGER ::= 4  -- Maximum number of individual sidelink Tx resource
   -- pools
maxSTAG-r11 INTEGER ::= 3  -- Maximum number of STAGs
maxServCell-r10 INTEGER ::= 5  -- Maximum number of Serving cells
maxServCell-r13 INTEGER ::= 32  -- Highest value of extended number range of Serving
   -- cells
maxServiceCount INTEGER ::= 16  -- Maximum number of MBMS services that can be included
   -- in an MBMS counting request and response
maxServiceCount-1 INTEGER ::= 15
maxSessionPerPMCH INTEGER ::= 29
maxSessionPerPMCH-1 INTEGER ::= 28
maxSIB INTEGER ::= 32  -- Maximum number of SIBs
maxSIB-1 INTEGER ::= 31
maxSI-MESSAGE INTEGER ::= 32  -- Maximum number of SI messages
maxSimultaneousBands-r10 INTEGER ::= 64  -- Maximum number of simultaneously aggregated bands
maxSubframePatternIDC-r11 INTEGER ::= 8  -- Maximum number of subframe reservation patterns
   -- that the UE can simultaneously recommend to the
   -- E-UTRAN for use.
maxUTRA-FDD-Carrier INTEGER ::= 16  -- Maximum number of UTRA FDD carrier frequencies
maxUTRA-TDD-Carrier INTEGER ::= 16  -- Maximum number of UTRA TDD carrier frequencies
maxWLAN-Id-r12 INTEGER ::= 16  -- Maximum number of WLAN identifiers
maxWLAN-Id-r13 INTEGER ::= 8  -- Maximum number of WLAN bands
maxWLAN-Id-r13 INTEGER ::= 32  -- Maximum number of WLAN identifiers
maxWLAN-Channels-r13 INTEGER ::= 16  -- Maximum number of WLAN channels used in
   -- WLAN-CarrierInfo
maxWLAN-CarrierInfo-r13 INTEGER ::= 8 -- Maximum number of WLAN Carrier Information

-- ASN1STOP

NOTE: The value of maxDRB aligns with SA2.

– End of EUTRA-RRC-Definitions

-- ASN1START
END
-- ASN1STOP

6.5 PC5 RRC messages

NOTE: The messages included in this section reflect the current status of the discussions. Additional messages may be included at a later stage.

6.5.1 General message structure

– PC5-RRC-Definitions

This ASN.1 segment is the start of the PC5 RRC PDU definitions.

-- ASN1START
PC5-RRC-Definitions DEFINITIONS AUTOMATIC TAGS ::= BEGIN IMPORTS TDD-ConfigSL-r12 FROM EUTRA-RRC-Definitions;
-- 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.

-- ASN1START
SBCCH-SL-BCH-Message ::= SEQUENCE {
  message SBCCH-SL-BCH-MessageType
}
SBCCH-SL-BCH-MessageType ::= MasterInformationBlock-SL
-- ASN1STOP

6.5.2 Message definitions

– MasterInformationBlock-SL

The MasterInformationBlock-SL includes the information transmitted by a UE transmitting SLSS, i.e. acting as synchronisation reference, via SL-BCH.
Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: SBCCH

Direction: UE to UE

**MasterInformationBlock-SL**

---

```asn
MasterInformationBlock-SL ::= SEQUENCE {
  sl-Bandwidth-r12     ENUMERATED {
    n6, n15, n25, n50, n75, n100},
  tdd-ConfigSL-r12     TDD-ConfigSL-r12,
  directFrameNumber-r12 BIT STRING (SIZE (10)),
  directSubframeNumber-r12 INTEGER (0..9),
  inCoverage-r12      BOOLEAN,
  reserved-r12      BIT STRING (SIZE (19))
}
```

---

**MasterInformationBlock-SL field descriptions**

- **directFrameNumber**
  Indicates the frame number in which SLSS and SL-BCH are transmitted. The subframe in the frame corresponding to `directFrameNumber` is indicated by `directSubframeNumber`.

- **inCoverage**
  Value `TRUE` indicates that the UE transmitting the `MasterInformationBlock-SL` is in E-UTRAN coverage.

- **sl-Bandwidth**
  Parameter: transmission bandwidth configuration. `n6` corresponds to 6 resource blocks, `n15` to 15 resource blocks and so on.

---

### 6.6 Direct Indication Information

Direct Indication information is transmitted on MPDCCH using P-RNTI but without associated Paging message. Table 6.6-1 defines the Direct Indication information, see TS 36.212 [22, 5.3.3.1.14].

When bit n is set to 1, UE shall behave as if the corresponding field is set in the Paging message, see 5.3.2.3. Bit 1 is the least significant bit.

**Table 6.6-1: Direct Indication information**

<table>
<thead>
<tr>
<th>Bit</th>
<th>Direct Indication information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><code>systemInfoModification</code></td>
</tr>
<tr>
<td>2</td>
<td><code>etws-Indication</code></td>
</tr>
<tr>
<td>3</td>
<td><code>cmas-Indication</code></td>
</tr>
<tr>
<td>4</td>
<td><code>eab-ParamModification</code></td>
</tr>
<tr>
<td>5</td>
<td><code>systemInfoModification-eDRX</code></td>
</tr>
<tr>
<td>6, 7, 8</td>
<td>Not used, and shall be ignored by UE if received.</td>
</tr>
</tbody>
</table>

---

---
6.7 NB-IoT RRC messages

6.7.1 General NB-IoT message structure

```asn1
NBIO-T-RRC-Definitions DEFINITIONS AUTOMATIC TAGS ::= BEGIN
IMPORTS
    RRCConnectionReestablishmentReject,
    SecurityModeCommand,
    SecurityModeComplete,
    SecurityModeFailure,
    AdditionalSpectrumEmission,
    ARFCN-ValueEUTRA-r9,
    CellIdentity,
    DedicatedInfoNAS,
    DRB-Identity,
    InitialUE-Identity,
    IntraFreqBlackCellList,
    IntraFreqNeighCellList,
    maxBands,
    maxCellBlack,
    maxCellInter,
    maxFB12,
    maxFreq,
    maxMultiBands,
    maxPageRec,
    maxPLMN-r11,
    maxSIB,
    maxSIB-1,
    NextHopChainingCount,
    PagingUE-Identity,
    PLMN-Identity,
    P-Max,
    PowerRampingParameters,
    PreambleTransMax,
    PhysCellId,
    Q-OffsetRange,
    Q-QualMin-r9,
    Q-RxLevMin,
    ReestabUE-Identity,
    RegisteredMME,
    ReselectionThreshold,
    ResumeIdentity-r13,
    RRC-TransactionIdentifier,
    RSRP-Range,
    ShortMAC-I,
    S-TMSI,
    SystemInformationBlockType16-r11,
    SystemInfoValueTagSI-r13,
    TimeAlignmentTimer,
    TrackingAreaCode
FROM EUTRA-RRC-Definitions;
```

---

**BCCH-BCH-Message-NB**

The **BCCH-BCH-Message-NB** class is the set of RRC messages that may be sent from the E-UTRAN to the UE via BCH on the BCCH logical channel.

```asn1
BCCH-BCH-Message-NB ::= SEQUENCE {
    message BCCH-BCH-MessageType-NB
}
BCCH-BCH-MessageType-NB ::= MasterInformationBlock-NB
```
-- ASN1STOP

-- BCCH-DL-SCH-Message-NB

The **BCCH-DL-SCH-Message-NB** class is the set of RRC messages that may be sent from the E-UTRAN to the UE via DL-SCH on the BCCH logical channel.

```asn1
-- ASN1START
BCCH-DL-SCH-Message-NB ::= SEQUENCE {
  message     BCCH-DL-SCH-MessageType-NB
}
BCCH-DL-SCH-MessageType-NB ::= CHOICE {
  c1      CHOICE {
    systemInformation-r13    SystemInformation-NB,
    systemInformationBlockType1-r13  SystemInformationBlockType1-NB
  },
  messageClassExtension SEQUENCE {}
}
-- ASN1STOP
```

-- PCCH-Message-NB

The **PCCH-Message-NB** class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the PCCH logical channel.

```asn1
-- ASN1START
PCCH-Message-NB ::= SEQUENCE {
  message     PCCH-MessageType-NB
}
PCCH-MessageType-NB ::= CHOICE {
  c1      CHOICE {
    paging-r13       Paging-NB
  },
  messageClassExtension SEQUENCE {}
}
-- ASN1STOP
```

-- DL-CCCH-Message-NB

The **DL-CCCH-Message-NB** class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the downlink CCCH logical channel.

```asn1
-- ASN1START
DL-CCCH-Message-NB ::= SEQUENCE {
  message     DL-CCCH-MessageType-NB
}
DL-CCCH-MessageType-NB ::= CHOICE {
  c1      CHOICE {
    rrcConnectionReestablishment-r13  RRCConnectionReestablishment-NB,
    rrcConnectionReestablishmentReject-r13 RRCConnectionReestablishmentReject,
    rrcConnectionSetup-r13     RRCConnectionSetup-NB,
    spare4 NULL, spare3 NULL, spare2 NULL, spare1 NULL
  },
  messageClassExtension SEQUENCE {}
}
-- ASN1STOP
```
– **DL-DCCH-Message-NB**

The **DL-DCCH-Message-NB** class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the downlink DCCH logical channel.

```asn1
DL-DCCH-Message-NB ::= SEQUENCE {
  message     DL-DCCH-MessageType-NB
}
DL-DCCH-MessageType-NB ::= CHOICE {
  c1      CHOICE {
    dlInformationTransfer-r13    DLInformationTransfer-NB,  
    rrcConnectionReconfiguration-r13  RRCConnectionReconfiguration-NB,  
    rrcConnectionRelease-r13    RRCConnectionRelease-NB,  
    securityModeCommand-r13     SecurityModeCommand,  
    ueCapabilityEnquiry-r13     UECapabilityEnquiry-NB,  
    rrcConnectionResume-r13     RRCConnectionResume-NB,  
    spare2 NULL, spare1 NULL
  },
  messageClassExtension SEQUENCE {  
  }
}
```

-- ASN1STOP

– **UL-CCCH-Message-NB**

The **UL-CCCH-Message-NB** class is the set of RRC messages that may be sent from the UE to the E-UTRAN on the uplink CCCH logical channel.

```asn1
UL-CCCH-Message-NB ::= SEQUENCE {
  message     UL-CCCH-MessageType-NB
}
UL-CCCH-MessageType-NB ::= CHOICE {
  c1      CHOICE {
    rrcConnectionReestablishmentRequest-r13 RRCConnectionReestablishmentRequest-NB,  
    rrcConnectionRequest-r13    RRCConnectionRequest-NB,  
    rrcConnectionResumeRequest-r13   RRCConnectionResumeRequest-NB,  
    spare1 NULL
  },
  messageClassExtension SEQUENCE {  
  }
}
```

-- ASN1STOP

– **UL-DCCH-Message-NB**

The **UL-DCCH-Message-NB** class is the set of RRC messages that may be sent from the UE to the E-UTRAN on the uplink DCCH logical channel.

```asn1
UL-DCCH-Message-NB ::= SEQUENCE {
  message     UL-DCCH-MessageType-NB
}
UL-DCCH-MessageType-NB ::= CHOICE {
  c1      CHOICE {
    rrcConnectionReconfigurationComplete-r13 RRCConnectionReconfigurationComplete-NB,  
    rrcConnectionReestablishmentComplete-r13 RRCConnectionReestablishmentComplete-NB,  
    rrcConnectionSetupComplete-r13    RRCConnectionSetupComplete-NB,  
    securityModeComplete-r13     SecurityModeComplete,  
    securityModeFailure-r13      SecurityModeFailure,  
    ueCapabilityInformation-r13     UECapabilityInformation-NB,  
    ulInformationTransfer-r13     ULInformationTransfer-NB,  
    rrcConnectionResumeComplete-r13     RRCConnectionResumeComplete-NB,  
    spare8 NULL, spare7 NULL,
```

```
6.7.2 NB-IoT Message definitions

– **DLInformationTransfer-NB**

The *DLInformationTransfer-NB* message is used for the downlink transfer of NAS dedicated information.

  Signalling radio bearer: SRB1 or SRB1bis
  RLC-SAP: AM
  Logical channel: DCCH
  Direction: E-UTRAN to UE

**DLInformationTransfer-NB message**

```asn1
DLInformationTransfer-NB ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier, 
  criticalExtensions     CHOICE {
    c1         CHOICE {
      dlInformationTransfer-r13  DLInformationTransfer-NB-r13-IEs, 
      spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  },
  lateNonCriticalExtension    OCTET STRING     OPTIONAL,
  nonCriticalExtension     SEQUENCE {}      OPTIONAL
}
```

– **MasterInformationBlock-NB**

The *MasterInformationBlock-NB* includes the system information transmitted on BCH.

  Signalling radio bearer: N/A
  RLC-SAP: TM
  Logical channel: BCCH
  Direction: E-UTRAN to UE

**MasterInformationBlock-NB**

```asn1
MasterInformationBlock-NB ::= SEQUENCE {
  systemFrameNumber-MSB-r13  BIT STRING (SIZE (4)),
  hyperSFN-LSB-r13    BIT STRING (SIZE (2)),
  schedulingInfoSIB1-r13  INTEGER (0..15),
  systemInfoValueTag-r13  INTEGER (0..31),
  ab-Enabled-r13     BOOLEAN,
  operationModeInfo-r13  CHOICE {
    DedicatedInfoNAS-r13  OCTET STRING,
    ...}
}
```
MasterInformationBlock-NB field descriptions

-- ab-Enabled
Value TRUE indicates that access barring is enabled and that the UE shall acquire SystemInformationBlockType14-NB before initiating RRC connection establishment or resume.

eutra-CRS-SequenceInfo
Information of the carrier containing NPSS/NSSS/NPBCH. Each value is associated with an E-UTRA PRB index as an offset from the middle of the LTE system sorted out by channel raster offset. See TS 36.211[21] and TS 36.213 [23].

eutra-NumCRS-Ports
Number of E-UTRA CRS antenna ports, either the same number of ports as NRS or 4 antenna ports. See TS 36.211 [21], TS 36.212 [22], and TS 36.213 [23].

hyperSFN-LSB
Indicates the 2 least significant bits of hyper SFN. The remaining bits are present in SystemInformationBlockType1-NB.

operationModeInfo
Deployment scenario (in-band/guard-band/standalone) and related information. See TS 36.211 [21] and TS 36.213 [23].

inband-SamePCI-r13
indicates an in-band deployment and that the NB-IoT and LTE cell share the same physical cell id and have the same number of NRS and CRS ports.
inband-DifferentPCI-r13
indicates an in-band deployment and that the NB-IoT and LTE cell have different physical cell id.
guardband
indicates a guard-band deployment.
standalone indicates a standalone deployment.

rasterOffset
NB-IoT offset from LTE channel raster. Unit in kHz in set {-7.5, -2.5, 2.5, 7.5} See TS 36.211[21] and TS 36.213 [23].

schedulingInfoSIB1
This field contains an index to a table specified in TS 36.213 [23, Table 16.4.1.3-3] that defines SystemInformationBlockType1-NB scheduling information.

systemFrameNumber-MSB
Defines the 4 most significant bits of the SFN. As indicated in TS 36.211 [21], the 6 least significant bits of the SFN are acquired implicitly by decoding the NPBCH.

systemInfoValueTag
Common for all SIBs other than MIB-NB, SIB14-NB and SIB16-NB.

-- Paging-NB

The Paging-NB message is used for the notification of one or more UEs.
Signalling radio bearer: N/A
RLC-SAP: TM
Logical channel: PCCH
Direction: E-UTRAN to UE

**Paging-NB message**

```
Paging-NB ::=      SEQUENCE {
  pagingRecordList-r13    PagingRecordList-NB-r13  OPTIONAL, -- Need ON
  systemInfoModification-r13   ENUMERATED {true}    OPTIONAL, -- Need ON
  systemInfoModification-eDRX-r13  ENUMERATED {true}    OPTIONAL, -- Need ON
  nonCriticalExtension    SEQUENCE {}      OPTIONAL
}
PagingRecordList-NB-r13 ::=   SEQUENCE (SIZE (1..maxPageRec)) OF PagingRecord-NB-r13
PagingRecord-NB-r13 ::=    SEQUENCE {
  ue-Identity-r13      PagingUE-Identity,
  ...
}
```

**Paging-NB field descriptions**

- **systemInfoModification**
  - If present: indication of a BCCH modification other than for SystemInformationBlockType14-NB (SIB14-NB) and SystemInformationBlockType16-NB (SIB16-NB). This indication does not apply to UEs using eDRX cycle longer than the BCCH modification period.

- **systemInfoModification-eDRX**
  - If present: indication of a BCCH modification other than for SystemInformationBlockType14-NB (SIB14-NB) and SystemInformationBlockType16-NB (SIB16-NB). This indication applies only to UEs using eDRX cycle longer than the BCCH modification period.

- **ue-Identity**
  - Provides the NAS identity of the UE that is being paged.

---

**RRCConnectionReconfiguration-NB**

The **RRCConnectionReconfiguration-NB** message is the command to modify an RRC connection. It may convey information for resource configuration (including RBs, MAC main configuration and physical channel configuration) including any associated dedicated NAS information.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: E-UTRAN to UE

**RRCConnectionReconfiguration-NB message**

```
RRCConnectionReconfiguration-NB ::= SEQUENCE {
  rrc-TransactionIdentifier    RRC-TransactionIdentifier,  
  criticalExtensions      CHOICE {  
    c1          CHOICE{  
      rrcConnectionReconfiguration-r13  RRCConnectionReconfiguration-NB-r13-IEs,  
    spare1 NULL  
    },  
    criticalExtensionsFuture   SEQUENCE {}  
  }  
}
RRCConnectionReconfiguration-NB-r13-IEs ::= SEQUENCE {
```
dedicatedInfoNASList-r13  SEQUENCE (SIZE(1..maxDRB-NB-r13)) OF DedicatedInfoNAS OPTIONAL, -- Need ON
radioResourceConfigDedicated-r13  RadioResourceConfigDedicated-NB-r13 OPTIONAL, -- Need ON
fullConfig-r13  ENUMERATED {true} OPTIONAL, -- Cond
Reestab
lateNonCriticalExtension  OCTET STRING OPTIONAL,
nonCriticalExtension  SEQUENCE {} OPTIONAL

-- ASN1STOP

**RRCConnectionReconfiguration-NB field descriptions**

**dedicatedInfoNASList**
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.

**fullConfig**
Indicates the full configuration option is applicable for the RRC Connection Reconfiguration message.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reestab</strong></td>
<td>This field is optionally present, need ON upon the first reconfiguration after RRC connection re-establishment; otherwise the field is not present.</td>
</tr>
</tbody>
</table>

---

**RRCConnectionReconfigurationComplete-NB**

The **RRCConnectionReconfigurationComplete-NB** message is used to confirm the successful completion of an RRC connection reconfiguration.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

**RRCConnectionReconfigurationComplete-NB message**

```plaintext
RRCConnectionReconfigurationComplete-NB ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,  
  criticalExtensions      CHOICE {
    rrcConnectionReconfigurationComplete-r13   RRCConnectionReconfigurationComplete-NB-r13-IEs, 
    criticalExtensionsFuture     SEQUENCE {} 
  }
}

RRCConnectionReconfigurationComplete-NB-r13-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING OPTIONAL,  
  nonCriticalExtension    SEQUENCE {} OPTIONAL
}
```

-- ASN1STOP

---

**RRCConnectionReestablishment-NB**

The **RRCConnectionReestablishment-NB** message is used to re-establish SRB1.

---
Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: E-UTRAN to UE

**RRCConnectionReestablishment-NB message**

```asn1
RRCConnectionReestablishment-NB ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1                 CHOICE{
      rrcConnectionReestablishment-r13 RRCConnectionReestablishment-NB-r13-IEs,
    spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {} }
}
RRCConnectionReestablishment-NB-r13-IEs ::= SEQUENCE {
  radioResourceConfigDedicated-r13 RadioResourceConfigDedicated-NB-r13,
  nextHopChainingCount-r13     NextHopChainingCount,
  lateNonCriticalExtension     OCTET STRING      OPTIONAL,
  nonCriticalExtension      SEQUENCE {}       OPTIONAL
}
```

**RRCConnectionReestablishmentComplete-NB message**

The **RRCConnectionReestablishmentComplete-NB** message is used to confirm the successful completion of an RRC connection reestablishment.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: UE to E-UTRAN

```asn1
RRCConnectionReestablishmentComplete-NB ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions      CHOICE {
    rrcConnectionReestablishmentComplete-r13 RRCConnectionReestablishmentComplete-NB-r13-IEs,
    criticalExtensionsFuture     SEQUENCE {} }
}
RRCConnectionReestablishmentComplete-NB-r13-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING     OPTIONAL,
  nonCriticalExtension    SEQUENCE {}      OPTIONAL
}
```

**RRCConnectionReestablishmentRequest-NB message**

The **RRCConnectionReestablishmentRequest-NB** message is used to request the reestablishment of an RRC connection.
Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: UE to E-UTRAN

**RRConnectionReestablishmentRequest-NB message**

```asn1
RRConnectionReestablishmentRequest-NB ::= SEQUENCE {
    criticalExtensions     CHOICE {
        rrcConnectionReestablishmentRequest-r13
            SEQUENCE {
                reestablishmentCause-r13 ReestablishmentCause-NB-r13,
                ue-Identity-r13      ReestabUE-Identity,
                spare        BIT STRING (SIZE (25))
            } OPTIONAL,
        criticalExtensionsFuture   SEQUENCE {} OPTIONAL
    }
}

ReestablishmentCause-NB-r13 ::= ENUMERATED {
    reconfigurationFailure, otherFailure,
    spare2, spare1
}
```

**RRConnectionReestablishmentRequest-NB field descriptions**

- **reestablishmentCause**
  Indicates the failure cause that triggered the re-establishment procedure.
  eNB is not expected to reject a RRConnectionReestablishmentRequest 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.

-- **RRConnectionReject-NB**

The **RRConnectionReject-NB** message is used to reject the RRC connection establishment or RRC connection resume.

Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: E-UTRAN to UE

**RRConnectionReject-NB message**

```asn1
RRConnectionReject-NB ::= SEQUENCE {
    criticalExtensions     CHOICE {
        c1     CHOICE {
            rrcConnectionReject-r13    RRCConnectionReject-NB-r13-IEs,
            spare1 NULL
        },
        criticalExtensionsFuture   SEQUENCE {} OPTIONAL
    }
}

RRCConnectionReject-NB-r13-IEs ::= SEQUENCE {
    extendedWaitTime-r13     INTEGER (1..1800),
    rrc-SuspendIndication-r13    ENUMERATED {true}   OPTIONAL, -- Need ON
    lateNonCriticalExtension OCTET STRING   OPTIONAL,
}
```
RRCConnectionReject-NB field descriptions

- **extendedWaitTime**: Value in seconds.
- **rrc-SuspendIndication**: If present, this field indicates that the UE should remain suspended and not release its stored context.

---

**RRCConnectionRelease-NB**

The RRCConnectionRelease-NB message is used to command the release of an RRC connection.

- **Signalling radio bearer**: SRB1 or SRB1bis
- **RLC-SAP**: AM
- **Logical channel**: DCCH
- **Direction**: E-UTRAN to UE

**RRCConnectionRelease-NB message**

```
RRCConnectionRelease-NB ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1         CHOICE {
      rrcConnectionRelease-r13   RRCConnectionRelease-NB-r13-IEs,
      spare1 NULL
    } ,
    criticalExtensionsFuture   SEQUENCE {}    
  }
}

RRCConnectionRelease-NB-r13-IEs ::= SEQUENCE {
  releaseCause-r13     ReleaseCause-NB-r13,
  resumeIdentity-r13     ResumeIdentity-r13    OPTIONAL,  -- Need OR
  extendedWaitTime-r13    INTEGER (1..1800)    OPTIONAL,  -- Need ON
  redirectedCarrierInfo-r13   RedirectedCarrierInfo-NB-r13 OPTIONAL,
  lateNonCriticalExtension   OCTET STRING     OPTIONAL,
  nonCriticalExtension    SEQUENCE {}      OPTIONAL
}

ReleaseCause-NB-r13 ::= ENUMERATED {loadBalancingTAURequired, other,
  rrc-Suspend, spare1}

RedirectedCarrierInfo-NB-r13 ::= CarrierFreq-NB-r13
```

**RRCConnectionRelease-NB field descriptions**

- **extendedWaitTime**: Value in seconds.
- **redirectedCarrierInfo**: The redirectedCarrierInfo indicates a carrier frequency (downlink for FDD) and is used to redirect the UE to a NB-IoT carrier frequency, by means of the cell selection upon leaving RRC_CONNECTED as specified in TS 36.304 [4].
- **releaseCause**: The releaseCause is used to indicate the reason for releasing the RRC Connection. E-UTRAN should not set the releaseCause to loadBalancingTAURequired if the extendedWaitTime is present.

---

**RRCConnectionRequest-NB**

The RRCConnectionRequest-NB message is used to request the establishment of an RRC connection.
Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: UE to E-UTRAN

**RRCConnectionRequest-NB message**

```asn1
RRCConnectionRequest-NB ::= SEQUENCE {
    criticalExtensions CHOICE {
        rrcConnectionRequest-r13  RRCConnectionRequest-NB-r13-IEs,
        criticalExtensionsFuture  SEQUENCE {}
    }
}
RRCConnectionRequest-NB-r13-IEs ::= SEQUENCE {
    ue-Identity-r13  InitialUE-Identity,
    establishmentCause-r13  EstablishmentCause-NB-r13,
    multiToneSupport-r13  ENUMERATED {true} OPTIONAL,
    multiCarrierSupport-r13  ENUMERATED {true} OPTIONAL,
    spare  BIT STRING (SIZE (22))
}
```

---

**RRCConnectionRequest-NB field descriptions**

**establishmentCause**
Provides the establishment cause for the RRC connection request as provided by the upper layers. eNB is not expected to reject a **RRCConnectionRequest** due to unknown cause value being used by the UE.

**multiCarrierSupport**
If present, this field indicates that the UE supports multi-carrier operation.

**multiToneSupport**
If present, this field indicates that the UE supports UL multi-tone transmissions on NPUSCH.

**ue-Identity**
UE identity included to facilitate contention resolution by lower layers.

---

**RRCConnectionResume-NB**

The **RRCConnectionResume-NB** message is used to resume the suspended RRC connection.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: E-UTRAN to UE

**RRCConnectionResume-NB message**

```asn1
RRCConnectionResume-NB ::= SEQUENCE {
    rrc-TransactionIdentifier  RRC-TransactionIdentifier,
    criticalExtensions CHOICE {
        c1  CHOICE {
            rrcConnectionResume-r13  RRCConnectionResume-NB-r13-IEs,
            spare  NULL
        },
        criticalExtensionsFuture  SEQUENCE {}
    }
}
RRCConnectionResume-NB-r13-IEs ::= SEQUENCE {
    radioResourceConfigDedicated-r13  RadioResourceConfigDedicated-NB-r13 OPTIONAL,  --
    nextHopChainingCount-r13  NextHopChainingCount,
}
```
### drb-ContinueROHC-r13

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>lateNonCriticalExtension</td>
<td>OCTET STRING</td>
<td>OPTIONAL, -- Need OP</td>
</tr>
<tr>
<td>nonCriticalExtension</td>
<td>SEQUENCE {}</td>
<td>OPTIONAL</td>
</tr>
</tbody>
</table>

```plaintext
--ASN1STOP
```

### RRCConnectionResumeComplete-NB

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>selectedPLMN-Identity-r13</td>
<td>INTEGER (1..maxPLMN-r11)</td>
<td>OPTIONAL,</td>
</tr>
<tr>
<td>dedicatedInfoNAS-r13</td>
<td>DedicatedInfoNAS</td>
<td>OPTIONAL,</td>
</tr>
<tr>
<td>lateNonCriticalExtension</td>
<td>OCTET STRING</td>
<td>OPTIONAL,</td>
</tr>
<tr>
<td>nonCriticalExtension</td>
<td>SEQUENCE {}</td>
<td>OPTIONAL</td>
</tr>
</tbody>
</table>

```plaintext
--ASN1STOP
```

#### RRCConnectionResumeComplete-NB field descriptions

**selectedPLMN-Identity**

Index of the PLMN selected by the UE from the plmn-IdentityList included in SystemInformationBlockType1-NB. 1 if the 1st PLMN is selected from the plmn-IdentityList included in SIB1-NB, 2 if the 2nd PLMN is selected from the plmn-IdentityList included in SIB1-NB and so on.

---

### RRCConnectionResumeRequest-NB

The **RRCConnectionResumeRequest-NB** message is used to request the resumption of a suspended RRC connection.
Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: UE to E-UTRAN

**RRCConnectionResumeRequest-NB message**

```asn1
RRCConnectionResumeRequest-NB ::= SEQUENCE {
    criticalExtensions CHOICE {
        rrcConnectionResumeRequest-r13   RRCConnectionResumeRequest-NB-r13-IEs,
        criticalExtensionsFuture    SEQUENCE {}
    }
}
RRCConnectionResumeRequest-NB-r13-IEs ::= SEQUENCE {
    resumeID-r13        ResumeIdentity-r13,
    shortResumeMAC-I-r13       ShortMAC-I,
    resumeCause-r13        EstablishmentCause-NB-r13,
    spare          BIT STRING (SIZE (9))
}
```

**RRCConnectionResumeRequest-NB field descriptions**

- **resumeCause**: Provides the resume cause for the RRC connection resume request as provided by the upper layers. eNB is not expected to reject a RRCConnectionResumeRequest due to unknown cause value being used by the UE.
- **resumeID**: UE identity to facilitate UE context retrieval at eNB.
- **shortResumeMAC-I**: Authentication token to facilitate UE authentication at eNB.

---

**RRCConnectionSetup-NB**

The RRCConnectionSetup-NB message is used to establish SRB1 and SRB1bis.

Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: E-UTRAN to UE

**RRCConnectionSetup-NB message**

```asn1
RRCConnectionSetup-NB ::= SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier,
    criticalExtensions  CHOICE {
        c1         CHOICE {
            rrcConnectionSetup-r13    RRCConnectionSetup-NB-r13-IEs,
            spare1 NULL
        },
        criticalExtensionsFuture    SEQUENCE {}
    }
    RadioResourceConfigDedicated-r13,
    lateNonCriticalExtension    OCTET STRING OPTIONAL,
    nonCriticalExtension       SEQUENCE {} OPTIONAL
}
```

---
The **RRConnectionSetupComplete-NB** message is used to confirm the successful completion of an RRC connection establishment.

- **Signalling radio bearer:** SRB1bis
- **RLC-SAP:** AM
- **Logical channel:** DCCH
- **Direction:** UE to E-UTRAN

**RRConnectionSetupComplete-NB message**

```asn1
-- ASN1START
RRConnectionSetupComplete-NB ::= SEQUENCE {
  rrc-TransactionIdentifier    RRC-TransactionIdentifier,
  criticalExtensions      CHOICE{
    rrcConnectionSetupComplete-r13  RRCConnectionSetupComplete-NB-r13-IEs,
    criticalExtensionsFuture   SEQUENCE {} }
}
RRConnectionSetupComplete-NB-r13-IEs ::= SEQUENCE {
  selectedPLMN-Identity-r13    INTEGER (1..maxPLMN-r11),
  s-TMSI-r13        S-TMSI       OPTIONAL,
  registeredMME-r13      RegisteredMME     OPTIONAL,
  dedicatedInfoNAS-r13     DedicatedInfoNAS,
  attachWithoutPDN-Connectivity-r13  ENUMERATED {true}    OPTIONAL,
  up-CIoT-EPS-Optimisation-r13    ENUMERATED {true}    OPTIONAL,
  lateNonCriticalExtension    OCTET STRING     OPTIONAL,
  nonCriticalExtension     SEQUENCE {}      OPTIONAL
}
-- ASN1STOP
```

**RRConnectionSetupComplete-NB field descriptions**

- **attachWithoutPDN-Connectivity**
  This field is used to indicate that the UE performs an Attach without PDN connectivity procedure, as indicated by the upper layers, TS 24.301 [35].

- **registeredMME**
  This field is used to transfer the GUMMEI of the MME where the UE is registered, as provided by upper layers.

- **selectedPLMN-Identity**
  Index of the PLMN selected by the UE from the plmn-IdentityList included in SystemInformationBlockType1-NB. 1 if the 1st PLMN is selected from the plmn-IdentityList included in SIB1, 2 if the 2nd PLMN is selected from the plmn-IdentityList included in SIB1 and so on.

- **up-CIoT-EPS-Optimisation**
  This field is included when the UE supports S1-U data transfer or the User plane CIoT EPS Optimisation, as indicated by the upper layers, see TS 24.301 [35].

---

**SystemInformation-NB**

The **SystemInformation-NB** message is used to convey one or more System Information Blocks. All the SIBs included are transmitted with the same periodicity.
SystemInformation-NB message

-- ASN1START

SystemInformation-NB ::= SEQUENCE {
  criticalExtensions CHOICE {
    systemInformation-r13 SystemInformation-NB-r13-IEs,
    criticalExtensionsFuture SEQUENCE {}  
  }
}

SystemInformation-NB-r13-IEs ::= SEQUENCE {
  sib-TypeAndInfo-r13 SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {
    sib2-r13 SystemInformationBlockType2-NB-r13,
    sib3-r13 SystemInformationBlockType3-NB-r13,
    sib4-r13 SystemInformationBlockType4-NB-r13,
    sib5-r13 SystemInformationBlockType5-NB-r13,
    sib14-r13 SystemInformationBlockType14-NB-r13,
    sib16-r13 SystemInformationBlockType16-NB-r13,
    ...
  },
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension SEQUENCE () OPTIONAL
}

-- ASN1STOP

SystemInformationBlockType1-NB

The SystemInformationBlockType1-NB message contains information relevant when evaluating if a UE is allowed to access a cell and defines the scheduling of other system information.

-- ASN1START

SystemInformationBlockType1-NB ::= SEQUENCE {
  hyperSFN-MSB-r13 BIT STRING (SIZE (8)),
  cellAccessRelatedInfo-r13 SEQUENCE {
    plmn-IdentityList-r13 PLMN-IdentityList-NB-r13,
    trackingAreaCode-r13 TrackingAreaCode,
    cellIdentity-r13 CellIdentity,
    cellBarred-r13 ENUMERATED {barred, notBarred},
    intraFreqReselection-r13 ENUMERATED {allowed, notAllowed}
  },
  cellSelectionInfo-r13 SEQUENCE {
    q-RxLevMin-r13 Q-RxLevMin,
    q-QualMin-r13 Q-QualMin-r9
  },
  p-Max-r13 P-Max OPTIONAL, -- Need OP
  freqBandIndicator-r13 FreqBandIndicator-NB-r13,
  freqBandInfo-r13 NS-PmaxList-NB-r13 OPTIONAL, -- Need OR
  multiBandInfoList-r13 MultiBandInfoList-NB-r13 OPTIONAL, -- Need OR
  downlinkBitmap-r13 DL-Bitmap-NB-r13 OPTIONAL, -- Need OP,
  eutraControlRegionSize-r13 ENUMERATED {n1, n2, n3} OPTIONAL, -- Cond inband
  nrs-CRS-PowerOffset-r13 ENUMERATED {dB-6, dB-4.77, dB-3, dB-1.77, dB-1, dB+1.23, dB-0, dB+1, dB-2, dB-3,
  ...
}

-- ASN1STOP
dB4, dB4dot23, dB5, dB6, dB7, dB8, dB9} OPTIONAL, -- Cond inband-SamePCI

schedulingInfoList-r13 SchedulingInfoList-NB-r13 OPTIONAL, -- Cond inband-SamePCI

si-WindowLength-r13 ENUMERATED {ms160, ms320, ms480, ms640, ms960, ms1280, ms1600, spare1}, -- Need OR

si-RadioFrameOffset-r13 INTEGER (1..15) OPTIONAL, -- Need OP

lateNonCriticalExtension OCTET STRING OPTIONAL, -- Need OR

SystemInformationBlockType1-NB-v1350-IEs SystemInformationBlockType1-NB-v1350-IEs OPTIONAL

SystemInformationBlockType1-NB-v1350-IEs ::= SEQUENCE {}

cellSelectionInfo-v1350 CellSelectionInfo-NB-v1350 OPTIONAL, -- Cond Qrxlevmin

nonCriticalExtension SEQUENCE {} OPTIONAL

SchedulingInfoList-NB-r13 ::= SEQUENCE (SIZE (1..maxSI-Message-NB-r13)) OF SchedulingInfo-NB-r13

SchedulingInfo-NB-r13 ::= SEQUENCE {
  si-Periodicity-r13 ENUMERATED {rf64, rf128, rf256, rf512, rf1024, rf2048, rf4096, spare},
  si-RepetitionPattern-r13 ENUMERATED {every2ndRF, every4thRF, every8thRF, every16thRF},
  sib-MappingInfo-r13 SIB-MappingInfo-NB-r13,
  si-TB-r13 ENUMERATED {b56, b120, b208, b256, b328, b440, b552, b680}
}

SystemInfoValueTagList-NB-r13 ::= SEQUENCE (SIZE (1..maxSI-Message-NB-r13)) OF SystemInfoValueTagSI-r13

SystemInfoValueTagSI-r13 ::= SEQUENCE {
  systemInfoValueTag-r13 SystemInfoValueTag
}

SIB-MappingInfo-NB-r13 ::= SEQUENCE (SIZE (0..maxSIB-1)) OF SIB-Type-NB-r13

SIB-Type-NB-r13 ::= ENUMERATED {
  sibType3-NB-r13, sibType4-NB-r13, sibType5-NB-r13, sibType14-NB-r13, sibType16-NB-r13, spare3, spare2, spare1}

CellSelectionInfo-NB-v1350 ::= SEQUENCE {
  delta-RxLevMin-v1350 INTEGER (-8..-1)
}

-- ASN1STOP
**SystemInformationBlockType1-NB field descriptions**

**attachWithoutPDN-Connectivity**
If present, the field indicates that attach without PDN connectivity as specified in TS 24.301 [35] is supported for this PLMN.

**cellBarred**
Barred means the cell is barred, as defined in TS 36.304 [4].

**cellIdentity**
Indicates the cell identity.

**cellReservedForOperatorUse**
As defined in TS 36.304 [4].

**cellSelectionMode**
Cell selection information as specified in TS 36.304 [4].

**downlinkBitmap**
NB-IoT downlink subframe configuration for downlink transmission. If the bitmap is not present, the UE shall assume that all subframes are valid (except for subframes carrying NPSS/NSSS/NPBCH/SIB1-NB) as specified in TS 36.213 [23, 16.4].

**eutraControlRegionSize**
Indicates the control region size of the E-UTRA cell for the in-band operation mode, see TS 36.213 [23]. Unit is in number of OFDM symbols.

**freqBandInfo**
A list of additionalPmax and additionalSpectrumEmission values as defined in TS 36.101 [42, 6.2.4F] for the frequency band in freqBandIndicator.

**hyperSFN-MSB**
Indicates the 8 most significant bits of hyper-SFN. Together with hyperSFN-LSB in MIB-NB, the complete hyper-SFN is built up, hyper-SFN is incremented by one when the SFN wraps around.

**intraFreqReselection**
Used to control cell reselection to intra-frequency cells when the highest ranked cell is barred, or treated as barred by the UE, as specified in TS 36.304 [4].

**multiBandInfoList**
A list of additional frequency band indicators, additionalPmax and additionalSpectrumEmission values, as defined in TS 36.101 [42, table 5.5-1]. If the UE supports the frequency band in the freqBandIndicator IE it shall apply that frequency band otherwise. The UE shall apply the first listed band which it supports in the multiBandInfoList IE.

**nrs-CRS-PowerOffset**
NRS power offset between NRS and E-UTRA CRS, see TS 36.213 [23, 16.2.2]. Unit in dB. Default value of 0.

**plmn-IdentityList**
List of PLMN identities. The first listed PLMN-Identity is the primary PLMN.

**p-Max**
Value applicable for the cell. If absent the UE applies the maximum power according to the UE capability.

**q-QualMin**
Parameter "Qqualmin" in TS 36.304 [4].

**q-RxLevMin, delta-RxLevMin**
Parameter Q\textsubscript{levmin} in TS 36.304 [4]. If delta-RxLevMin is not included, actual value Q\textsubscript{levmin} = q-RxLevMin * 2 [dBm]. If delta-RxLevMin is included, actual value Q\textsubscript{levmin} = (q-RxLevMin + delta-RxLevMin) * 2 [dBm].

**schedulingInfoList**
Indicates additional scheduling information of SI messages.

**si-Periodicity**
Periodicity of the SI-message in radio frames, such that rf256 denotes 256 radio frames, rf512 denotes 512 radio frames, and so on.

**si-RadioFrameOffset**
Offset in number of radio frames to calculate the start of the SI window.
If the field is absent, no offset is applied.

**si-RepetitionPattern**
Indicates the starting radio frames within the SI window used for SI message transmission. Value every2ndRF corresponds to every 2 radio frames, value every4thRF corresponds to every 4 radio frames and so on. The first transmission of the SI message is transmitted from the first radio frame of the SI window.

**si-TB**
This field indicates the transport block size in number of bits and the corresponding number of consecutive NB-IoT downlink subframes that are used to broadcast the SI message. Value b56 corresponds to 56 bits, b120 corresponds to 120 bits and so on. TBS of 56 bits and 120 bits are transmitted over 2 sub-frames, other TBS are transmitted over 8 sub-frames, see TS 36.213 [23, Table 16.4.15.1-1].

**si-WindowLength**
Common SI scheduling window for all SIs. Unit in milliseconds, where ms160 denotes 160 milliseconds, ms320 denotes 320 milliseconds and so on.

**sib-MappingInfo**
List of the SIBs mapped to this SystemInformation message. There is no mapping information of SIB2-NB; it is always present in the first SystemInformation message listed in the schedulingInfoList list.
### SystemInformationBlockType1-NB field descriptions

<table>
<thead>
<tr>
<th>systemInfoValueTagList</th>
<th>Indicates SI message specific value tags. It includes the same number of entries, and listed in the same order, as in SchedulingInfoList.</th>
</tr>
</thead>
<tbody>
<tr>
<td>systemInfoValueTagSI</td>
<td>SI message specific value tag as specified in Clause 5.2.1.3. Common for all SIBs within the SI message other than SIB14-NB.</td>
</tr>
<tr>
<td>trackingAreaCode</td>
<td>A trackingAreaCode that is common for all the PLMNs listed.</td>
</tr>
</tbody>
</table>

#### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>inband</td>
<td>The field is mandatory present if IE operationModelInfo in MIB-NB is set to inband-SamePCI or inband-DifferentPCI. Otherwise the field is not present.</td>
</tr>
<tr>
<td>inband-SamePCI</td>
<td>The field is mandatory present, if IE operationModelInfo in MIB-NB is set to inband-SamePCI. Otherwise the field is not present.</td>
</tr>
<tr>
<td>Qrxlevmin</td>
<td>This field is optionally present, Need OR, if q-RxLevMin is set to the minimum value. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

---

### UECapabilityEnquiry-NB

The *UECapabilityEnquiry-NB* message is used to request the transfer of UE radio access capabilities for NB-IoT.

- Signalling radio bearer: SRB1 or SRB1bis
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: E-UTRAN to UE

#### UECapabilityEnquiry-NB message

---

### UECapabilityInformation-NB

The *UECapabilityInformation-NB* message is used to transfer of UE radio access capabilities requested by the E-UTRAN.
Signalling radio bearer: SRB1 or SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

**UECapabilityInformation-NB message**

---

```asn1
UECapabilityInformation-NB ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE{
    ueCapabilityInformation-r13  UECapabilityInformation-NB-r13-IEs,
    criticalExtensionsFuture  SEQUENCE {}  
  }

UECapabilityInformation-NB-r13-IEs ::= SEQUENCE {
  ue-Capability-r13      UE-Capability-NB-r13,
  ue-RadioPagingInfo-r13     UE-RadioPagingInfo-NB-r13,
  lateNonCriticalExtension    OCTET STRING      OPTIONAL,
  nonCriticalExtension     SEQUENCE {}       OPTIONAL
}
```

---

**UECapabilityInformation-NB field descriptions**

- **ue-RadioPagingInfo**
  This field contains UE capability information used for paging.

---

**ULInformationTransfer-NB**

The **ULInformationTransfer-NB** message is used for the uplink transfer of NAS information.

Signalling radio bearer: SRB1 or SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

**ULInformationTransfer-NB message**

---

```asn1
ULInformationTransfer-NB ::= SEQUENCE {
  criticalExtensions     CHOICE {
    ulInformationTransfer-r13  ULInformationTransfer-NB-r13-IEs,
    criticalExtensionsFuture  SEQUENCE {}  
  }

ULInformationTransfer-NB-r13-IEs ::= SEQUENCE {
  dedicatedInfoNAS-r13     DedicatedInfoNAS,
  lateNonCriticalExtension    OCTET STRING      OPTIONAL,
  nonCriticalExtension     SEQUENCE {}       OPTIONAL
}
```

---
6.7.3 NB-IoT information elements

6.7.3.1 NB-IoT System information blocks

- SystemInformationBlockType2-NB

The IE SystemInformationBlockType2-NB contains radio resource configuration information that is common for all UEs.

NOTE: UE timers and constants related to functionality for which parameters are provided in another SIB are included in the corresponding SIB.

SystemInformationBlockType2-NB information element

```
SystemInformationBlockType2-NB-r13 ::= SEQUENCE {
  radioResourceConfigCommon-r13   RadioResourceConfigCommonSIB-NB-r13,
  ue-TimersAndConstants-r13    UE-TimersAndConstants-NB-r13,
  freqInfo-r13       SEQUENCE {
    ul-CarrierFreq-r13      CarrierFreq-NB-r13    OPTIONAL,-- Need OP
          additionalSpectrumEmission-r13   AdditionalSpectrumEmission
    },
  timeAlignmentTimerCommon-r13   TimeAlignmentTimer,
  multiBandInfoList-r13 SEQUENCE (SIZE (1..maxMultiBands)) OF AdditionalSpectrumEmission
          OPTIONAL,-- Need OR
  lateNonCriticalExtension     OCTET STRING     OPTIONAL,
  ...
}
```

SystemInformationBlockType2-NB field descriptions

additionalSpectrumEmission
The UE requirements related to IE AdditionalSpectrumEmission are defined in TS 36.101 [42, 6.2.4F].

multiBandInfoList
A list of additionalSpectrumEmission i.e. one for each additional frequency band included in multiBandInfoList in SystemInformationBlockType1-NB, listed in the same order.

ul-CarrierFreq
Uplink carrier frequency as defined in TS 36.101 [42, 5.7.3F]. If operationModeInfo in the MIB-NB is set to standalone and the field is absent, the value of the carrier frequency is determined by the TX-RX frequency separation defined in TS 36.101 [42, table 5.7.4-1] and the value of the carrier frequency offset is 0. If operationModeInfo in the MIB-NB is not set to standalone, the field is mandatory present.

- SystemInformationBlockType3-NB

The IE SystemInformationBlockType3-NB contains cell re-selection information common for intra-frequency, and inter-frequency cell re-selection as well as intra-frequency cell re-selection information other than neighbouring cell related.

SystemInformationBlockType3-NB information element

```
SystemInformationBlockType3-NB-r13 ::= SEQUENCE {
  cellReselectionInfoCommon-r13   SEQUENCE {
    q-Hyst-r13        ENUMERATED {
      dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
      dB12, dB14, dB16, dB18, dB20, dB22, dB24
    }
  },
  cellReselectionServingFreqInfo-r13  SEQUENCE {
    s-NonIntraSearch-r13     ReselectionThreshold
  },
  intraFreqCellReselectionInfo-r13  SEQUENCE {
    q-RxLevMin-r13       Q-RxLevMin,
    q-QualMin-r13       Q-QualMin-r9   OPTIONAL, -- Need OP
    p-Max-r13        P-Max     OPTIONAL, -- Need OP
    s-IntraSearch-r13      ReselectionThreshold,
    t-Reselection-r13      T-Reselection-NB-r13
  },
  ...
}
```
freqBandInfo-r13                    NS-PmaxList-NB-r13            OPTIONAL, -- Need OR
multiBandInfoList-r13               SEQUENCE (SIZE (1..maxMultiBands)) OF
                                      NS-PmaxList-NB-r13          OPTIONAL, -- Need OR
lateNonCriticalExtension            OCTET STRING                    OPTIONAL,
                                      ...
                                      [
                                      ([ intraFreqCellReselectionInfo-v1350
                                        IntraFreqCellReselectionInfo-NB-v1350 OPTIONAL --
                                        Cond Qrxlevmin
                                        ]),
                                      ([ intraFreqCellReselectionInfo-v1360
                                        IntraFreqCellReselectionInfo-NB-v1360 OPTIONAL --
                                        Need OR
                                        ])
                                      ]
                                      IntraFreqCellReselectionInfo-NB-v1350 ::= SEQUENCE {
                                        delta-RxLevMin-v1350      INTEGER (-8..-1)
                                      }
                                      IntraFreqCellReselectionInfo-NB-v1360 ::= SEQUENCE {
                                        s-IntraSearchP-v1360      ReselectionThreshold-NB-v1360
                                      }
                                      -- ASN1STOP

```

SystemInformationBlockType3-NB field descriptions

**multiBandInfoList**

A list of additionalPmax and additionalSpectrumEmission values as defined in TS 36.101 [42, 6.2.4F] applicable for the intra-frequency neighbouring NB-IoT cells if the UE selects the frequency band from freqBandIndicator in SystemInformationBlockType1-NB.

**p-Max**

Value applicable for the intra-frequency neighbouring E-UTRA cells. If absent the UE applies the maximum power according to the UE capability.

**q-Hyst**

Parameter Qhyst in TS 36.304 [4], Value in dB. Value dB1 corresponds to 1 dB, dB2 corresponds to 2 dB and so on.

**q-QualMin**

Parameter "Qqualmin" in TS 36.304 [4], applicable for intra-frequency neighbour cells. If the field is not present, the UE applies the (default) value of negative infinity for Qqualmin.

**q-RxLevMin, delta-RxLevMin**

Parameter "Qrxlevmin" in TS 36.304 [4], applicable for intra-frequency neighbour cells. If delta-RxLevMin is not included, actual value $Q_{rxlevmin} = q-RxLevMin \times 2$ [dB]. If delta-RxLevMin is included, actual value $Q_{rxlevmin} = (q-RxLevMin + \text{delta-RxLevMin}) \times 2$ [dB].

**s-IntraSearchP**

Parameter "SIntraSearchP" in TS 36.304 [4].

In case s-IntraSearchP-v1360 is included, the UE shall ignore s-IntraSearchP (i.e. without suffix).

**s-NonIntraSearch**

Parameter "SnonIntraSearchP" in TS 36.304 [4].

**t-Reelection**

Parameter "TreselectionNB-IoT_Intra" in TS 36.304 [4].

---

**SystemInformationBlockType4-NB**

The IE SystemInformationBlockType4-NB contains neighbouring cell related information relevant only for intra-frequency cell re-selection. The IE includes cells with specific re-selection parameters.

**SystemInformationBlockType4-NB information element**

```

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qrxlevmin</td>
<td>This field is optionally present, Need OR, if q-RxLevMin is set to the minimum value. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

---

ETSI
### SystemInformationBlockType4-NB field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>intraFreqBlackCellList</code></td>
<td>List of blacklisted intra-frequency neighbouring cells.</td>
</tr>
<tr>
<td><code>intraFreqNeighCellList</code></td>
<td>List of intra-frequency neighbouring cells with specific cell re-selection parameters.</td>
</tr>
</tbody>
</table>

### SystemInformationBlockType5-NB

The IE `SystemInformationBlockType5-NB` contains information relevant only for inter-frequency cell re-selection i.e. information about other NB-IoT frequencies and inter-frequency neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency.

#### SystemInformationBlockType5-NB information element

```asn1
-- ASN1START
SystemInformationBlockType5-NB-r13 ::= SEQUENCE {
  interFreqCarrierFreqList-r13   InterFreqCarrierFreqList-NB-r13,
  t-Reselection-r13      T-Reselection-NB-r13,
  lateNonCriticalExtension    OCTET STRING     OPTIONAL,
  ...,
}

InterFreqCarrierFreqList-NB-r13 ::=  SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-NB-r13

InterFreqCarrierFreqInfo-NB-r13 ::= SEQUENCE {
  dl-CarrierFreq-r13     CarrierFreq-NB-r13,
  q-RxLevMin-r13      Q-RxLevMin,
  q-QualMin-r13      Q-QualMin-r9     OPTIONAL,  -- Need OP
  p-Max-r13       P-Max       OPTIONAL,  -- Need OP
  q-OffsetFreq-r13     Q-OffsetRange     DEFAULT dB0,
  interFreqNeighCellList-r13   InterFreqNeighCellList-NB-r13 OPTIONAL,  -- Need OR
  interFreqBlackCellList-r13   InterFreqBlackCellList-NB-r13 OPTIONAL,  -- Need OR
  multiBandInfoList-r13    MultiBandInfoList-NB-r13  OPTIONAL,  -- Need OR
  ...,
  [[ delta-RxLevMin-v1350     INTEGER (-8..-1)  OPTIONAL -- Cond Qrxlevmin
]]
}

InterFreqNeighCellList-NB-r13 ::=  SEQUENCE (SIZE (1..maxCellInter)) OF PhysCellId

InterFreqBlackCellList-NB-r13 ::=  SEQUENCE (SIZE (1..maxCellBlack)) OF PhysCellId

-- ASN1STOP
```
### SystemInformationBlockType5-NB field descriptions

**interFreqBlackCellList**
List of blacklisted inter-frequency neighbouring cells.

**interFreqCarrierFreqList**
List of neighbouring inter-frequencies. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the E-ARFCN used to indicate this.

**interFreqNeighCellList**
List of inter-frequency neighbouring cells. E-UTRAN may include `interFreqNeighCellList` only when including extensions introduced in later releases and if received by the UE it should be ignored.

**multiBandInfoList**
Indicates the list of frequency bands, with the associated `additionalPmax` and `additionalSpectrumEmission` values as defined in TS 36.101 [42, 6.2.4F], in addition to the band represented by `dl-CarrierFreq` for which cell reselection parameters are common.

**p-Max**
Value applicable for the neighbouring NB-IoT cells on this carrier frequency. If absent the UE applies the maximum power according to the UE capability.

**q-OffsetFreq**
Parameter "Qoffsetfrequency" in TS 36.304 [4].

**q-QualMin**
Parameter "Qqualmin" in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of negative infinity for `Qqualmin`.

**q-RxLevMin, delta-RxLevMin**
Parameter "QRxLevmin" in TS 36.304 [4]. If `delta-RxLevMin` is not included, actual value `Qrxlevmin = q-RxLevMin * 2 [dBm]`. If `delta-RxLevMin` is included, actual value `Qrxlevmin = (q-RxLevMin + delta-RxLevMin) * 2 [dBm]`.

**t-Reselection**
Parameter "TreselectionNB-IoT_Inter" in TS 36.304 [4].

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qrxlevmin</td>
<td>This field is optionally present. Need OR, if <code>q-RxLevMin</code> is set to the minimum value. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

---

### SystemInformationBlockType14-NB

The IE `SystemInformationBlockType14-NB` contains the AB parameters.

**SystemInformationBlockType14-NB information element**

```asn1
-- ASN1START

SystemInformationBlockType14-NB-r13 ::= SEQUENCE {
  ab-Param-r13  CHOICE {
    ab-Common-r13     AB-Config-NB-r13,  
    ab-PerPLMN-List-r13    SEQUENCE (SIZE (1..maxPLMN-r11)) OF AB-ConfigPLMN-NB-r13
  } OPTIONAL, -- Need OR
  lateNonCriticalExtension OCTET STRING OPTIONAL,  
  ... }

AB-ConfigPLMN-NB-r13 ::= SEQUENCE {
  ab-Config-r13     AB-Config-NB-r13 OPTIONAL -- Need OR
}

AB-Config-NB-r13 ::= SEQUENCE {
  ab-Category-r13     ENUMERATED (a, b, c),  
  ab-BarringBitmap-r13  BIT STRING (SIZE(10)),  
  ab-BarringForExceptionData-r13 ENUMERATED (true) OPTIONAL, -- Need OP  
  ab-BarringForSpecialAC-r13  BIT STRING (SIZE(5))
}

-- ASN1STOP
```
SystemInformationBlockType14-NB field descriptions

**ab-BarringBitmap**
Access class barring for AC 0-9. The first/ leftmost bit is for AC 0, the second bit is for AC 1, and so on.

**ab-BarringForExceptionData**
Indicates whether ExceptionData is subject to access barring.

**ab-BarringForSpecialAC**
Access class barring for AC 11-15. The first/ leftmost bit is for AC 11, the second bit is for AC 12, and so on.

**ab-Category**
Indicates the category of UEs for which AB applies. Value a corresponds to all UEs, value b corresponds to the UEs that are neither in their HPLMN nor in a PLMN that is equivalent to it, and value c corresponds to the UEs that are neither in the PLMN listed as most preferred PLMN of the country where the UEs are roaming in the operator-defined PLMN selector list on the USIM, nor in their HPLMN nor in a PLMN that is equivalent to their HPLMN, see TS 22.011 [10].

**ab-Common**
The AB parameters applicable for all PLMN(s).

**ab-PerPLMN-List**
The AB parameters per PLMN, listed in the same order as the PLMN(s) occur in plmn-IdentityList in SystemInformationBlockType1-NB.

---

**SystemInformationBlockType16-NB**
The IE `SystemInformationBlockType16-NB` 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.

```asn1
SystemInformationBlockType16-NB-r13 ::= SystemInformationBlockType16-r11
```

---

### 6.7.3.2 NB-IoT Radio resource control information elements

**CarrierConfigDedicated-NB**
The IE `CarrierConfigDedicated-NB` is used to specify a non-anchor carrier in NB-IoT.

**CarrierConfigDedicated-NB information elements**

```asn1
CarrierConfigDedicated-NB-r13 ::= SEQUENCE {
  d1-CarrierConfig-r13  DL-CarrierConfigDedicated-NB-r13,
  ul-CarrierConfig-r13  UL-CarrierConfigDedicated-NB-r13
}
```

```asn1
DL-CarrierConfigDedicated-NB-r13 ::= SEQUENCE {
  d1-CarrierFreq-r13    CarrierFreq-NB-r13,
  downlinkBitmapNonAnchor-r13    CHOICE {
    useNoBitmap-r13      NULL,
    useAnchorBitmap-r13    NULL,
    explicitBitmapConfiguration-r13    DL-Bitmap-NB-r13,
    spare         NULL
  }  OPTIONAL, -- Need ON
  d1-GapNonAnchor-r13    CHOICE {
    useNoGap-r13       NULL,
    useAnchorGapConfig-r13     NULL,
    explicitGapConfiguration-r13    DL-GapConfig-NB-r13,
    spare         NULL
  }  OPTIONAL, -- Need ON
  inbandCarrierInfo-r13  SEQUENCE {
    samePCI-Indicator-r13  CHOICE {
      samePCI-r13    SEQUENCE {
        indexToMidPRB-r13    INTEGER (-55..54)
      },
      differentPCI-r13  SEQUENCE {
        eutra-NumCRS-Ports-r13   ENUMERATED {same, four}
      }
    },
    optional PCI-r13  ENUMERATED {n1, n2, n3}
  }  OPTIONAL, -- Cond anchor-guardband
  eutraControlRegionSize-r13  ENUMERATED {n1, n2, n3}
```

---
CarrierConfigDedicated-NB field descriptions

dl-CarrierConfig
Downlink non-anchor carrier used for all unicast transmissions.

dl-CarrierFreq
DL carrier frequency. The downlink carrier is not in a E-UTRA PRB which contains E-UTRA PSS/SSS/PBCH.

dl-GapNonAnchor
Downlink transmission gap configuration for the non-anchor carrier, see TS 36.211 [21, 10.2.3.4].

downlinkBitmapNonAnchor
NB-IoT downlink subframe configuration for downlink transmission on the non-anchor carrier. See TS 36.213 [23, 16.4].

eutraControlRegionSize
Indicates the control region size of the E-UTRA cell for the in-band operation mode, see TS 36.213 [23]. Unit is in number of OFDM symbols. If operationModelInfo in MIB-NB is set to inband-SamePCI or inband-DifferentPCI, it should be set to the value broadcast in SIB1-NB.

eutra-NumCRS-Ports
Number of E-UTRA CRS antenna ports, either the same number of ports as NRS or 4 antenna ports. See TS 36.211 [21], TS 36.212 [22], and TS 36.213 [23].

inbandCarrierInfo
Provides the configuration of a non-anchor inband carrier.

indexToMidPRB
The PRB index is signaled by offset from the middle of the EUTRA system.

nrs-PowerOffsetNonAnchor
Provides the power offset of the downlink narrowband reference-signal EPRE of the non-anchor carrier relative to the anchor carrier, unit in dB. Value dB-12 corresponds to -12 dB, dB-10 corresponds to -10 dB and so on. See TS 36.213 [23, 16.2.2].

samePCI-Indicator
This parameter specifies whether the non-anchor carrier reuses the same PCI as the EUTRA carrier.

ul-CarrierConfig
Uplink non-anchor carrier used for all unicast transmissions.

ul-CarrierFreq
UL carrier frequency as defined in TS 36.101 [42, 5.7.3F]. If absent, the same TX-RX frequency separation and carrier frequency offset as for the anchor carrier apply.

Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>non-anchor-inband</td>
<td>The field is mandatory present if the non-anchor carrier is an inband carrier; otherwise it is not present.</td>
</tr>
<tr>
<td>anchor-guardband</td>
<td>The field is mandatory present if operationModelInfo is set to guardband in the MIB; otherwise it is not present.</td>
</tr>
</tbody>
</table>

CarrierFreq-NB

The IE CarrierFreq-NB is used to provide the NB-IoT carrier frequency, as defined in TS 36.101 [42].

CarrierFreq-NB information elements

-- ASN1START

CarrierFreq-NB-r13 ::= SEQUENCE {
  carrierFreq-r13  ARFCN-ValueEUTRA-r9,
  carrierFreqOffset-r13  ENUMERATED {
}
CarrierFreq-NB field descriptions

carrierFreq
Provides the ARFCN applicable for the NB-IoT carrier frequency as defined in TS 36.101 [42, Table 5.7.3-1].
carrierFreqOffset
Offset of the NB-IoT channel number to EARFCN as defined in TS 36.101 [42, 5.7.3F]. Value v-10 means -10, v-9 means -9, and so on.

-- DL-Bitmap-NB

The IE DL-Bitmap-NB is used to specify the set of NB-IoT downlink subframes for downlink transmission.

DL-Bitmap-NB information element

-- ASN1START
DL-Bitmap-NB-r13 ::= CHOICE {
  subframePattern10-r13   BIT STRING (SIZE (10)),
  subframePattern40-r13   BIT STRING (SIZE (40))
}
-- ASN1STOP

DL-Bitmap-NB field descriptions

subframePattern10, subframePattern40
NB-IoT downlink subframe configuration over 10ms or 40ms for inband and 10ms for standalone/guardband. The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string divided by 10. Value 0 in the bitmap indicates that the corresponding subframe is invalid for downlink transmission. Value 1 in the bitmap indicates that the corresponding subframe is valid for downlink transmission.

-- DL-GapConfig-NB

The IE DL-GapConfig-NB is used to specify the downlink gap configuration for NPDCCH and NPDSCH. Downlink gaps apply to all NPDCCH/NPDSCH transmissions except for BCCH.

DL-GapConfig-NB information element

-- ASN1START
DL-GapConfig-NB-r13 ::= SEQUENCE {
  dl-GapThreshold-r13   ENUMERATED {n32, n64, n128, n256},
  dl-GapPeriodicity-r13  ENUMERATED {sf64, sf128, sf256, sf512},
  dl-GapDurationCoeff-r13 ENUMERATED {oneEighth, oneFourth, threeEighth, oneHalf}
}
-- ASN1STOP

DL-GapConfig-NB field descriptions

dl-GapDurationCoeff
Coefficient to calculate the gap duration of a DL transmission: dl-GapDurationCoeff * dl-GapPeriodicity, Duration in number of subframes. See TS 36.211 [21, 10.2.3.4].
dl-GapPeriodicity
Periodicity of a DL transmission gap in number of subframes. See TS 36.211 [21, 10.2.3.4].
dl-GapThreshold
Threshold on the maximum number of repetitions configured for NPDCCH before application of DL transmission gap configuration. See TS 36.211 [21, 10.2.3.4].
LogicalChannelConfig-NB

The IE `LogicalChannelConfig-NB` is used to configure the logical channel parameters.

**LogicalChannelConfig-NB information element**

```
LogicalChannelConfig-NB-r13 ::= SEQUENCE {
    priority-r13      INTEGER (1..16)   OPTIONAL,  -- Cond UL
    logicalChannelSR-Prohibit-r13  BOOLEAN     OPTIONAL,  -- Need ON
    ...
}
```

**LogicalChannelConfig-NB field descriptions**

- **logicalChannelSR-Prohibit**
  Value `TRUE` indicates that the `logicalChannelSR-ProhibitTimer` is enabled for the logical channel. If `logicalChannelSR-Prohibit` is configured (i.e. indicates value `TRUE`), E-UTRAN also configures `logicalChannelSR-ProhibitTimer`. See TS 36.321 [6].

- **priority**
  Logical channel priority in TS 36.321 [6]. Value is an integer.

Conditional presence | Explanation
--- | ---
UL | The field is mandatory present for UL logical channels; otherwise it is not present.

MAC-MainConfig-NB

The IE `MAC-MainConfig-NB` is used to specify the MAC main configuration for signalling and data radio bearers.

**MAC-MainConfig-NB information element**

```
MAC-MainConfig-NB-r13 ::= SEQUENCE {
    ul-SCH-Config-r13    SEQUENCE {  
        periodicBSR-Timer-r13   PeriodicBSR-Timer-NB-r13  OPTIONAL, -- Need ON
        retxBSR-Timer-r13    RetxBSR-Timer-NB-r13
    }                 OPTIONAL, -- Need ON
    drx-Config-r13      DRX-Config-NB-r13    OPTIONAL, -- Need ON
    timeAlignmentTimerDedicated-r13  TimeAlignmentTimer,
    logicalChannelSR-Config-r13   CHOICE {  
        release        NULL,
        setup        SEQUENCE {  
            logicalChannelSR-ProhibitTimer-r13 ENUMERATED {  
                pp2, pp8, pp32, pp512,  
                pp1024, pp2048, spare}
        }
    }                 OPTIONAL, -- Need ON
    ...
}
```

- **PeriodicBSR-Timer-NB-r13**
  `ENUMERATED`

- **RetxBSR-Timer-NB-r13**
  `ENUMERATED`

- **DRX-Config-NB-r13**
  `CHOICE`

---
--- ASN1START

**MAC-MainConfig-NB field descriptions**

drx-Config
Used to configure DRX as specified in TS 36.321 [6].

drx-Cycle
longDRX-Cycle in TS 36.321 [6]. The value of longDRX-Cycle is in number of sub-frames. Value sf256 corresponds to 256 sub-frames, sf512 corresponds to 512 sub-frames and so on.

drx-StartOffset
drxStartOffset in TS 36.321 [6]. Value is in number of sub-frames by step of (drx-cycle / 256).

drx-InactivityTimer
Timer for DRX in TS 36.321 [6]. Value in number of PDCCH periods. Value pp0 corresponds to 0 PDCCH period and behaviour as specified in 7.3.2 applies, pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on.

drx-RetransmissionTimer
Timer for DRX in TS 36.321 [6]. Value in number of PDCCH periods. Value pp0 corresponds to 0 PDCCH period and behaviour as specified in 7.3.2 applies, pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on.

drx-ULRetransmissionTimer
Timer for DRX in TS 36.321 [6]. Value in number of PDCCH periods. Value pp0 corresponds to 0 PDCCH period and behaviour as specified in 7.3.2 applies, pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on.

drxmlChannelSR-ProhibitTimer
Timer used to delay the transmission of an SR. See TS 36.321 [6]. Value in number of PDCCH periods. Value pp2 corresponds to 2 PDCCH periods, pp8 corresponds to 8 PDCCH periods and so on.

periodicBSR-Timer
Timer for BSR reporting in TS 36.321 [6]. Value in number of PDCCH periods. Value pp2 corresponds to 2 PDCCH periods, pp4 corresponds to 4 PDCCH periods and so on.

retrxBSR-Timer
Timer for BSR reporting in TS 36.321 [6]. Value in number of PDCCH periods. Value pp4 corresponds to 4 PDCCH periods, pp16 corresponds to 16 PDCCH periods and so on.

onDurationTimer
Timer for DRX in TS 36.321 [6]. Value in number of PDCCH periods. Value pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on.

timeAlignmentTimer
Indicates the value of the time alignment timer, see TS 36.321 [6].

---

**NPDCCH-ConfigDedicated-NB**
The IE NPDCCH-ConfigDedicated-NB specifies the subframes and resource blocks for NPDCCH monitoring.

**NPDCCH-ConfigDedicated-NB information element**

--- ASN1START

---
NPDCCH-ConfigDedicated-NB field descriptions

npdcch-NumRepetitions
Maximum number of repetitions for NPDCCH UE specific search space (USS), see TS 36.213 [23, 16.6]. UE monitors one set of values (consisting of aggregation level, number of repetitions and number of blind decodes) according to the configured maximum number of repetitions.

npdcch-Offset-USS
Fractional period offset of starting subframe for NPDCCH UE specific search space (USS), see TS 36.213 [23, 16.6].

npdcch-StartSF-USS
Starting subframe configuration for an NPDCCH UE-specific search space, see TS 36.213 [23, 16.6]. Value v1dot5 corresponds to 1.5, value 2 corresponds to 2 and so on.

NPDSCH-ConfigCommon-NB

The IE NPDSCH-ConfigCommon-NB is used to specify the common NPDSCH configuration.

NPDSCH-ConfigCommon-NB information element

-- ASN1START

NPDSCH-ConfigCommon-NB-r13 ::= SEQUENCE {
  nrs-Power-r13     INTEGER (-60..50)
}

-- ASN1STOP

NPDSCH-ConfigCommon-NB field descriptions

nrs-Power
Provides the downlink narrowband reference-signal EPRE, see TS 36.213 [23, 16.2]. The actual value in dBm.

NPRACh-ConfigSIB-NB

The IE NPRACh-ConfigSIB-NB is used to specify the NPRACH configuration in the system information.

NPRACh-ConfigSIB-NB information elements

-- ASN1START

NPRACh-ConfigSIB-NB-r13 ::= SEQUENCE {
  nprrach-Cp-Length-r13     ENUMERATED {us66dot7, us266dot7},
  nprrach-Rsrp-ThresholdsPrachInfoList-r13 RSRP-ThresholdsNPRACh-InfoList-NB-r13 OPTIONAL, -- need OR
  nprrach-ParametersList-r13  NPRACH-ParametersList-NB-r13
}

NPRACh-ConfigSIB-NB-v1330 ::=  SEQUENCE {
  nprrach-ParametersList-v1330   NPRACH-ParametersList-NB-v1330
}

NPRACh-ParametersList-NB-r13 ::= SEQUENCE (SIZE (1.. maxNPRACh-Resources-NB-r13)) OF NPRACh-Parameters-NB-r13

NPRACh-ParametersList-NB-v1330 ::= SEQUENCE (SIZE (1.. maxNPRACh-Resources-NB-r13)) OF NPRACh-Parameters-NB-v1330

NPRACh-Parameters-NB-r13::=  SEQUENCE {
  nprrach-Periodicity-r13     ENUMERATED {ms40, ms80, ms160, ms240, ms320, ms640, ms1280, ms2560},
  nprrach-StartTime-r13     ENUMERATED {ms8, ms16, ms32, ms64, ms128, ms256, ms512, ms1024},
  nprrach-SubcarrierOffset-r13    ENUMERATED {n0, n12, n24, n36, n2, n18, n34, spare1},
  nprrach-NumSubcarriers-r13    ENUMERATED {n12, n24, n36, n48},
  nprrach-SubcarrierMsg3-RangeStart-r13 ENUMERATED {zero, oneThird, twoThird, one},
  maxNumPreambleAttemptCE-r13 ENUMERATED {n3, n4, n5, n6, n7, n8, n10, spare1},
  numRepetitionsPerPreambleAttempt-r13 ENUMERATED (n1, n2, n4, n8, n16, n32, n64, n128),
  npdcch-NumRepetitions-RA-r13 ENUMERATED (r1, r2, r4, r8, r16, r32, r64, r128, r256, r512, r1024, r2048, spare4, spare3, spare2, spare1),
NPRACH-Parameters-NB-v1330 ::= SEQUENCE {
  npach-NumCBRA-StartSubcarriers-r13  ENUMERATED (n8, n10, n11, n12, n20, n22, n23, n24, n32, n34, n35, n36, n40, n44, n46, n48),
}

RSRP-ThresholdsNPRACH-InfoList-NB-r13 ::= SEQUENCE (SIZE(1..2)) OF RSRP-Range

NPRACH-ConfigSIB-NB field descriptions

maxNumPreambleAttemptsCE
Maximum number of preamble transmission attempts per NPRACH resource. See TS 36.321 [6].

npdcch-NumRepetitions-RA
Maximum number of repetitions for NPDCCH common search space (CSS) for RAR, Msg3 retransmission and Msg4, see TS 36.213 [23, 16.6].

npdcch-Offset-RA
Fractional period offset of starting subframe for NPDCCH common search space (CSS Type 2), see TS 36.213 [23, 16.6].

npdcch-StartSF-RA
Starting subframe configuration for NPDCCH common search space (CSS), including RAR, Msg3 retransmission, and Msg4, see TS 36.213 [23, 16.6].

nprach-CP-Length
Cyclic prefix length for NPRACH transmission (T_{CP}), see TS 36.211 [21, 10.1.6]. Value us66dot7 corresponds to 66.7 microseconds and value us266dot7 corresponds to 266.7 microseconds.

nprach-NumCBRA-StartSubcarriers
The number of start subcarriers from which a UE can randomly select a start subcarrier as specified in TS 36.321 [6]. The start subcarrier indices that the UE is allowed to randomly select from, are given by:

\[ \text{nprach-SubcarrierOffset} + \left[ 0, \text{nprach-NumCBRA-StartSubcarriers} - 1 \right] \]

nprach-NumSubcarriers
Number of sub-carriers in a NPRACH resource, see TS 36.211 [21, 10.1.6]. In number of subcarriers.

nprach-ParametersList
Configures NPRACH parameters for each NPRACH resource. Up to three PRACH resources can be configured in a cell. Each NPRACH resource is associated with a different number of NPRACH repetitions.

nprach-Periodicity
Periodicity of a NPRACH resource, see TS 36.211 [21, 10.1.6]. Unit in millisecond.

nprach-StartTime
Start time of the NPRACH resource in one period, see TS 36.211 [21, 10.1.6]. Unit in millisecond.

nprach-SubcarrierOffset
Frequency location of the NPRACH resource, see TS 36.211 [21, 10.1.6]. In number of subcarriers, offset from sub-carrier 0.

nprach-SubcarrierMSG3-RangeStart
Fraction for calculating the starting subcarrier index of the range reserved for indication of UE support for multi-tone Msg3 transmission, within the NPRACH resource, see TS 36.211 [21, 10.1.6]. Multi-tone Msg3 transmission is not supported for {32, 64, 128} repetitions of NPRACH. For at least one of the NPRACH resources with the number of NPRACH repetitions other than {32, 64, 128}, the value of \( \text{nprach-SubcarrierMSG3-RangeStart} \) should not be 0. If \( \text{nprach-SubcarrierMSG3-RangeStart} \) is equal to oneThird or twoThird, the start subcarrier indexes for the two partitions are given by:

\[ \left[ 0, \text{floor}(\text{nprach-NumCBRA-StartSubcarriers} * \text{nprach-SubcarrierMSG3-RangeStart}) - 1 \right] \]

\[ \left[ \text{floor}(\text{nprach-NumCBRA-StartSubcarriers} * \text{nprach-SubcarrierMSG3-RangeStart}), \text{nprach-NumCBRA-StartSubcarriers} - 1 \right] \]

numRepetitionsPerPreambleAttempt
Number of NPRACH repetitions per attempt for each NPRACH resource, See TS 36.211 [21, 10.1.6].

rsrp-ThresholdsPrachInfoList
The criterion for UEs to select a NPRACH resource. Up to 2 RSRP threshold values can be signalled. The first element corresponds to RSRP threshold 1, the second element corresponds to RSRP threshold 2. See TS 36.321 [6]. If absent, there is only one NPRACH resource.

NPUSCH-Config-NB

The IE \text{NPUSCH-ConfigCommon-NB} is used to specify the common NPUSCH configuration. The IE \text{NPUSCH-ConfigDedicated-NB} is used to specify the UE specific NPUSCH configuration.
NPUSCH-Config-NB information element

-- ASN1START

NPUSCH-ConfigCommon-NB-r13 ::= SEQUENCE {
  ack-NACK-NumRepetitions_Msg4-r13  SEQUENCE (SIZE(1.. maxNPRACH-Resources-NB-r13)) OF
      ACK-NACK-NumRepetitions-NB-r13,
  srs-SubframeConfig-r13 ENUMERATED {
      sc0, sc1, sc2, sc3, sc4, sc5, sc6, sc7,  
      sc8, sc9, sc10, sc11, sc12, sc13, sc14, sc15
    } OPTIONAL, -- Need OR
  dmrs-Config-r13     SEQUENCE {
      threeTone-BaseSequence-r13 INTEGER (0..12) OPTIONAL, -- Need OP
      threeTone-CyclicShift-r13 INTEGER (0..2),
      sixTone-BaseSequence-r13 INTEGER (0..14) OPTIONAL, -- Need OP
      sixTone-CyclicShift-r13 INTEGER (0..3),
      twelveTone-BaseSequence-r13 INTEGER (0..30) OPTIONAL -- Need OP
    } OPTIONAL, -- Need OR
  ul-ReferenceSignalsNPUSCH-r13 UL-ReferenceSignalsNPUSCH-NB-r13
}

UL-ReferenceSignalsNPUSCH-NB-r13 ::= SEQUENCE {
  groupHoppingEnabled-r13 BOOLEAN,
  groupAssignmentNPUSCH-r13 INTEGER (0..29)
}

NPUSCH-ConfigDedicated-NB-r13 ::= SEQUENCE {
  ack-NACK-NumRepetitions-r13  ACK-NACK-NumRepetitions-NB-r13 OPTIONAL, -- Need ON
  npusch-AllSymbols-r13       BOOLEAN OPTIONAL, -- Cond SRS
  groupHoppingDisabled-r13 ENUMERATED {true} OPTIONAL -- Need OR
}

ACK-NACK-NumRepetitions-NB-r13 ::= ENUMERATED (r1, r2, r4, r8, r16, r32, r64, r128)

-- ASN1STOP
**NPUSCH-Config-NB field descriptions**

**ack-ACK-NumRepetitions**
Number of repetitions for the ACK/NACK resource unit carrying HARQ response to NPDSCH, see TS 36.213 [23, 16.4.2]. If absent, the value of `ack-ACK-NumRepetitions-Msg4` signalled in SIB2 is used.

**ack-ACK-NumRepetitions-Msg4**
Number of repetitions for ACK/NACK HARQ response to NPDSCH containing Msg4 per NPRACH resource, see TS 36.213 [23, 16.4.2].

**groupAssignmentNPUSCH**
See TS 36.211 [21, 10.1.4.1.3].

**groupHoppingDisabled**
See TS 36.211 [21, 10.1.4.1.3].

**groupHoppingEnabled**
See TS 36.211 [21, 10.1.4.1.3].

**npusch-AllSymbols**
If set to TRUE, the UE shall use all NB-IoT symbols for NPUSCH transmission. If set to FALSE, the UE punctures the NPUSCH transmissions in the symbols that collides with SRS. If the field is not present, the UE uses all NB-IoT symbols for NPUSCH transmission. See TS 36.211 [21, 10.1.3.6].

**sixTone-BaseSequence**
The base sequence of DMRS sequence in a cell for 6 tones transmission; see TS 36.211 [21, 10.1.4.1.2]. If absent, it is given by NB-IoT CellID mod 14. Value 14 is not used.

**sixTone-CyclicShift**
Define 4 cyclic shifts for the 6-tone case, see TS 36.211 [21, 10.1.4.1.2].

**srs-SubframeConfig**
SRS SubframeConfiguration. See TS 36.211 [21, table 5.5.3.3-1]. Value sc0 corresponds to value 0, sc1 to value 1 and so on.

**threeTone-BaseSequence**
The base sequence of DMRS sequence in a cell for 3 tones transmission; see TS 36.211 [21, 10.1.4.1.2]. If absent, it is given by NB-IoT CellID mod 12. Value 12 is not used.

**threeTone-CyclicShift**
Define 3 cyclic shifts for the 3-tone case, see TS 36.211 [21, 10.1.4.1.2].

**twelveTone-BaseSequence**
The base sequence of DMRS sequence in a cell for 12 tones transmission; see TS 36.211 [21, 10.1.4.1.2]. If absent, it is given by NB-IoT CellID mod 30. Value 30 is not used.

**ul-ReferenceSignalsNPUSCH**
Used to specify parameters needed for the transmission on NPUSCH.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRS</td>
<td>This field is optionally present, need OP, if <code>srs-SubframeConfig</code> is broadcasted. Otherwise, the IE is not present.</td>
</tr>
</tbody>
</table>

---

**PDCP-Config-NB**

The IE `PDCP-Config-NB` is used to set the configurable PDCP parameters for data radio bearers.

**PDCP-Config-NB information element**

```
-- ASN1START
PDCP-Config-NB-r13 ::= SEQUENCE {
  discardTimer-r13          ENUMERATED {
    ms5120, ms10240, ms20480, ms40960,
    ms81920, infinity, spare2, spare1
  } OPTIONAL, -- Cond Setup
  headerCompression-r13     CHOICE {
    notUsed      NULL,
    rohc         SEQUENCE {
      maxCID-r13   INTEGER (1..16383) DEFAULT 15,
      profiles-r13 SEQUENCE {
        profile0x0002  BOOLEAN,
        profile0x0003  BOOLEAN,
        profile0x0004  BOOLEAN,
        profile0x0006  BOOLEAN,
        profile0x0102  BOOLEAN,
        profile0x0103  BOOLEAN,
        profile0x0104  BOOLEAN
      }
    }
  }
}
```

---

**ETS1**
--- PDCP-Config-NB field descriptions

**discardTimer**
Indicates the discard timer value specified in TS 36.323 [8]. Value in milliseconds. Value ms5120 means 5120 ms, ms10240 means 10240 ms and so on.

**headerCompression**
E-UTRAN does not reconfigure header compression except optionally upon RRC Connection Resumption.

**maxCID**
Indicates the value of the MAX_CID parameter as specified in TS 36.323 [8]. 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.

**profiles**
The profiles used by both compressor and decompressor in both UE and E-UTRAN. The field indicates which of the ROHC profiles specified in TS 36.323 [8] are supported, i.e. value true indicates that the profile is supported. Profile 0x0000 shall always be supported when the use of ROHC is configured. If support of two ROHC profile identifiers with the same 8 LSB’s is signalled, only the profile corresponding to the highest value shall be applied.

--- Conditional presence

| Setup | The field is mandatory present in case of radio bearer setup. Otherwise the field is optionally present, need ON. |

--- PhysicalConfigDedicated-NB

The IE PhysicalConfigDedicated-NB is used to specify the UE specific physical channel configuration.

--- PhysicalConfigDedicated-NB information element

```asn
PhysicalConfigDedicated-NB-r13 ::= SEQUENCE {
  carrierConfigDedicated-r13   CarrierConfigDedicated-NB-r13  OPTIONAL, -- Need ON
  npdch-ConfigDedicated-r13   NPDCCH-ConfigDedicated-NB-r13  OPTIONAL, -- Need ON
  npusch-ConfigDedicated-r13   NPUSCH-ConfigDedicated-NB-r13  OPTIONAL, -- Need ON
  uplinkPowerControlDedicated-r13  UplinkPowerControlDedicated-NB-r13 OPTIONAL, -- Need ON
  ...
}
```

--- PhysicalConfigDedicated-NB field descriptions

**carrierConfigDedicated**
Non-anchor carrier used for all unicast transmissions.

**npdch-ConfigDedicated**
NPDCCH configuration.

**npusch-ConfigDedicated**
UL unicast configuration.

**uplinkPowerControlDedicated**
UL power control parameter.

--- RACH-ConfigCommon-NB

The IE RACH-ConfigCommon-NB is used to specify the generic random access parameters.

--- RACH-ConfigCommon-NB information element

```asn
RACH-ConfigCommon-NB-r13 ::= SEQUENCE {
  preambleTransMax-CE-r13   PreambleTransMax,
}
```
### RACH-ConfigCommon-NB field descriptions

#### connEstFailOffset
Parameter "Qoffsettemp" in TS 36.304 [4]. If the field is not present the value of infinity shall be used for "Qoffsettemp".

#### mac-ContentionResolutionTimer
Timer for contention resolution in TS 36.321 [6]. Value in PDCCH periods. Value pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on. The value considered by the UE is: 
\[
\text{mac-} \text{ContentionResolutionTimer} = \text{Min} (\text{signaled value} \times \text{PDCCH period}, 10.24s).
\]

#### powerRampingParameters
Power ramping step and preamble initial received target power – same as TS 36.213 [23] and TS 36.321 [6]. If more than one repetition level is configured in the cell, then the UE transmits NPRACH with max power except for the lowest repetition level. Otherwise, the UE uses NPRACH power ramping.

#### preambleTransMax-CE
Maximum number of preamble transmission in TS 36.321 [6]. Value is an integer.

#### ra-ResponseWindowSize
Duration of the RA response window in TS 36.321 [6]. Value in PDCCH periods. Value pp2 corresponds to 2 PDCCH periods, pp3 corresponds to 3 PDCCH periods and so on. The value considered by the UE is: 
\[
\text{ra-ResponseWindowSize} = \text{Min} (\text{signaled value} \times \text{PDCCH period}, 10.24s).
\]

### RadioResourceConfigCommonSIB-NB

The IE `RadioResourceConfigCommonSIB-NB` is used to specify common radio resource configurations in the system information, e.g., the random access parameters and the static physical layer parameters.

#### RadioResourceConfigCommonSIB-NB information element

```
RadioResourceConfigCommonSIB-NB-r13 ::= SEQUENCE {
rach-ConfigCommon-r13     RACH-ConfigCommon-NB-r13,  
bcch-Config-r13      BCCH-Config-NB-r13,  
pcch-Config-r13      PCCH-Config-NB-r13,  
nprach-Config-r13      NPRACH-ConfigSIB-NB-r13,  
npusch-ConfigCommon-r13     NPUSCH-ConfigCommon-NB-r13,  
npdcch-NumRepetitionPaging-r13   ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128,

```
RadioResourceConfigCommonSIB-NB field descriptions

defaultPagingCycle
Default paging cycle, used to derive 'T' in TS 36.304 [4]. Value rf128 corresponds to 128 radio frames, rf256 corresponds to 256 radio frames and so on.

dl-Gap
Downlink transmission gap configuration for the anchor carrier. See TS 36.211 [21, 10.2.3.4]. If the field is absent, there is no gap.

modificationPeriodCoeff
Actual modification period, expressed in number of radio frames= modificationPeriodCoeff * defaultPagingCycle. n16 corresponds to value 16, n32 corresponds to value 32, and so on. The BCCH modification period should be larger or equal to 40.96s.

nB
Parameter: nB is used as one of parameters to derive the Paging Frame and Paging Occasion according to TS 36.304 [4]. Value in multiples of 'T' as defined in TS 36.304 [4]. A value of fourT corresponds to 4 * T, a value of twoT corresponds to 2 * T and so on.

npdcch-NumRepetitionPaging
Maximum number of repetitions for NPDCCH common search space (CSS) for paging, see TS 36.213 [23, 16.6].

RadioResourceConfigDedicated-NB

The IE RadioResourceConfigDedicated-NB is used to setup/modify/release RBs, to modify the MAC main configuration, and to modify dedicated physical configuration.

RadioResourceConfigDedicated-NB information element

```asn1
RadioResourceConfigDedicated-NB-r13 ::= SEQUENCE {
    srB-ToAddModList-r13     SRB-ToAddModList-NB-r13   OPTIONAL, -- Need ON,
    drB-ToAddModList-r13     DRB-ToAddModList-NB-r13  OPTIONAL, -- Need ON,
    drB-ToReleaseList-r13     DRB-ToReleaseList-NB-r13 OPTIONAL, -- Need ON,
    mac-MainConfig-r13      CHOICE {
        explicitValue-r13      MAC-MainConfig-NB-r13,
        defaultValue-r13      NULL }
        OPTIONAL, -- Need ON,
    physicalConfigDedicated-r13 PhysicalConfigDedicated-NB-r13 OPTIONAL, -- Need ON,
    rlf-TimersAndConstants-r13 RLF-TimersAndConstants-NB-r13 OPTIONAL, -- Need ON,
    ... }

SRB-ToAddModList-NB-r13 ::= SEQUENCE (SIZE (1)) OF SRB-ToAddMod-NB-r13

SRB-ToAddMod-NB-r13 ::= SEQUENCE {
    rlC-Config-r13      CHOICE {
        explicitValue      RLC-Config-NB-r13,
        defaultValue      NULL }
        OPTIONAL, -- Cond Setup,
    logicalChannelConfig-r13   CHOICE {
        explicitValue      LogicalChannelConfig-NB-r13,
        defaultValue      NULL }
        OPTIONAL, -- Cond Setup,
    ... }

DRB-ToAddModList-NB-r13 ::= SEQUENCE (SIZE (1..maxDRB-NB-r13)) OF DRB-ToAddMod-NB-r13

DRB-ToAddMod-NB-r13 ::= SEQUENCE {
    eps-BearerIdentity-r13    INTEGER (0..15) OPTIONAL, -- Cond DRB-Setup,
    rlC-Config-r13      RLC-Config-NB-r13 OPTIONAL, -- Cond DRB-Setup,
    logicalChannelIdentity-r13   INTEGER (3..10) OPTIONAL, -- Cond DRB-Setup,
    logicalChannelConfig-r13   LogicalChannelConfig-NB-r13 OPTIONAL, -- Cond DRB-Setup,
    ... }
```
RadioResourceConfigDedicated-NB field descriptions

logicalChannelConfig
For SRB a choice is used to indicate whether the logical channel configuration is signalled explicitly or set to the default logical channel configuration for SRB1 as specified in 9.2.1.1.

logicalChannelIdentity
The logical channel identity for both UL and DL for a DRB. Value 3 is not used.

mac-MainConfig
The default MAC MAIN configuration is specified in 9.2.2.

physicalConfigDedicated
The default dedicated physical configuration is specified in 9.2.4.

rlc-Config
For SRBs a choice is used to indicate whether the RLC configuration is signalled explicitly or set to the values defined in the default RLC configuration for SRB1 in 9.2.1.1. RLC AM is the only applicable RLC mode.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRB-Setup</td>
<td>The field is mandatory present if the corresponding DRB is being set up; otherwise it is not present.</td>
</tr>
<tr>
<td>Setup</td>
<td>The field is mandatory present if the corresponding SRB/DRB is being setup; otherwise the field is optionally present, need ON.</td>
</tr>
</tbody>
</table>

— RLC-Config-NB

The IE RLC-Config-NB is used to specify the RLC configuration of SRBs and DRBs.

RLC-Config-NB information element

<table>
<thead>
<tr>
<th>RLC-Config-NB field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>enableStatusReportSN-Gap</td>
</tr>
<tr>
<td>Indicates that status reporting due to detection of reception failure is enabled, as specified in TS 36.322 [7].</td>
</tr>
</tbody>
</table>

| maxRetxThreshold                |
| Parameter for RLC AM in TS 36.322 [7]. Value t1 corresponds to 1 retransmission, t2 to 2 retransmissions and so on. |

| t-PollRetransmit                |
| Timer for RLC AM in TS 36.322 [7], in milliseconds. Value msX means X ms, msY means Y ms and so on. |
-- RLF-TimersAndConstants-NB

The IE RLF-TimersAndConstants-NB contains UE specific timers and constants applicable for UEs in RRC_CONNECTED.

**RLF-TimersAndConstants-NB information element**

```asn1
RLF-TimersAndConstants-NB-r13 ::= CHOICE {
  release        NULL,
  setup        SEQUENCE {
    t301-r13       ENUMERATED {
      ms2500, ms4000, ms6000, ms10000, ms15000, ms25000, ms40000, ms60000},
    t310-r13       ENUMERATED {
      ms0, ms200, ms500, ms1000, ms2000, ms4000, ms8000},
    n310-r13       ENUMERATED {
      n1, n2, n3, n4, n6, n8, n10, n20},
    t311-r13       ENUMERATED {
      ms1000, ms3000, ms5000, ms10000, ms15000, ms20000, ms30000},
    n311-r13       ENUMERATED {
      n1, n2, n3, n4, n5, n6, n8, n10},
    ...,
    [[ t311-v1350      ENUMERATED {
      ms40000, ms60000, ms90000, ms120000}]
      OPTIONAL -- Need OR
    ]
  }
}
```

**RLF-TimersAndConstants-NB field descriptions**

- **n3xy**
  Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on.

- **t3xy**
  Timers are described in section 7.3. Value ms0 corresponds with 0 ms, ms200 corresponds with 200 ms and so on. If present, the UE shall use the extended value t311-v1350 and ignore the value signaled by t311-r13.

-- UplinkPowerControl-NB

The IE UplinkPowerControlCommon-NB and IE UplinkPowerControlDedicated-NB are used to specify parameters for uplink power control in the system information and in the dedicated signalling, respectively.

**UplinkPowerControl-NB information elements**

```asn1
UplinkPowerControlCommon-NB-r13 ::= SEQUENCE {
  p0-NominalNPUSCH-r13    INTEGER (-126..24),
  alpha-r13       ENUMERATED {al0, al04, al05, al06, al07, al08, al09, al1},
  deltaPreambleMsg3-r13    INTEGER (-1..6)
}

UplinkPowerControlDedicated-NB-r13 ::= SEQUENCE {
  p0-UE-NPUSCH-r13      INTEGER (-8..7)
}
```

-- ASN1STOP
**UplinkPowerControl-NB field descriptions**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \alpha )</td>
<td>( \alpha ) is a parameter that controls the uplink power control.</td>
</tr>
<tr>
<td>( \Delta_{P_{\text{PREAMBLE}}-\text{Msg3}} )</td>
<td>( \Delta_{P_{\text{PREAMBLE}}-\text{Msg3}} ) indicates the change in power for the preamble.</td>
</tr>
<tr>
<td>( P_{0-NOMINAL_NPUSCH} )</td>
<td>( P_{0-NOMINAL_NPUSCH} ) is the nominal power for the NPUSCH.</td>
</tr>
<tr>
<td>( P_{0-UE-NPUSCH} )</td>
<td>( P_{0-UE-NPUSCH} ) is the power for the UE-specific NPUSCH.</td>
</tr>
</tbody>
</table>

6.7.3.3 NB-IoT Security control information elements

Void

6.7.3.4 NB-IoT Mobility control information elements

---

**FreqBandIndicator-NB**

The IE `FreqBandIndicator-NB` indicates the E-UTRA operating band as defined in TS 36.101 [42, table 5.5-1].

---

**FreqBandIndicator-NB information element**

```asn
FreqBandIndicator-NB-r13 ::= INTEGER (1..maxFBI2)
```

---

**MultiBandInfoList-NB**

---

**MultiBandInfoList-NB information element**

```asn
MultiBandInfoList-NB-r13 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF MultiBandInfo-NB-r13
```

---

**NS-PmaxList-NB**

The IE `NS-PmaxList-NB` concerns a list of `additionalPmax` and `additionalSpectrumEmission` as defined in TS 36.101 [42, 6.2.4F] for a given frequency band. E-UTRAN does not include the same value of `additionalSpectrumEmission` in `SystemInformationBlockType2-NB` within this list.

---

**NS-PmaxList-NB information element**

```asn
NS-PmaxList-NB-r13 ::= SEQUENCE (SIZE (1..maxNS-Pmax-NB-r13)) OF NS-PmaxValue-NB-r13
```

```asn
NS-PmaxValue-NB-r13 ::= SEQUENCE {
  additionalPmax-r13    P-Max      OPTIONAL, -- Need OR
  additionalSpectrumEmission-r13 AdditionalSpectrumEmission
}
```
– **ReselectionThreshold-NB**

The IE ReselectionThreshold-NB is used to indicate an Rx level threshold for cell reselection. Actual value of threshold = field value * 2 [dB].

**ReselectionThreshold-NB information element**

```asn
ReselectionThreshold-NB-v1360 ::= INTEGER (32..63)
```

– **T-Reselection-NB**

The IE T-Reselection-NB concerns the cell reselection timer TreselectionRAT for NB-IoT.

Value in seconds. s0 means 0 second and behaviour as specified in 7.3.2 applies, s3 means 3 seconds and so on.

**T-Reselection-NB information element**

```asn
T-Reselection-NB-r13 ::= ENUMERATED {s0, s3, s6, s9, s12, s15, s18, s21}
```

6.7.3.5 NB-IoT Measurement information elements

Void

6.7.3.6 NB-IoT Other information elements

– **EstablishmentCause-NB**

The IE EstablishmentCause-NB provides the establishment cause for the RRC connection request or the RRC connection resume request as provided by the upper layers.

**EstablishmentCause-NB information element**

```asn
EstablishmentCause-NB-r13 ::= ENUMERATED {
  mt-Access, mo-Signalling, mo-Data, mo-ExceptionData,
  delayTolerantAccess-v1330, spare3, spare2, spare1}
```

– **UE-Capability-NB**

The IE UE-Capability-NB is used to convey the NB-IoT UE Radio Access Capability Parameters, see TS 36.306 [5]. The IE UE-Capability-NB is transferred in NB-IoT only.

**UE-Capability-NB information element**

```asn
UE-Capability-NB-r13 ::= SEQUENCE {
  accessStratumRelease-r13  AccessStratumRelease-NB-r13, OPTIONAL,
  ue-Category-NB-r13        ENUMERATED {nb1}     OPTIONAL,
  multipleDRB-r13          ENUMERATED {supported}    OPTIONAL,
  pdcp-Parameters-r13      PDCP-Parameters-NB-r13    OPTIONAL,
  phyLayerParameters-r13   PhyLayerParameters-NB-r13,
  rf-Parameters-r13        RF-Parameters-NB-r13,
  dummy                   SEQUENCE {}       OPTIONAL
}
```
AccessStratumRelease-NB-r13 ::= ENUMERATED {rel13, spare7, spare6, spare5, spare4, spare3, spare2, spare1, ...}

PDCP-Parameters-NB-r13 ::= SEQUENCE {
  supportedROHC-Profiles-r13   SEQUENCE {
    profile0x0002      BOOLEAN,
    profile0x0003      BOOLEAN,
    profile0x0004      BOOLEAN,
    profile0x0006      BOOLEAN,
    profile0x0102      BOOLEAN,
    profile0x0103      BOOLEAN,
    profile0x0104      BOOLEAN
  },
  maxNumberROHC-ContextSessions-r13 ENUMERATED {cs2, cs4, cs8, cs12} DEFAULT cs2,
  ...
}

PhyLayerParameters-NB-r13 ::=  SEQUENCE {
  multiTone-r13      ENUMERATED {supported}   OPTIONAL,
  multiCarrier-r13      ENUMERATED {supported}   OPTIONAL
}

RF-Parameters-NB-r13 ::=   SEQUENCE {
  supportedBandList-r13    SupportedBandList-NB-r13,
  multiNS-Pmax-r13     ENUMERATED {supported}  OPTIONAL
}

SupportedBandList-NB-r13 ::=  SEQUENCE (SIZE (1..maxBands)) OF SupportedBand-NB-r13

SupportedBand-NB-r13 ::=   SEQUENCE {
  band-r13       FreqBandIndicator-NB-r13,
  powerClassNB-20dBm-r13    ENUMERATED {supported}  OPTIONAL
}

--- ASN1STOP

**UE-Capability-NB field descriptions**

**accessStratumRelease**
Set to rel13 in this version of the specification.

**dummy**
This field is not used in the specification. It shall not be sent by the UE.

**maxNumberROHC-ContextSessions**
Set to the maximum number of concurrently active ROHC contexts supported by the UE, excluding context sessions that leave all headers uncompressed. cs2 corresponds with 2 (context sessions), cs4 corresponds with 4 and so on. The network ignores this field if the UE supports none of the ROHC profiles in supportedROHC-Profiles.

**multiCarrier**
Defines whether the UE supports multi-carrier operation.

**multipleDRB**
Defines whether the UE supports multiple DRBs.

**multiNS-Pmax**
Defines whether the UE supports the mechanisms defined for NB-IoT cells broadcasting NS-PmaxList-NB.

**multiTone**
Defines whether the UE supports UL multi-tone transmissions on NPUSCH.

**powerClassNB-20dBm**
Defines whether the UE supports power class 20dBm in NB-IoT for the band, as specified in TS 36.101 [42]. If powerClassNB-20dBm is not included, UE supports power class 23 dBm in the NB-IoT band.

**supportedBandList**
Includes the supported NB-IoT bands as defined in TS 36.101 [42].

**supportedROHC-Profiles**
List of supported ROHC profiles as defined in TS 36.323 [8].

**ue-Category-NB**
UE category as defined in TS 36.306 [5]. The field is always included in this version of the specification.

**NOTE 1:** The IE UE-Capability-NB does not include AS security capability information, since these are the same as the security capabilities that are signalled by NAS. Consequently AS need not provide “man-in-the-middle” protection for the security capabilities.
-- UE-RadioPagingInfo-NB

The IE UE-RadioPagingInfo-NB contains UE NB-IoT capability information needed for paging.

**UE-RadioPagingInfo-NB information element**

```asn1
UE-RadioPagingInfo-NB-r13 ::= SEQUENCE {
  ue-Category-NB-r13    ENUMERATED {nb1}   OPTIONAL,
  ...
}
```

**UE-RadioPagingInfo-NB field descriptions**

- **ue-Category-NB**
  UE NB-IoT category as defined in TS 36.306 [5].

-- UE-TimersAndConstants-NB

The IE UE-TimersAndConstants-NB contains timers and constants used by the UE in either RRC_CONNECTED or RRC_IDLE.

**UE-TimersAndConstants-NB information element**

```asn1
UE-TimersAndConstants-NB-r13 ::= SEQUENCE {
  t300-r13       ENUMERATED {
    ms2500, ms4000, ms6000, ms10000,
    ms15000, ms25000, ms40000, ms60000},
  t301-r13       ENUMERATED {
    ms2500, ms4000, ms6000, ms10000,
    ms15000, ms25000, ms40000, ms60000},
  t310-r13       ENUMERATED {
    ms0, ms200, ms500, ms1000, ms2000, ms4000, ms8000},
  n310-r13       ENUMERATED {
    n1, n2, n3, n4, n6, n8, n10, n20},
  t311-r13       ENUMERATED {
    ms1000, ms3000, ms5000, ms10000, ms15000,
    ms20000, ms30000},
  n311-r13       ENUMERATED {
    n1, n2, n3, n4, n5, n6, n8, n10},
  ...
  t311-v1350     ENUMERATED {
    ms40000, ms60000, ms90000, ms120000}
    OPTIONAL  -- Need OR
}
```

**UE-TimersAndConstants-NB field descriptions**

- **n3xy**
  Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on.

- **t3xy**
  Timers are described in section 7.3. Value ms0 corresponds with 0 ms, ms200 corresponds with 200 ms and so on. If present, the UE shall use the extended value t311-v1350 and ignore the value signaled by t311-r13.

6.7.4 NB-IoT RRC multiplicity and type constraint values

- Multiplicity and type constraint definitions

-- ASN1START
maxNPRACH-Resources-NB-r13  INTEGER ::= 3  -- Maximum number of NPRACH resources for NB-IoT
maxDRB-NB-r13               INTEGER ::= 2  -- Maximum number of Data Radio Bearers for NB-IoT
maxNS-Pmax-NB-r13           INTEGER ::= 4  -- Maximum number of NS and P-Max values per band
maxSI-Message-NB-r13        INTEGER ::= 8  -- Maximum number of SI messages for NB-IoT

-- ASN1STOP

--- End of NBIOT-RRC-Definitions

-- ASN1START
END
-- ASN1STOP

### 6.7.5 Direct Indication Information

Direct Indication information is transmitted on NPDCCH using P-RNTI but without associated Paging-NB message. Table 6.7.5-1 defines the Direct Indication information, see TS 36.212 [22, 6.4.3.3].

When bit n is set to 1, the UE shall behave as if the corresponding field is set in the Paging-NB message, see 5.3.2.3. Bit 1 is the least significant bit.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Field in Direct Indication information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>systemInfoModification</td>
</tr>
<tr>
<td>2</td>
<td>systemInfoModification-eDRX</td>
</tr>
<tr>
<td>3, 4, 5, 6, 7, 8</td>
<td>Not used, and shall be ignored by UE if received</td>
</tr>
</tbody>
</table>

### 7 Variables and constants

#### 7.1 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.

--- EUTRA-UE-Variables

This ASN.1 segment is the start of the E-UTRA UE variable definitions.

---
VarConnEstFailReport

The UE variable VarConnEstFailReport includes the connection establishment failure information.

VarConnEstFailReport UE variable

--- ASN1START

VarConnEstFailReport-r11 ::= SEQUENCE {
  connEstFailReport-r11    ConnEstFailReport-r11,
  plmn-Identity-r11     PLMN-Identity
}

--- ASN1STOP

VarLogMeasConfig

The UE variable VarLogMeasConfig includes the configuration of the logging of measurements to be performed by the UE while in RRC_IDLE, covering intra-frequency, inter-frequency, inter-RAT mobility and MBSFN related measurements. If MBSFN logging is configured, the UE performs logging of measurements while in both RRC_IDLE and RRC_CONNECTED. Otherwise, the UE performs logging of measurements only while in RRC_IDLE.

VarLogMeasConfig UE variable

--- ASN1START

VarLogMeasConfig-r10 ::= SEQUENCE {
  areaConfiguration-r10 AreaConfiguration-r10 OPTIONAL,
  loggingDuration-r10   LoggingDuration-r10,
  loggingInterval-r10   LoggingInterval-r10
}

VarLogMeasConfig-r11 ::= SEQUENCE {

VarLogMeasConfig-r12 ::=  SEQUENCE {
  areaConfiguration-r10   AreaConfiguration-r10  OPTIONAL,
  areaConfiguration-v1130 AreaConfiguration-v1130  OPTIONAL,
  loggingDuration-r10    LoggingDuration-r10,
  loggingInterval-r10    LoggingInterval-r10,
  targetMBSFN-AreaList-r12 TargetMBSFN-AreaList-r12 OPTIONAL
}

VarLogMeasReport-r10 ::=    SEQUENCE {
  traceReference-r10     TraceReference-r10,
  traceRecordingSessionRef-r10  OCTET STRING (SIZE (2)),
  tce-Id-r10       OCTET STRING (SIZE (1)),
  plmn-Identity-r10     PLMN-Identity,
  absoluteTimeInfo-r10    AbsoluteTimeInfo-r10,
  logMeasInfoList-r10     LogMeasInfoList2-r10
}

VarMeasConfig ::=     SEQUENCE {
  -- Measurement identities
  measIdList       MeasIdToAddModList     OPTIONAL,
  measIdListExt-r12     MeasIdToAddModListExt-r12   OPTIONAL,
  measIdList-v1310      MeasIdToAddModList-v1310    OPTIONAL,
  measObjectList      MeasObjectToAddModList    OPTIONAL,
  measObjectListExt-r13    MeasObjectToAddModListExt-r13  OPTIONAL,
  measObjectList-v9i0     MeasObjectToAddModList-v9i0
}
-- Reporting configurations
reportConfigList     ReportConfigToAddModList   OPTIONAL,
-- Other parameters
quantityConfig      QuantityConfig      OPTIONAL,
measScaleFactor-r12     MeasScaleFactor-r12     OPTIONAL,
s-Measure       INTEGER (-140..-44)     OPTIONAL,
speedStatePars      CHOICE {
      release
        NULL,
        setup        SEQUENCE {
          mobilityStateParameters    MobilityStateParameters,
          timeToTrigger-SF     SpeedStateScaleFactors
        }
      }
    allowInterruptions-r11   BOOLEAN        OPTIONAL
}                  OPTIONAL,
-- ASN1STOP

-- VarMeasReportList

The UE variable VarMeasReportList includes information about the measurements for which the triggering conditions have been met.

VarMeasReportList UE variable

-- ASN1START
VarMeasReportList ::=    SEQUENCE (SIZE (1..maxMeasId)) OF VarMeasReport
VarMeasReportList-r12 ::=   SEQUENCE (SIZE (1..maxMeasId-r12)) OF VarMeasReport
VarMeasReport ::=     SEQUENCE {
      -- List of measurement that have been triggered
      measId        MeasId,
      measId-v1250      MeasId-v1250     OPTIONAL,
      cellsTriggeredList     CellsTriggeredList    OPTIONAL,
      csi-RS-TriggeredList-r12   CSI-RS-TriggeredList-r12  OPTIONAL,
      numberOfReportsSent     INTEGER
    }
CellsTriggeredList ::=    SEQUENCE (SIZE (1..maxCellMeas)) OF CHOICE {
      physCellIdEUTRA       PhysCellId,
      physCellIdUTRA       CHOICE {
        fdd          PhysCellIdUTRA-FDD,
        tdd          PhysCellIdUTRA-TDD
      },
      physCellIdGERAN       SEQUENCE {
        carrierFreq        CarrierFreqGERAN,
        physCellIdId        PhysCellIdGERAN
      },
      physCellIdCDMA2000      PhysCellIdCDMA2000,
      wlan-Identifiers-r13     WLAN-Identifiers-r12
    }
CSI-RS-TriggeredList-r12 ::=  SEQUENCE (SIZE (1..maxCSI-RS-Meas-r12)) OF MeasCSI-RS-Id-r12
-- ASN1STOP

-- VarMobilityHistoryReport

The UE variable VarMobilityHistoryReport includes the mobility history information.

-- ASN1START
VarMobilityHistoryReport-r12 ::= VisitedCellInfoList-r12
-- ASN1STOP

-- VarRLF-Report

The UE variable VarRLF-Report includes the radio link failure information or handover failure information.
**VarRLF-Report UE variable**

```asn1
VarRLF-Report-r10 ::= SEQUENCE {
    rlf-Report-r10 RLF-Report-r9,
    plmn-Identity-r10 PLMN-Identity
}
VarRLF-Report-r11 ::= SEQUENCE {
    rlf-Report-r10 RLF-Report-r9,
    plmn-IdentityList-r11 PLMN-IdentityList3-r11
}
```

**VarShortMAC-Input**

The UE variable *VarShortMAC-Input* specifies the input used to generate the shortMAC-I.

```asn1
VarShortMAC-Input ::= SEQUENCE {
    cellIdentity CellIdentity,
    physCellId PhysCellId,
    c-RNTI C-RNTI
}
```

**VarShortMAC-Input field descriptions**

- **cellIdentity**
  Set to CellIdentity of the current cell.

- **c-RNTI**
  Set to C-RNTI that the UE had in the PCell it was connected to prior to the failure.

- **physCellId**
  Set to the physical cell identity of the PCell the UE was connected to prior to the failure.

**VarShortResumeMAC-Input**

The UE variable *VarShortResumeMAC-Input* specifies the input used to generate the shortResumeMAC-I during RRC Connection Resume procedure.

```asn1
VarShortResumeMAC-Input-r13 ::= SEQUENCE {
    cellIdentity-r13 CellIdentity-r13,
    physCellId-r13 PhysCellId-r13,
    c-RNTI-r13 C-RNTI-r13,
    resumeDiscriminator-r13 BIT STRING(\text{SIZE}(1))
}
```

**VarShortResumeMAC-Input UE variable**

```asn1
VarShortResumeMAC-Input-r13 ::= SEQUENCE {
    cellIdentity-r13 CellIdentity-r13,
    physCellId-r13 PhysCellId-r13,
    c-RNTI-r13 C-RNTI-r13,
    resumeDiscriminator-r13 BIT STRING(\text{SIZE}(1))
}
```
**VarShortResumeMAC-Input field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cellIdentity</strong></td>
<td>Set to CellIdentity of the current cell.</td>
</tr>
<tr>
<td><strong>c-RNTI</strong></td>
<td>Set to C-RNTI that the UE had in the PCell it was connected to prior to suspension of the RRC connection.</td>
</tr>
<tr>
<td><strong>physCellId</strong></td>
<td>Set to the physical cell identity of the PCell the UE was connected to prior to suspension of the RRC connection.</td>
</tr>
<tr>
<td><strong>resumeDiscriminator</strong></td>
<td>A constant that allows differentiation in the calculation of the MAC-I for shortResumeMAC-I. The resumeDiscriminator is set to ‘1’</td>
</tr>
</tbody>
</table>

---

**VarWLAN-MobilityConfig**

The UE variable VarWLAN-MobilityConfig includes information about WLAN for access selection and mobility.

**VarWLAN-MobilityConfig UE variable**

```asn1
VarWLAN-MobilityConfig ::=  SEQUENCE {
    wlan-MobilitySet-r13     WLAN-Id-List-r13   OPTIONAL,
    successReportRequested     ENUMERATED {true}   OPTIONAL
}
```

**VarWLAN-MobilityConfig field descriptions**

- **wlan-MobilitySet**
  Indicates the WLAN mobility set configured.
- **successReportRequested**
  Indicates whether the UE shall report successful connection to WLAN. Applicable to LWA and LWIP.

---

**VarWLAN-Status**

The UE variable VarWLAN-Status includes information about the status of WLAN connection for LWA, RCLWI or LWIP.

**VarWLAN-Status UE variable**

```asn1
VarWLAN-Status-r13 ::=    SEQUENCE {
    status-r13        WLAN-Status-r13
}
```

**VarWLAN-Status field descriptions**

- **status**
  Indicates the connection status to WLAN and causes for connection failures.

---

**Multiplicity and type constraint definitions**

This section includes multiplicity and type constraints applicable (only) for UE variables.

```asn1
maxLogMeas-r10    INTEGER ::= 4060-- Maximum number of logged measurement entries that can be stored by the UE
```

---
7.1a NB-IoT 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.

– NBIOT-UE-Variables

This ASN.1 segment is the start of the NB-IoT UE variable definitions.

-- ASN1START
NBIOT-UE-Variables DEFINITIONS AUTOMATIC TAGS ::= BEGIN
IMPORTS
  VarShortMAC-Input,
  VarShortResumeMAC-Input-r13
FROM EUTRA-UE-Variables;
VarShortMAC-Input-NB-r13 ::= VarShortMAC-Input
VarShortResumeMAC-Input-NB-r13 ::= VarShortResumeMAC-Input-r13
-- ASN1STOP

– End of NBIOT-UE-Variables

-- ASN1START
END
-- ASN1STOP

7.2 Counters

<table>
<thead>
<tr>
<th>Counter</th>
<th>Reset</th>
<th>Incremented</th>
<th>When reaching max value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 7.3 Timers

### 7.3.1 Timers (Informative)

<table>
<thead>
<tr>
<th>Timer</th>
<th>Start</th>
<th>Stop</th>
<th>At expiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>T300</td>
<td>Transmission of RRCConnectionRequest or RRCConnectionResumeRequest</td>
<td>Reception of RRCConnectionSetup, RRCConnectionReject or RRCConnectionResume message, cell re-selection and upon abortion of connection establishment by upper layers</td>
<td>Perform the actions as specified in 5.3.3.6</td>
</tr>
<tr>
<td>NOTE1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T301</td>
<td>Transmission of RRCConnectionReestablishmentRequest</td>
<td>Reception of RRCConnectionReestablishment or RRCConnectionReestablishment Reject message as well as when the selected cell becomes unsuitable</td>
<td>Go to RRC_IDLE</td>
</tr>
<tr>
<td>NOTE1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T302</td>
<td>Reception of RRCConnectionReject while performing RRC connection establishment</td>
<td>Upon entering RRC_CONNECTED and upon cell re-selection</td>
<td>Inform upper layers about barring alleviation as specified in 5.3.3.7</td>
</tr>
<tr>
<td>T303</td>
<td>Access barred while performing RRC connection establishment for mobile originating calls</td>
<td>Upon entering RRC_CONNECTED and upon cell re-selection</td>
<td>Inform upper layers about barring alleviation as specified in 5.3.3.7</td>
</tr>
<tr>
<td>T304</td>
<td>Reception of RRCConnectionReconfiguration message including the MobilityControl Info or reception of MobilityFromEUTRACommand message including CellChangeOrder</td>
<td>Criterion for successful completion of handover within E-UTRA, handover to E-UTRA or cell change order is met (the criterion is specified in the target RAT in case of inter-RAT)</td>
<td>In case of cell change order from E-UTRA or intra E-UTRA handover, initiate the RRC connection re-establishment procedure; In case of handover to E-UTRA, perform the actions defined in the specifications applicable for the source RAT.</td>
</tr>
<tr>
<td>T305</td>
<td>Access barred while performing RRC connection establishment for mobile originating signalling</td>
<td>Upon entering RRC_CONNECTED and upon cell re-selection</td>
<td>Inform upper layers about barring alleviation as specified in 5.3.3.7</td>
</tr>
<tr>
<td>T306</td>
<td>Access barred while performing RRC connection establishment for mobile originating CS fallback.</td>
<td>Upon entering RRC_CONNECTED and upon cell re-selection</td>
<td>Inform upper layers about barring alleviation as specified in 5.3.3.7</td>
</tr>
<tr>
<td>T307</td>
<td>Reception of RRCConnectionReconfiguration message including MobilityControlInfoSCG</td>
<td>Successful completion of random access on the PSCell, upon initiating re-establishment and upon SCG release</td>
<td>Inform E-UTRAN about the SCG change failure by initiating the SCG failure information procedure as specified in 5.6.13.</td>
</tr>
<tr>
<td>Timer</td>
<td>Start</td>
<td>Stop</td>
<td>At expiry</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>T308</td>
<td>Access barred due to ACDC while performing RRC connection establishment subject to ACDC</td>
<td>Upon entering RRC_CONNECTED and upon cell re-selection</td>
<td>Inform upper layers about barring alleviation for ACDC as specified in 5.3.3.7</td>
</tr>
<tr>
<td>T310</td>
<td>Upon detecting physical layer problems for the PCell i.e. upon receiving N310 consecutive out-of-sync indications from lower layers</td>
<td>Upon receiving N311 consecutive in-sync indications from lower layers for the PCell, upon triggering the handover procedure and upon initiating the connection re-establishment procedure</td>
<td>If security is not activated: go to RRC_IDLE else: initiate the connection re-establishment procedure</td>
</tr>
<tr>
<td>T311</td>
<td>Upon initiating the RRC connection re-establishment procedure</td>
<td>Selection of a suitable E-UTRA cell or a cell using another RAT.</td>
<td>Enter RRC_IDLE</td>
</tr>
<tr>
<td>T312</td>
<td>Upon triggering a measurement report for a measurement identity for which T312 has been configured, while T310 is running</td>
<td>Upon receiving N311 consecutive in-sync indications from lower layers, upon triggering the handover procedure, upon initiating the connection re-establishment procedure, and upon the expiry of T310</td>
<td>If security is not activated: go to RRC_IDLE else: initiate the connection re-establishment procedure</td>
</tr>
<tr>
<td>T313</td>
<td>Upon detecting physical layer problems for the PSCell i.e. upon receiving N313 consecutive out-of-sync indications from lower layers</td>
<td>Upon receiving N314 consecutive in-sync indications from lower layers for the PSCell, upon initiating the connection re-establishment procedure, upon SCG release and upon receiving RRCConnectionReconfiguration including MobilityControlInfoSCG</td>
<td>Inform E-UTRAN about the SCG radio link failure by initiating the SCG failure information procedure as specified in 5.6.13.</td>
</tr>
<tr>
<td>T320</td>
<td>Upon receiving t320 or upon cell (re)selection to E-UTRA from another RAT with validity time configured for dedicated priorities (in which case the remaining validity time is applied).</td>
<td>Upon entering RRC_CONNECTED, when PLMN selection is performed on request by NAS, or upon cell (re)selection to another RAT (in which case the timer is carried on to the other RAT).</td>
<td>Discard the cell reselection priority information provided by dedicated signalling.</td>
</tr>
<tr>
<td>T321</td>
<td>Upon receiving measConfig including a reportConfig with the purpose set to reportCGI</td>
<td>Upon acquiring the information needed to set all fields of cellGlobalId for the requested cell, upon receiving measConfig that includes removal of the reportConfig with the purpose set to reportCGI</td>
<td>Initiate the measurement reporting procedure, stop performing the related measurements and remove the corresponding measId</td>
</tr>
<tr>
<td>T325</td>
<td>Timer (re)started upon receiving RRCConnectionReject message with deprioritisationTimer.</td>
<td></td>
<td>Stop deprioritisation of all frequencies or E-UTRA signalled by RRCConnectionReject.</td>
</tr>
<tr>
<td>Timer</td>
<td>Start</td>
<td>Stop</td>
<td>At expiry</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>T330</td>
<td>Upon receiving <em>LoggedMeasurementConfiguration</em> message</td>
<td>Upon log volume exceeding the suitable UE memory, upon initiating the release of <em>LoggedMeasurementConfiguration</em> procedure</td>
<td>Perform the actions specified in 5.6.6.4</td>
</tr>
<tr>
<td>T340</td>
<td>Upon transmitting <em>UEAssistanceInformation</em> message with <em>powerPrefIndication</em> set to normal</td>
<td>Upon initiating the connection re-establishment procedure</td>
<td>No action.</td>
</tr>
<tr>
<td>NOTE2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T350</td>
<td>Upon entering RRC_IDLE if t350 has been received in wlan-OffloadInfo.</td>
<td>Upon entering RRC_CONNECTED, or upon cell reselection.</td>
<td>Perform the actions specified in 5.6.12.4.</td>
</tr>
<tr>
<td>T351</td>
<td>Reception of <em>RRCConnectionReconfiguration</em> message including the association <em>Timer</em> in WLAN-MobilityConfig.</td>
<td>Upon successful connection to WLAN, upon WLAN connection failure, upon leaving RRC_CONNECTED, upon triggering the handover procedure, or upon initiating the connection re-establishment procedure.</td>
<td>Perform WLAN Connection Status Reporting specified in 5.6.15.2.</td>
</tr>
<tr>
<td>T360</td>
<td>Upon performing the redistribution target selection as specified in TS 36.304 [4].</td>
<td>Upon entering RRC_CONNECTED, upon receiving a Paging message including <em>redistributionIndication</em>; upon reselecting a cell not belonging to the redistribution target.</td>
<td>Stop considering a frequency or cell to be redistribution target, and perform the redistribution target selection if the condition specified in TS 36.304 [4] is met.</td>
</tr>
<tr>
<td>T370</td>
<td>Upon receiving <em>SL-DiscConfig</em> including a <em>discSysInfoToReportConfig</em> set to setup.</td>
<td>Upon initiating the transmission of <em>SidelinkUEInformation</em> including <em>discSysInfoReportFreqList</em>, upon receiving <em>SL-DiscConfig</em> including <em>discSysInfoToReportConfig</em> set to <em>release</em>, upon handover and re-establishment.</td>
<td>Release <em>discSysInfoToReportConfig</em>.</td>
</tr>
<tr>
<td>NOTE1</td>
<td>Only the timers marked with &quot;NOTE1&quot; are applicable to NB-IoT.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOTE2</td>
<td>The behaviour as specified in 7.3.2 applies.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 7.3.2 Timer handling

When the UE applies zero value for a timer, the timer shall be started and immediately expire unless explicitly stated otherwise.

### 7.4 Constants

<table>
<thead>
<tr>
<th>Constant</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>N310</td>
<td>Maximum number of consecutive &quot;out-of-sync&quot; indications for the PCell received from lower layers</td>
</tr>
<tr>
<td>N311</td>
<td>Maximum number of consecutive &quot;in-sync&quot; indications for the PCell received from lower layers</td>
</tr>
<tr>
<td>N313</td>
<td>Maximum number of consecutive &quot;out-of-sync&quot; indications for the PSCell received from lower layers</td>
</tr>
</tbody>
</table>
8 Protocol data unit abstract syntax

8.1 General

The RRC PDU contents in clause 6, clause 9.3.2 and clause 10 are described using abstract syntax notation one (ASN.1) as specified in ITU-T Rec. X.680 [13] and X.681 [14]. 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 [15].

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, BR-BCCH, CCCH or MCCH) 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

- when delivering an RRC PDU from the PDCP layer, the first bit of the PDCP SDU shall represent the first bit of the RRC PDU and onwards; and

- when delivering 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, BCCH and BR-BCCH.

Padding bits shall be set to 0 and the number of padding bits is a multiple of 8.

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.

9.1 Specified configurations

9.1.1 Logical channel configurations

9.1.1.1 BCCH configuration

Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDCP configuration</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td>TM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC configuration</td>
<td>TM</td>
<td></td>
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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

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<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td>TM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC configuration</td>
<td>Normal MAC headers are used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logical channel configuration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>priority</td>
<td>1</td>
<td>Highest priority</td>
<td></td>
</tr>
<tr>
<td>prioritisedBitRate</td>
<td>infinity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bucketSizeDuration</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>logicalChannelGroup</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>logicalChannelSR-Mask-r9</td>
<td>release</td>
<td></td>
<td>v920</td>
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### 9.1.1.3 PCCH configuration

#### Parameters

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<tr>
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<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td>TM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC configuration</td>
<td>TM</td>
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NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

### 9.1.1.4 MCCH and MTCH configuration

#### Parameters

<table>
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</thead>
<tbody>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td>UM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sn-FieldLength</td>
<td>size5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Reordering</td>
<td>0</td>
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</tr>
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</table>

### 9.1.1.5 SBCCH configuration

#### Parameters

<table>
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<tr>
<td>PDCP configuration</td>
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<td></td>
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NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

9.1.1.6 STCH configuration

Parameters

<table>
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<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>discardTimer</td>
<td>Undefined</td>
<td>Up to UE implementation</td>
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</tr>
<tr>
<td>pdcp-SN-Size</td>
<td>16</td>
<td></td>
<td></td>
</tr>
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<td>maxCID</td>
<td>15</td>
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<tr>
<td>profiles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td>Uni-directional UM RLC</td>
<td>UM window size is set to 0</td>
<td></td>
</tr>
<tr>
<td>sn-FieldLength</td>
<td>5</td>
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<tr>
<td>logicalChannelIdentity</td>
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<td>Selected by the transmitting UE, up to UE implementation</td>
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</tr>
<tr>
<td>Logical channel configuration</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>priority</td>
<td>Undefined</td>
<td>Selected by the transmitting UE, up to UE implementation</td>
<td></td>
</tr>
<tr>
<td>prioritisedBitRate</td>
<td>Undefined</td>
<td>Selected by the transmitting UE, up to UE implementation</td>
<td></td>
</tr>
<tr>
<td>bucketSizeDuration</td>
<td>Undefined</td>
<td>Selected by the transmitting UE, up to UE implementation</td>
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</tr>
<tr>
<td>logicalChannelGroup</td>
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9.1.1.7 SC-MCCH and SC-MTCH configuration

Parameters

<table>
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<th>Semantics description</th>
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</thead>
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<tr>
<td>PDCP configuration</td>
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<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td>UM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sn-FieldLength</td>
<td>size5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Reordering</td>
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<td></td>
<td></td>
</tr>
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</table>

9.1.1.8 BR-BCCH configuration

Parameters
<table>
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<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
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</thead>
<tbody>
<tr>
<td>PDCP configuration</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td>TM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC configuration</td>
<td>TM</td>
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</tr>
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**NOTE:** RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

### 9.1.2 SRB configurations

#### 9.1.2.1 SRB1

**Parameters**

<table>
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<th>Ver</th>
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</thead>
<tbody>
<tr>
<td>RLC configuration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>logicalChannelIdentity</td>
<td>1</td>
<td></td>
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</table>

#### 9.1.2.1a SRB1bis

**Parameters**

<table>
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<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLC configuration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>logicalChannelIdentity</td>
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</table>

#### 9.1.2.2 SRB2

**Parameters**

<table>
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<th>Value</th>
<th>Semantics description</th>
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<td></td>
<td></td>
</tr>
<tr>
<td>logicalChannelIdentity</td>
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</tr>
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### 9.2 Default radio configurations

The following sections only list default values for REL-8 parameters included in protocol version v8.5.0. For all fields introduced in a later protocol version, the default value is "released" unless explicitly specified otherwise. If UE is to apply default configuration while it is configured with some critically extended fields, the UE shall apply the original version with only default values. For the following fields, introduced in a protocol version later than v8.5.0, the default corresponds with "value not applicable":

- `codeBookSubsetRestriction-v920`;
- `pmi-RI-Report`;

**NOTE 1:** Value "N/A" indicates that the UE does not apply a specific value (i.e. upon switching to a default configuration, E-UTRAN can not assume the UE keeps the previously configured value). This implies that E-UTRAN needs to configure a value before invoking the related functionality.

**NOTE 2:** In general, the signalling should preferably support a "release" option for fields introduced after v8.5.0. 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.
9.2.1 SRB configurations

9.2.1.1 SRB1

Parameters

<table>
<thead>
<tr>
<th>Name</th>
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<th>NB-IoT</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLC configuration CHOICE</td>
<td>am</td>
<td>am</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ul-RLC-Config</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;t-PollRetransmit</td>
<td>ms45</td>
<td>ms25000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;pollPDU</td>
<td>infinity N/A</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;pollByte</td>
<td>infinity N/A</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;maxRetxThreshold</td>
<td>t4</td>
<td>t4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dl-RLC-Config</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;t-Reordering</td>
<td>ms35</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;t-StatusProhibit</td>
<td>ms0</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;enableStatusReportSN-Gap</td>
<td>N/A</td>
<td>disabled</td>
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</table>

Logical channel configuration

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>priority</td>
<td>1</td>
<td>Highest priority</td>
</tr>
<tr>
<td>prioritisedBitRate</td>
<td>infinity N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>bucketSizeDuration</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>logicalChannelGroup</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>logicalChannelISR-Prohibit</td>
<td>N/A</td>
<td>TRUE</td>
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9.2.1.2 SRB2

Parameters

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<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLC configuration CHOICE</td>
<td>am</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ul-RLC-Config</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;t-PollRetransmit</td>
<td>ms45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;pollPDU</td>
<td>infinity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;pollByte</td>
<td>infinity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;maxRetxThreshold</td>
<td>t4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dl-RLC-Config</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;t-Reordering</td>
<td>ms35</td>
<td></td>
<td></td>
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<tr>
<td>&gt;t-StatusProhibit</td>
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Logical channel configuration
### 9.2.2 Default MAC main configuration

Parameters

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<td>maxHARQ-tx</td>
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<td>retxBSR-Timer</td>
<td>sf2560</td>
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<td>drx-Config</td>
<td>release</td>
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<td>phr-Config</td>
<td>release</td>
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### 9.2.3 Default semi-persistent scheduling configuration

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<tr>
<th>SPS-Config</th>
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<td>&gt;sps-ConfigDL</td>
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<td>&gt;sps-ConfigUL</td>
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### 9.2.4 Default physical channel configuration

Parameters (not applicable for NB-IoT)

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<td>&gt;p-a</td>
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<td>PUCCH-ConfigDedicated</td>
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<tr>
<td>&gt;tdd-AckNackFeedbackMode</td>
<td>bundling</td>
<td>Only valid for TDD mode</td>
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</tr>
<tr>
<td>&gt;ackNackRepetition</td>
<td>release</td>
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<tr>
<td>PUSCH-ConfigDedicated</td>
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<td>&gt;betaOffset-ACK-Index</td>
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<td>&gt;betaOffset-RI-Index</td>
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<td>&gt;betaOffset-CQI-Index</td>
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</tr>
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<td>Name</td>
<td>Value</td>
<td>Semantics description</td>
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<td>filterCoefficient</td>
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<td>tpc-pdcch-ConfigPUCCH</td>
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<td></td>
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<tr>
<td>tpc-pdcch-ConfigPUSCH</td>
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<td></td>
</tr>
<tr>
<td>CQI-ReportConfig</td>
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<td>cqi-ReportModeAperiodic</td>
<td>N/A</td>
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<td>nomPDSCH-RS-EPRE-Offset</td>
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<tr>
<td>SoundingRS-UL-ConfigDedicated</td>
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<td>AntennaInfoDedicated</td>
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<td>transmissionMode</td>
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<td></td>
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<td>codebookSubsetRestriction</td>
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<td></td>
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<td>SchedulingRequestConfig</td>
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Parameters applicable for NB-IoT

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<th>Semantics description</th>
<th>Ver</th>
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<td>ack-NACK-NumRepetitions</td>
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<tr>
<td>npusch-AllSymbols</td>
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<td>UplinkPowerControlDedicated</td>
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9.2.5 Default values timers and constants

Parameters

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</tbody>
</table>
### 9.3 Sidelink pre-configured parameters

#### 9.3.1 Specified parameters

This section only lists parameters whose value is specified in the standard.

#### Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>n310</td>
<td>n1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t311</td>
<td>ms1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n311</td>
<td>n1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 9.3.2 Pre-configurable parameters

This ASN.1 segment is the start of the E-UTRA definitions of pre-configured sidelink parameters.

**NOTE 1:** Upper layers are assumed to provide a set of pre-configured parameters that are valid at the current UE location if any, see TS 24.334 [69, 10.2].

```asn1
-- ASN1START
EUTRA-Sidelink-Preconf DEFINITIONS AUTOMATIC TAGS ::= BEGIN

IMPORTS
   AdditionalSpectrumEmission,
   ARFCN-ValueEUTRA-r9,
   FilterCoefficient,
   maxSL-TxPool-r12,
   maxSL-CommRxPoolPreconf-v1310,
   maxSL-CommTxPoolPreconf-v1310,
   maxSL-DiscRxPoolPreconf-r13,
   maxSL-DiscTxPoolPreconf-r13,
   P-Max,
   ReselectionInfoRelay-r13,
   SL-CF-Len-r12,
   SL-HoppingConfigComm-r12,
   SL-OffsetIndicatorSync-r12,
   SL-PeriodComm-r12,
   RSRP-RangeSL3-r12,
   SL-PriorityList-r13,
   SL-TF-ResourceConfig-r12,
   SL-TRPT-Subset-r12,
   P0-SL-r12,
   TDD-ConfigSL-r12
```
---

**SL-Preconfiguration**

The IE **SL-Preconfiguration** includes the sidelink pre-configured parameters.

---

**SL-Preconfiguration information elements**

```asn1
FROM EUTRA-RRC-Definitions;

-- ASN1START

SL-Preconfiguration-r12 ::= SEQUENCE {
  preconfigGeneral-r12  SL-PreconfigGeneral-r12,
  preconfigSync-r12     SL-PreconfigSync-r12,
  preconfigComm-r12     SL-PreconfigCommPoolList4-r12,
  ...
  [preconfigComm-v1310  SEQUENCE {
    commRxPoolList-r13   SL-PreconfigCommRxPoolList-r13,
    commTxPoolList-r13   SL-PreconfigCommTxPoolList-r13  OPTIONAL,
  }]  OPTIONAL,
  preconfigDisc-r13     SEQUENCE {
    discRxPoolList-r13   SL-PreconfigDiscRxPoolList-r13,
    discTxPoolList-r13   SL-PreconfigDiscTxPoolList-r13  OPTIONAL,
  }]  OPTIONAL,
  preconfigRelay-r13    SL-PreconfigRelay-r13  OPTIONAL
}

SL-PreconfigGeneral-r12 ::= SEQUENCE {
  -- PDCP configuration
  rohc-Profiles-r12     SEQUENCE {
    profile0x0001-r12     BOOLEAN,
    profile0x0002-r12     BOOLEAN,
    profile0x0004-r12     BOOLEAN,
    profile0x0006-r12     BOOLEAN,
    profile0x0101-r12     BOOLEAN,
    profile0x0102-r12     BOOLEAN,
    profile0x0104-r12     BOOLEAN,
  },
  -- Physical configuration
  carrierFreq-r12       ARFCN-ValueEUTRA-r9,
  maxTxPower-r12        P-Max,
  additionalSpectrumEmission-r12  AdditionalSpectrumEmission,
  sl-bandwidth-r12      ENUMERATED {n6, n15, n25, n50, n75, n100},
  tdd-ConfigSL-r12      TDD-ConfigSL-r12,
  reserved-r12          BIT STRING (SIZE (19)),
  ...
}

SL-PreconfigSync-r12 ::= SEQUENCE {
  syncCP-Len-r12        SL-CP-Len-r12,
  syncOffsetIndicator1-r12    SL-OffsetIndicatorSync-r12,
  syncOffsetIndicator2-r12    SL-OffsetIndicatorSync-r12,
  syncTxParameters-r12      P0-SL-r12,
  syncTxThresholdSL3-r12    RSRP-RangeSL3-r12,
  filterCoefficient-r12    FilterCoefficient,
  syncRefMinHyst-r12       ENUMERATED {dB0, dB3, dB6, dB9, dB12},
  syncRefDiffHyst-r12      ENUMERATED {dB0, dB3, dB6, dB9, dB12, dBinf},
  ...
  [syncTxPeriodic-r13     ENUMERATED {true}  OPTIONAL
  ]]}

SL-PreconfigCommPoolList4-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-PreconfigCommPool-r12

SL-PreconfigCommRxPoolList-r13 ::= SEQUENCE (SIZE (1..maxSL-CommRxPoolPreconf-v1310)) OF SL-PreconfigCommPool-r12

SL-PreconfigCommTxPoolList-r13 ::= SEQUENCE (SIZE (1..maxSL-CommTxPoolPreconf-v1310)) OF SL-PreconfigCommPool-r12

SL-PreconfigCommPool-r12 ::= SEQUENCE {
  ...}

-- ASN1STOP
```
-- This IE is same as SL-CommResourcePool with rxParametersNCell absent
  sc-CP-Len-r12 SL-CP-Len-r12,
  sc-Period-r12 SL-PeriodComm-r12,
  sc-TF-ResourceConfig-r12 SL-TF-ResourceConfig-r12,
  sc-TxParameters-r12 P0-SL-r12,
  data-CP-Len-r12 SL-CP-Len-r12,
  data-TF-ResourceConfig-r12 SL-TF-ResourceConfig-r12,
  dataHoppingConfig-r12 SL-HoppingConfigComm-r12,
  dataTxParameters-r12 P0-SL-r12,
  trpt-Subset-r12 SL-TRPT-Subset-r12,
  ...,
  [[ priorityList-r13 SL-PriorityList-r13 OPTIONAL -- For Tx ]]}

SL-PreconfigDiscRxPoolList-r13 ::= SEQUENCE (SIZE (1..maxSL-DiscRxPoolPreconf-r13)) OF SL-PreconfigDiscPool-r13

SL-PreconfigDiscTxPoolList-r13 ::= SEQUENCE (SIZE (1..maxSL-DiscTxPoolPreconf-r13)) OF SL-PreconfigDiscPool-r13

SL-PreconfigDiscPool-r13 ::= SEQUENCE {
  -- This IE is same as SL-DiscResourcePool with rxParameters absent
  cp-Len-r13 SL-CP-Len-r12,
  discPeriod-r13 ENUMERATED {rf4, rf6, rf7, rf8, rf12, rf14, rf16, rf24, rf28, rf32, rf64, rf128, rf256, rf512, rf1024, spare},
  numRetx-r13 INTEGER (0..3),
  numRepetition-r13 INTEGER (1..50),
  tf-ResourceConfig-r13 SL-TF-ResourceConfig-r12,
  txParameters-r13 SEQUENCE {
  txParametersGeneral-r13 P0-SL-r12,
  txProbability-r13 ENUMERATED (p25, p50, p75, p100) OPTIONAL,
  ...}
}

SL-PreconfigRelay-r13 ::= SEQUENCE {
  reselectionInfoOoC-r13 ReselectionInfoRelay-r13
}

END

-- ASN1STOP

SL-Preconfiguration field descriptions

carrierFreq
Indicates the carrier frequency for out of coverage sidelink communication and sidelink discovery. In case of FDD it is uplink carrier frequency and the corresponding downlink frequency can be determined from the default TX-RX frequency separation defined in TS 36.101 [42, table 5.7.3-1].

commRxPoolList
Indicates a list of reception pools for sidelink communication in addition to the resource pools indicated by preconfigComm.

commTxPoolList
Indicates a list of transmission pools for sidelink communication in addition to the first resource pool within preconfigComm.

preconfigComm
Indicates a list of resource pools. The first resource pool in the list is used for both reception and transmission of sidelink communication. The other resource pools, if present, are only used for reception of sidelink communication.

syncRefDiffHyst
Hysteresis when evaluating a SyncRef UE using relative comparison. Value dB0 corresponds to 0 dB, dB3 to 3 dB and so on. value dBInf corresponds to infinite dB.

syncRefMinHyst
Hysteresis when evaluating a SyncRef UE using absolute comparison. Value dB0 corresponds to 0 dB, dB3 to 3 dB and so on.

NOTE 1: The network may configure one or more of the reception only resource pools in preconfigComm to cover reception from in coverage UEs using scheduled resource allocation. For such a resource pool the network should set all bits of subframeBitmap to 1 and offsetIndicator to indicate the subframe immediately following the sidelink control information.
NOTE 2: The network should ensure that the resources defined by the first entry in `preconfigComm` (used for transmission by an out of coverage UE) do not overlap with those of the pool(s) covering scheduled transmissions by in coverage UEs. Furthermore, the network should ensure that for none of the entries in `preconfigComm` the resources defined by `sc-TF-ResourceConfig` overlap.

10 Radio information related interactions between network nodes

10.1 General

This section 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 E-UTRA radio interface, i.e. the same transfer syntax and protocol extension mechanisms apply.

10.2 Inter-node RRC messages

10.2.1 General

This section specifies RRC messages that are sent either across the X2- or the S1-interface, either to or from the eNB, 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.

---

**EUTRA-InterNodeDefinitions**

This ASN.1 segment is the start of the E-UTRA inter-node PDU definitions.

---

```asn1
EUTRA-InterNodeDefinitions DEFINITIONS AUTOMATIC TAGS ::= BEGIN IMPORTS AntennaInfoCommon,  AntennaInfoDedicated-v10i0,  ARFCN-ValueEUTRA,  ARFCN-ValueEUTRA-v9e0,  ARFCN-ValueEUTRA-r9,  CellIdentity,  C-RNTI,  DL-DCCCH-Message,  DRB-Identity,  DRB-ToReleaseList,  FreqBandIndicator-r11,  InDeviceCoexIndication-r11,  MasterInformationBlock,  maxBands,  maxFreq,  maxDRB,  maxSCell-r10,  maxSCell-r13,  maxServCell-r10,  maxServCell-r13,  MBMSInterestIndication-r11,  MeasConfig,  MeasGapConfig,  MeasResultForRSSI-r13,  OtherConfig-r9,  PhysCellId,  P-Max,  PowerCoordinationInfo-r12,  SidelinkUEInformation-r12,  SL-CommConfig-r12,  SL-CommConfig-r12,  RadioResourceConfigDedicated,  RadioResourceConfigDedicated-v1370,  RadioResourceConfigDedicated-v13c0,END
```
10.2.2 Message definitions

-- HandoverCommand

This message is used to transfer the handover command generated by the target eNB.

Direction: target eNB to source eNB/ source RAN

---

**HandoverCommand message**

---

HandoverCommand := SEQUENCE { criticalExtensions CHOICE { c1 CHOICE{ handoverCommand-r8 HandoverCommand-r8-IEs, spare7 NULL, spare6 NULL, spare5 NULL, spare4 NULL, spare3 NULL, spare2 NULL, spare1 NULL }, criticalExtensionsFuture SEQUENCE {} } } HandoverCommand-r8-IEs := SEQUENCE { handoverCommandMessage OCTET STRING (CONTAINING DL-DCCH-Message), nonCriticalExtension SEQUENCE [] }  

---

**HandoverCommand field descriptions**

**handoverCommandMessage**

Contains the entire DL-DCCH-Message including the **RRConnectionReconfiguration** message used to perform handover within E-UTRAN or handover to E-UTRAN, generated (entirely) by the target eNB.
NOTE: The source BSC, in case of inter-RAT handover from GERAN to E-UTRAN, expects that the HandoverCommand message includes DL-DCH-Message only. Thus, criticalExtensionsFuture, spare1-spare7 and nonCriticalExtension should not be used regardless whether the source RAT is E-UTRAN, UTRAN or GERAN.

-- **HandoverPreparationInformation**

This message is used to transfer the E-UTRA RRC information used by the target eNB during handover preparation, including UE capability information.

Direction: source eNB/ source RAN to target eNB

**HandoverPreparationInformation message**

```asn1
HandoverPreparationInformation ::= SEQUENCE {
  criticalExtensions   CHOICE {
    c1   CHOICE {
      handoverPreparationInformation-r8 HandoverPreparationInformation-r8-IEs,
      spare7 NULL,
      spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}

HandoverPreparationInformation-r8-IEs ::= SEQUENCE {
  ue-RadioAccessCapabilityInfo  UE-CapabilityRAT-ContainerList,
  as-Config       AS-Config     OPTIONAL,  -- Cond HO
  rrm-Config       RRM-Config     OPTIONAL,
  as-Context       AS-Context    OPTIONAL,  -- Cond HO
  nonCriticalExtension    HandoverPreparationInformation-v920-IEs  OPTIONAL
}

HandoverPreparationInformation-v920-IEs ::= SEQUENCE {
  ue-ConfigRelease-r9     ENUMERATED {
    rel9, rel10, rel11, rel12, v10j0, v11e0,
    v1280, rel13, ...}   OPTIONAL, -- Cond HO2
  nonCriticalExtension    HandoverPreparationInformation-v9d0-IEs  OPTIONAL
}

HandoverPreparationInformation-v9d0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING (CONTAINING HandoverPreparationInformation-v9j0-IEs) OPTIONAL,
  nonCriticalExtension    HandoverPreparationInformation-v9e0-IEs   OPTIONAL
}

-- Latenon-critical extensions:
HandoverPreparationInformation-v9j0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING     OPTIONAL,
  nonCriticalExtension    HandoverPreparationInformation-v10j0-IEs  OPTIONAL
}

HandoverPreparationInformation-v10j0-IEs ::= SEQUENCE {
  as-Config-v10j0      AS-Config-v10j0   OPTIONAL,
  nonCriticalExtension    HandoverPreparationInformation-v10x0-IEs  OPTIONAL
}

HandoverPreparationInformation-v10x0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING   OPTIONAL,
  nonCriticalExtension    HandoverPreparationInformation-v13c0-IEs  OPTIONAL
}

HandoverPreparationInformation-v13c0-IEs ::= SEQUENCE {
  as-Config-v13c0      AS-Config-v13c0   OPTIONAL,
  nonCriticalExtension    SEQUENCE {}    OPTIONAL
}

-- Regular non-critical extensions:
HandoverPreparationInformation-v9e0-IEs ::= SEQUENCE {
```
HandoverPreparationInformation field descriptions

**as-Config**
The radio resource configuration. Applicable in case of intra-E-UTRA handover. If the target receives an incomplete `MeasConfig` and `RadioResourceConfigDedicated` in the `as-Config`, the target eNB may decide to apply the full configuration option based on the `ue-ConfigRelease`.

**as-Context**
Local E-UTRAN context required by the target eNB.

**rrm-Config**
Local E-UTRAN context used depending on the target node’s implementation, which is mainly used for the RRM purpose.

**ue-ConfigRelease**
Indicates the RRC protocol release or version applicable for the current UE configuration. This could be used by target eNB to decide if the full configuration approach should be used. If this field is not present, the target assumes that the current UE configuration is based on the release 8 version of RRC protocol. NOTE 1.

**ue-RadioAccessCapabilityInfo**
For E-UTRA radio access capabilities, it is up to E-UTRA how the backward compatibility among `supportedBandCombinationReduced`, `supportedBandCombination` and `supportedBandCombinationAdd` is ensured. If `supportedBandCombinationReduced` and `supportedBandCombinationAdd` are included into `ueCapabilityRAT-Container`, it can be assumed that the value of fields, `requested Bands`, `reducedIntNonContCombRequested` and `requestedCCsXL` are consistent with all supported band combination fields. NOTE 2.

**ue-SupportedEARFCN**
Includes UE supported EARFCN of the handover target E-UTRA cell if the target E-UTRA cell belongs to multiple frequency bands.

NOTE 1: The source typically sets the `ue-ConfigRelease` to the release corresponding with the current dedicated radio configuration. The source may however also consider the common radio resource configuration e.g. in case interoperability problems would appear if the UE temporarily continues extensions of this part of the configuration in a target PCell not supporting them.

NOTE 2: The following table indicates per source RAT whether RAT capabilities are included or not.

<table>
<thead>
<tr>
<th>Source RAT</th>
<th>E-UTRA capabilities</th>
<th>UTRA capabilities</th>
<th>GERAN capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTRAN</td>
<td>Included</td>
<td>May be included, ignored by eNB if received</td>
<td>May be included</td>
</tr>
<tr>
<td>GERAN CS</td>
<td>Excluded</td>
<td>May be included, ignored by eNB if received</td>
<td>Included</td>
</tr>
<tr>
<td>GERAN PS</td>
<td>Excluded</td>
<td>May be included, ignored by eNB if received</td>
<td>Included</td>
</tr>
<tr>
<td>E-UTRAN</td>
<td>Included</td>
<td>May be included</td>
<td>May be included</td>
</tr>
</tbody>
</table>
**Conditional presence | Explanation**

| HO   | The field is mandatory present in case of handover within E-UTRA; otherwise the field is not present. |
| HO2  | The field is optional present in case of handover within E-UTRA; otherwise the field is not present. |
| HO3  | The field is optional present in case of handover from GERAN to E-UTRA, otherwise the field is not present. |

---

**SCG-Config**

This message is used to transfer the SCG radio configuration generated by the SeNB.

**Direction:** Secondary eNB to master eNB

**SCG-Config message**

```asn1
-- ASN1START
SCG-Config-r12 ::= SEQUENCE {
    criticalExtensions     CHOICE {
        c1         CHOICE{
            scg-Config-r12     SCG-Config-r12-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture   SEQUENCE {} 
    }
}
SCG-Config-r12-IEs ::= SEQUENCE {
    scg-RadioConfig-r12     SCG-ConfigPartSCG-r12    OPTIONAL,
    nonCriticalExtension     SCG-Config-v12x0-IEs    OPTIONAL
}
SCG-Config-v12x0-IEs ::= SEQUENCE {
    -- Following field is only for late non-critical extensions from REL-12
    lateNonCriticalExtension   OCTET STRING      OPTIONAL,
    -- Following field is only for late non-critical extensions from REL-13 onwards
    nonCriticalExtension    SCG-Config-v13c0-IEs    OPTIONAL
}
SCG-Config-v13c0-IEs ::= SEQUENCE {
    scg-RadioConfig-v13c0    SCG-ConfigPartSCG-v13c0    OPTIONAL,
    nonCriticalExtension     SEQUENCE {}       OPTIONAL
}
-- ASN1STOP
```

**SCG-Config field descriptions**

- **scg-RadioConfig-r12**
  Includes the change of the dedicated SCG configuration and, upon addition of an SCG cell, the common SCG configuration.
  The SeNB only includes a new SCG cell in response to a request from MeNB, but may include release of an SCG cell release or release of the SCG part of an SCG/Split DRB without prior request from MeNB. The SeNB does not use this field to initiate release of the SCG.

---

**SCG-ConfigInfo**

This message is used by MeNB to request the SeNB to perform certain actions e.g. to establish, modify or release an SCG, and it may include additional information e.g. to assist the SeNB with assigning the SCG configuration.

**Direction:** Master eNB to secondary eNB

**SCG-ConfigInfo message**

```asn1
-- ASN1START
SCG-ConfigInfo-r12 ::= SEQUENCE {
    
}
-- ASN1STOP
```
criticalExtensions
  c1
    CHOICE {
      scg-ConfigInfo-r12   SCG-ConfigInfo-r12-IEs,
        spare7 NULL,
        spare6 NULL, spare5 NULL, spare4 NULL,
        spare3 NULL, spare2 NULL, spare1 NULL
    },
  criticalExtensionsFuture   SEQUENCE ()
}

SCG-ConfigInfo-r12-IEs ::=  SEQUENCE {
  radioResourceConfigDedMCG-r12    RadioResourceConfigDedicated  OPTIONAL,
  sCellToAddModListMCG-r12    SCellToAddModList-r10    OPTIONAL,
  measGapConfig-r12    MeasGapConfig  OPTIONAL,
  powerCoordinationInfo-r12    PowerCoordinationInfo-r12  OPTIONAL,
  scg-RadioConfig-r12    SCG-ConfigPartSCG-r12    OPTIONAL,
  eutra-CapabilityInfo-r12    OCTET STRING (CONTAINING UECapabilityInformation)  OPTIONAL,
  mbmsInterestIndication-r12   OCTET STRING (CONTAINING MBMSInterestIndication-r11) OPTIONAL,
  measResultServCellListSCG-r12 MeasResultServCellListSCG-r12  OPTIONAL,
  drb-ToAddModListSCG-r12    DRB-InfoListSCG-r12     OPTIONAL,
  drb-ToReleaseListSCG-r12    DRB-ToReleaseList     OPTIONAL,
  sCellToReleaseListSCG-r12    SCellToReleaseList-r10    OPTIONAL,
  p-Max-r12       P-Max        OPTIONAL,
  nonCriticalExtension   SCG-ConfigInfo-v1310-IEs   OPTIONAL
}

SCG-ConfigInfo-v1310-IEs ::=  SEQUENCE {
  measResultSSTD-r13    MeasResultSSTD-r13     OPTIONAL,
  sCellToAddModListMCG-Ext-r13  SCellToAddModListExt-r13   OPTIONAL,
  measResultServCellListSCG-Ext-r13 MeasResultServCellListSCG-Ext-r13 OPTIONAL,
  sCellToReleaseListSCG-Ext-r13 SCellToReleaseListExt-r13  OPTIONAL,
  nonCriticalExtension   SCG-ConfigInfo-v1330-IEs   OPTIONAL
}

SCG-ConfigInfo-v1330-IEs ::=  SEQUENCE {
  measResultListRSSI-SCG-r13  MeasResultListRSSI-SCG-r13   OPTIONAL,
  nonCriticalExtension   SEQUENCE {}       OPTIONAL
}

DRB-InfoListSCG-r12 ::=    SEQUENCE (SIZE (1..maxDRB)) OF DRB-InfoSCG-r12

DRB-InfoSCG-r12 ::=    SEQUENCE {
  eps-BearerIdentity-r12   INTEGER (0..15)    OPTIONAL, -- Cond DRB-Setup
  drb-Type-r12     ENUMERATED {split, scg}  OPTIONAL, -- Cond DRB-Setup
  ...
}

SCellToAddModListSCG-r12 ::= SEQUENCE (SIZE (1..maxSCell-r10)) OF Cell-ToAddMod-r12

SCellToAddModListSCG-Ext-r13 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF Cell-ToAddMod-r12

Cell-ToAddMod-r12 ::= SEQUENCE {
  sCellIndex-r12      SCellIndex-r10,
  d1-CarrierFreq-r12     ARFCN-ValueEUTRA-r9
}
MeasResultServCellListSCG-Ext-r13 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF MeasResultServCellSCG-r12

MeasResultServCellSCG-r12 ::= SEQUENCE {
  servCellId-r12     ServCellIndex-r10,
  measResultSCell-r12     SEQUENCE {
    rsrpResultSCell-r12     RSRP-Range,
    rsrqResultSCell-r12     RSRQ-Range
  },
  ...,
  [ servCellId-r13     ServCellIndex-r13  OPTIONAL,
    measResultSCell-r13     SEQUENCE {
      rs-sinr-ResultSCell-r13    RS-SINR-Range-r13
    }               OPTIONAL
  ]
}

MeasResultListRSSI-SCG-r13 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF MeasResultRSSI-SCG-r13

MeasResultRSSI-SCG-r13 ::=   SEQUENCE {
  servCellId-r13     ServCellIndex-r13,
  measResultForRSSI-r13    MeasResultForRSSI-r13
}

SCG-ConfigRestrictInfo-r12 ::=  SEQUENCE {
  maxSCH-TB-BitsDL-r12    INTEGER (1..100),
  maxSCH-TB-BitsUL-r12    INTEGER (1..100)
}

-- ASN1STOP

**SCG-ConfigInfo field descriptions**

**drb-ToAddModListSCG**
Includes DRBs the SeNB is requested to establish or modify (DRB type change).

**drb-ToReleaseListSCG**
Includes DRBs the SeNB is requested to release.

**maxSCH-TB-BitsXL**
Indicates the maximum DL-SCH/UL-SCH TB bits that may be scheduled in a TTI. Specified as a percentage of the value defined for the applicable UE category.

**measGapConfig**
Includes the current measurement gap configuration.

**measResultListRSSI-SCG**
Includes RSSI measurement results of SCG (serving) cells.

**measResultSSTD**
Includes measurement results of UE SFN and Subframe Timing Difference between the PCell and the PSCell.

**radioResourceConfigDedMCG**
Includes the current dedicated MCG radio resource configuration.

**sCellIndex**
If sCellIndex-r13 is present, sCellIndex-r12 shall be ignored.

**sCellToAddModListMCG**
Includes the current MCG SCell configuration. Field **sCellToAddModListMCG** is used to add the first 4 SCells with **sCellIndex-r10** while **sCellToAddModListMCG-Ext** is used to add the rest.

**sCellToAddModListSCG**
Includes SCG cells the SeNB is requested to establish. Measurement results may be provided for these cells. Field **sCellToAddModListSCG** is used to add the first 4 SCells with **sCellIndex-r12** while **sCellToAddModListSCG-Ext** is used to add the rest.

**sCellToReleaseListSCG**
Includes SCG cells the SeNB is requested to release.

**scg-RadioConfig**
Includes the current dedicated SCG configuration.

**scg-ConfigRestrictInfo**
Includes fields for which MeNB explicitly indicates the restriction to be observed by SeNB.

**servCellId**
If servCellId-r13 is present, servCellId-r12 shall be ignored.

**p-Max**
Cell specific value i.e. as broadcast by PCell.
Conditional presence | Explanation
--- | ---
DRB-Setup | The field is mandatory present in case DRB establishment is requested; otherwise the field is not present.
SCellAdd | The field is mandatory present in case SCG cell establishment is requested; otherwise the field is not present.
SCellAdd2 | The field is optional present in case SCG cell establishment is requested; otherwise the field is not present.

---

**UEPagingCoverageInformation**

This message is used to transfer UE paging coverage information, covering both upload to and download from the EPC.

Direction: eNB to/from EPC

**UEPagingCoverageInformation message**

```asn1
UEPagingCoverageInformation ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1         CHOICE{
      uePagingCoverageInformation-r13   UEPagingCoverageInformation-r13-IEs,
      spare7 NULL,
      spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}  
  }
}
UEPagingCoverageInformation-r13-IEs ::= SEQUENCE {
  mpcch-NumRepetition-r13    INTEGER (1..256) OPTIONAL,
  nonCriticalExtension     SEQUENCE {}  OPTIONAL
}
```

**UEPagingCoverageInformation field descriptions**

- **mpcch-NumRepetition**
  Number of repetitions for MPDCCH. The value is an estimate of the required number of repetitions for MPDCCH for paging.

---

**UERadioAccessCapabilityInformation**

This message is used to transfer UE radio access capability information, covering both upload to and download from the EPC.

Direction: eNB to/from EPC

**UERadioAccessCapabilityInformation message**

```asn1
UERadioAccessCapabilityInformation ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1         CHOICE{
      ueRadioAccessCapabilityInformation-r8    UERadioAccessCapabilityInformation-r8-IEs,
      spare7 NULL,
      spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}  
  }
}
UERadioAccessCapabilityInformation-r8-IEs ::= SEQUENCE {
  ue-RadioAccessCapabilityInfo  OCTET STRING (CONTAINING UEcapabilityInformation),
  nonCriticalExtension    SEQUENCE {}  OPTIONAL
}
```
-- ASN1STOP

**UERadioAccessCapabilityInformation field descriptions**

*ue-RadioAccessCapabilityInfo*
Including E-UTRA, GERAN, and CDMA2000-1xRTT Bandclass radio access capabilities (separated). UTRA radio access capabilities are not included. For E-UTRA radio access capabilities, it is up to E-UTRA how the backward compatibility among *supportedBandCombinationReduced*, *supportedBandCombination* and *supportedBandCombinationAdd* is ensured. If *supportedBandCombinationReduced* and *supportedBandCombination*/*supportedBandCombinationAdd* are included into *ueCapabilityRAT-Container*, it can be assumed that the value of fields, *requestedBands*, *reducedIntNonContCombRequested* and *requestedCCsXL* are consistent with all supported band combination fields.

---

**UERadioPagingInformation**

This message is used to transfer radio paging information, covering both upload to and download from the EPC.

*Direction:* eNB to/from EPC

---

**UERadioPagingInformation message**

-- ASN1START

```
UERadioPagingInformation ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1         CHOICE{
      ueRadioPagingInformation-r12   UERadioPagingInformation-r12-IEs,  
      spare7 NULL,                  
      spare6 NULL, spare5 NULL, spare4 NULL,  
      spare3 NULL, spare2 NULL, spare1 NULL  
    },
    criticalExtensionsFuture   SEQUENCE {}  
  }
  ue-RadioPagingInfo-r12    OCTET STRING (CONTAINING UE-RadioPagingInfo-r12),
  nonCriticalExtension    UERadioPagingInformation-v1310-IEs   OPTIONAL
}
```

---

**UERadioPagingInformation field descriptions**

*ue-RadioPagingInfo*
The field is used to transfer UE capability information used for paging. The eNB generates the *ue-RadioPagingInfo* and the contained UE capability information is absent when not supported by the UE.

*supportedBandListEUTRAForPaging*
Indicates the UE supported frequency bands which is derived by the eNB from *UE-EUTRA-Capability*.

10.3 Inter-node RRC information element definitions

---

**AS-Config**
The *AS-Config* IE contains information about RRC configuration information in the source eNB which can be utilized by target eNB to determine the need to change the RRC configuration during the handover preparation phase. The information can also be used after the handover is successfully performed or during the RRC connection re-establishment or resume.
**AS-Config** information element

```asn1
-- ASN1START
AS-Config ::= SEQUENCE {
    sourceMeasConfig MeasConfig,
    sourceRadioResourceConfig RadioResourceConfigDedicated,
    sourceSecurityAlgorithmConfig SecurityAlgorithmConfig,
    sourceUE-Identity C-RNTI,
    sourceMasterInformationBlock MasterInformationBlock,
    sourceSystemInformationBlock-Type1 SystemInformationBlock-Type1(WITH COMPONENTS {..., nonCriticalExtension ABSENT}),
    sourceSystemInformationBlock-Type2 SystemInformationBlock-Type2,
    antennaInfoCommon AntennaInfoCommon,
    sourceDl-CarrierFreq ARFCN-ValueEUTRA,
    ...,
    [  
        sourceSystemInformationBlock-Type1-Ext OCTET STRING (CONTAINING SystemInformationBlock-Type1-v890-IEs) OPTIONAL,
        sourceOtherConfig-r9 OtherConfig-r9  
    ],
    [  
        sourceSCellConfigList-r10 SCellToAddModList-r10 OPTIONAL
    ],
    [  
        sourceConfigSCG-r12 SCG-Config-r12 OPTIONAL
    ]
}
AS-Config-v9e0 ::= SEQUENCE {
    sourceDl-CarrierFreq-v9e0 ARFCN-ValueEUTRA-v9e0
}
AS-Config-v10j0 ::= SEQUENCE {
    antennaInfoDedicatedPCell-v10i0 AntennaInfoDedicated-v10i0 OPTIONAL
}
AS-Config-v1250 ::= SEQUENCE {
    sourceWlan-OffloadConfig-r12 WLAN-OffloadConfig-r12 OPTIONAL,
    sourceSL-DiscConfig-r12 SL-DiscConfig-r12 OPTIONAL
}
AS-Config-v1320 ::= SEQUENCE {
    sourceSCellConfigList-r13 SCellToAddModListExt-r13 OPTIONAL,
    sourceRCLWI-Configuration-r13 RCLWI-Configuration-r13 OPTIONAL
}
AS-Config-v13c0 ::= SEQUENCE {
    radioResourceConfigDedicated-v13c01 RadioResourceConfigDedicated-v13c01 OPTIONAL,
    radioResourceConfigDedicated-v13c02 RadioResourceConfigDedicated-v13c02 OPTIONAL,
    sCell1ToAddModList-v13c0 SCell1ToAddModList-v13c0 OPTIONAL,
    sCell1ToAddModListExt-v13c0 SCell1ToAddModListExt-v13c0 OPTIONAL
}
-- ASN1STOP
```

**NOTE:** The **AS-Config** re-uses information elements primarily created to cover the radio interface signalling requirements. Consequently, the information elements may include some parameters that are not relevant for the target eNB e.g. the SFN as included in the *MasterInformationBlock*. 
AS-Config field descriptions

antennaInfoCommon
This field provides information about the number of antenna ports in the source PCell.

sourceDL-CarrierFreq
Provides the parameter Downlink EARFCN in the source PCell, see TS 36.101 [42]. If the source eNB provides AS-Config-v9e0, it sets sourceDL-CarrierFreq (i.e. without suffix) to maxEARFCN.
sourceOtherConfig
Provides other configuration in the source PCell.

sourceMasterInformationBlock
MasterInformationBlock transmitted in the source PCell.

sourceMeasConfig
Measurement configuration in the source cell. The measurement configuration for all measurements existing in the source eNB when handover is triggered shall be included. See 10.5.

sourceRCLWI-Configuration
RCLWI Configuration in the source PCell.

sourceSL-CommConfig
This field covers the sidelink communication configuration.

sourceSL-DiscConfig
This field covers the sidelink discovery configuration.

sourceRadioResourceConfig
Radio configuration in the source PCell. The radio resource configuration for all radio bearers existing in the source PCell when handover is triggered shall be included. See 10.5.

sourceSCellConfigList
Radio resource configuration (common and dedicated) of the SCells configured in the source eNB.

sourceSecurityAlgorithmConfig
This field provides the AS integrity protection (SRBs) and AS ciphering (SRBs and DRBs) algorithm configuration used in the source PCell.

sourceSystemInformationBlockType1
SystemInformationBlockType1 (or SystemInformationBlockType1-BR) transmitted in the source PCell.

sourceSystemInformationBlockType2
SystemInformationBlockType2 transmitted in the source PCell.

-- AS-Context

The IE AS-Context is used to transfer local E-UTRAN context required by the target eNB.

AS-Context information element

```asn1
AS-Context ::=       SEQUENCE { 
                  reestablishmentInfo      ReestablishmentInfo   OPTIONAL  -- Cond HO
} 

AS-Context-v1130 ::=     SEQUENCE { 
                                        idc-Indication-r11     OCTET STRING (CONTAINING 
                                                   InDeviceCoexIndication-r11) OPTIONAL, -- Cond HO2
                                        mbmsInterestIndication-r11    OCTET STRING (CONTAINING 
                                                   MBMSInterestIndication-r11) OPTIONAL, -- Cond HO2
                                        powerPrefIndication-r11     OCTET STRING (CONTAINING 
                                                   UEAssistanceInformation-r11) OPTIONAL, -- Cond HO2
                                        ...
                                        [[[ sidelinkUEInformation-r12    OCTET STRING (CONTAINING 
                                                        SidelinkUEInformation-r12) OPTIONAL -- Cond HO2
                                                ]]
} 

AS-Context-v1320 ::=     SEQUENCE { 
                                        wlanConnectionStatusReport-r13   OCTET STRING (CONTAINING 
                                                   WLANConnectionStatusReport-r13) OPTIONAL  -- Cond HO2
} 

-- ASN1STOP
```
ReestablishmentInfo field descriptions

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>HO</td>
<td>The field is mandatory present in case of handover within E-UTRA; otherwise the field is not present.</td>
</tr>
<tr>
<td>HO2</td>
<td>The field is optional present in case of handover within E-UTRA; otherwise the field is not present.</td>
</tr>
</tbody>
</table>

ReestablishmentInfo

The ReestablishmentInfo IE contains information needed for the RRC connection re-establishment.

ReestablishmentInfo information element

```asn1
ReestablishmentInfo ::= SEQUENCE {
    sourcePhysCellId     PhysCellId,
    targetCellShortMAC-I  ShortMAC-I,
    additionalReestabInfoList   AdditionalReestabInfoList OPTIONAL,
    ...
}
AdditionalReestabInfoList ::= SEQUENCE ( SIZE (1..maxReestabInfo) ) OF AdditionalReestabInfo
AdditionalReestabInfo ::= SEQUENCE{
    cellIdentity      CellIdentity,
    key-eNodeB-Star     Key-eNodeB-Star,
    shortMAC-I       ShortMAC-I
}
Key-eNodeB-Star ::= BIT STRING (SIZE (256))
```

ReestablishmentInfo field descriptions

- `additionalReestabInfoList` Contains a list of shortMAC-I and KeNB* for cells under control of the target eNB, required for potential re-establishment by the UE in these cells to succeed.
- `Key-eNodeB-Star` Parameter KeNB*: See TS 33.401 [32, 7.2.8.4]. If the cell identified by `cellIdentity` belongs to multiple frequency bands, the source eNB selects the DL-EARFCN for the KeNB* calculation using the same logic as UE uses when selecting the DL-EARFCN in IDLE as defined in section 6.2.2. This parameter is only used for X2 handover, and for S1 handover, it shall be ignored by target eNB.
- `sourcePhysCellId` The physical cell identity of the source PCell, used to determine the UE context in the target eNB at re-establishment.
- `targetCellShortMAC-I` The ShortMAC-I for the handover target PCell, in order for potential re-establishment to succeed.

RRM-Config

The RRM-Config IE contains information about UE specific RRM information before the handover which can be utilized by target eNB.

RRM-Config information element

```asn1
RRM-Config ::= SEQUENCE {
    ue-InactiveTime    ENUMERATED {
        s1, s2, s3, s5, s7, s10, s15, s20,
        s25, s30, s40, s50, min1, min1s20c, min1s40,
        min2, min2s30, min3, min3s30, min4, min5, min6,
    }
```

ETSI
min7, min8, min9, min10, min12, min14, min17, min20, min24, min28, min33, min38, min44, min50, hr1, hr1min30, 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-r10 CandidateCellInfoList-r10  OPTIONAL
  ]
]
}
CandidateCellInfoList-r10 ::=  SEQUENCE (SIZE (1..maxFreq)) OF CandidateCellInfo-r10
CandidateCellInfo-r10 ::=  SEQUENCE {
  -- cellIdentification
  physCellId-r10     PhysCellId,
  dl-CarrierFreq-r10    ARFCN-ValueEUTRA,
  -- available measurement results
  rsrpResult-r10     RSRP-Range   OPTIONAL,
  rsrqResult-r10     RSRQ-Range   OPTIONAL,
  ...
  [
    dl-CarrierFreq-v1090   ARFCN-ValueEUTRA-v9e0  OPTIONAL
  ],
  [
    rsrqResult-v1250    RSRQ-Range-v1250   OPTIONAL
  ],
  [
    rs-sinr-Result-r13    RS-SINR-Range-r13   OPTIONAL
  ]
}

**RRM-Config field descriptions**

<table>
<thead>
<tr>
<th>candidateCellInfoList</th>
<th>A list of the best cells on each frequency for which measurement information was available, in order of decreasing RSRP.</th>
</tr>
</thead>
<tbody>
<tr>
<td>dl-CarrierFreq</td>
<td>The source includes dl-CarrierFreq-v1090 if and only if dl-CarrierFreq-r10 is set to maxEARFCN.</td>
</tr>
<tr>
<td>ue-InactiveTime</td>
<td>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.</td>
</tr>
</tbody>
</table>

10.4 Inter-node RRC multiplicity and type constraint values

- Multiplicity and type constraints definitions

  -- ASN1START
  maxReestabInfo INTEGER ::= 32  -- Maximum number of KeNB* and shortMAC-I forwarded at handover for re-establishment preparation
  -- ASN1STOP

- End of EUTRA-InterNodeDefinitions

  -- ASN1START
  END
  -- ASN1STOP

10.5 Mandatory information in AS-Config

The AS-Config transferred between source eNB and target-eNB shall include all IEs necessary to describe the AS context. The conditional presence in section 6 is only applicable for eNB to UE communication.
The "need" or "cond" statements are not applied in case of sending the IEs from source eNB to target eNB. Some fields shall be included regardless of the "need" or "cond" e.g. discardTimer. The AS-Config re-uses information elements primarily created to cover the radio interface signalling requirements. The information elements may include some parameters that are not relevant for the target eNB e.g. the SFN as included in the MasterInformationBlock.

All the fields in the AS-Config as defined in 10.3 that are introduced after v9.2.0 and that are optional for eNB to UE communication shall be included, if the functionality is configured. The fields in the AS-Config that are defined before and including v9.2.0 shall be included as specified in the following.

Within the sourceRadioResourceConfig, sourceMeasConfig and sourceOtherConfig, the source eNB shall include fields that are optional for eNB to UE communication, if the functionality is configured unless explicitly specified otherwise in the following:

- in accordance with a condition that is explicitly stated to be applicable; or
- a default value is defined for the concerned field; and the configured value is the same as the default value that is defined; or
- the need of the field is OP and the current UE configuration corresponds with the behaviour defined for absence of the field;

The following fields, if the functionality is configured, are not mandatory for the source eNB to include in the AS-Config since delta signalling by the target eNB for these fields is not supported:

- semiPersistSchedC-RNTI
- measGapConfig

For the measurement configuration, a corresponding operation as 5.5.6.1 and 5.5.2.2a is executed by target eNB.

10.6 Inter-node NB-IoT messages

10.6.1 General

This section specifies NB-IoT RRC messages that are sent either across the X2- or the S1-interface, either to or from the eNB, i.e. a single 'logical channel' is used for all NB-IoT RRC messages transferred across network nodes.

-- NB-IoT-InterNodeDefinitions

This ASN.1 segment is the start of the NB-IoT inter-node PDU definitions.

-- ASN1START

NB1OIT-InterNodeDefinitions DEFINITIONS AUTOMATIC TAGS ::= 
BEGIN

IMPORTS
  C-RNTI,
  PhysCellId,
  SecurityAlgorithmConfig,
  ShortMAC-I
FROM EUTRA-RRC-Definitions

  AdditionalReestabInfoList
FROM EUTRA-InterNodeDefinitions

  CarrierFreq-NB-r13,
  RadioResourceConfigDedicated-NB-r13,
  UE-Capability-NB-r13,
  UE-RadioPagingInfo-NB-r13
FROM NB1OIT-RRC-Definitions;

-- ASN1STOP
10.6.2 Message definitions

---

**HandoverPreparationInformation-NB**

This message is used to transfer the UE context from the eNB where the RRC connection has been suspended and transfer it to the eNB where the RRC Connection has been requested to be resumed.

Direction: source eNB to target eNB

**HandoverPreparationInformation-NB message**

```asn1
HandoverPreparationInformation-NB ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1          CHOICE{
      handoverPreparationInformation-r13  HandoverPreparationInformation-NB-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}

HandoverPreparationInformation-NB-IEs ::= SEQUENCE {
  ue-RadioAccessCapabilityInfo-r13  UE-Capability-NB-r13,
  as-Config-r13       AS-Config-NB,
  rrm-Config-r13       RRM-Config-NB OPTIONAL,
  as-Context-r13       AS-Context-NB OPTIONAL,
  nonCriticalExtension     HandoverPreparationInformation-NB-v1380-IEs OPTIONAL
}

HandoverPreparationInformation-NB-v1380-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING OPTIONAL,
  nonCriticalExtension    SEQUENCE () OPTIONAL
}
```

**HandoverPreparationInformation-NB field descriptions**

- **as-Config**
  The radio resource configuration.

- **as-Context**
  The local E-UTRAN context required by the target eNB.

- **rrm-Config**
  The local E-UTRAN context used depending on the target node's implementation, which is mainly used for the RRM purpose.

- **ue-RadioAccessCapabilityInfo**
  The NB-IoT UE Radio Access Capability Parameters, see TS 36.306 [5].

---

**UEPagingCoverageInformation-NB**

This message is used to transfer UE paging coverage information for NB-IoT, covering both upload to and download from the EPC.

Direction: eNB to/from EPC

**UEPagingCoverageInformation-NB message**

```asn1
UEPagingCoverageInformation-NB ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1          CHOICE{
      uePagingCoverageInformation-r13   UEPagingCoverageInformation-NB-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}

UEPagingCoverageInformation-NB-IEs ::= SEQUENCE {
  uePagingCoverageInformation-r13   UEPagingCoverageInformation-NB-IEs,
  nonCriticalExtension     SEQUENCE ()
}
```
UEPagingCoverageInformation-NB-IEs ::= SEQUENCE {
    npdcch-NumRepetitionPaging-r13 INTEGER (1..2048) OPTIONAL,
    nonCriticalExtension SEQUENCE {} OPTIONAL
} -- ASN1STOP

UEPagingCoverageInformation-NB field descriptions

npdcch-NumRepetitionPaging
Number of repetitions for NPDCCH, see TS 36.211 [21]. This value is an estimate of the required number of repetitions for NPDCCH.

-- UERadioAccessCapabilityInformation-NB

This message is used to transfer UE NB-IoT Radio Access capability information, covering both upload to and download from the EPC.

Direction: eNB to/ from EPC

UERadioAccessCapabilityInformation-NB message

-- ASN1START

UERadioAccessCapabilityInformation-NB ::= SEQUENCE {
    criticalExtensions CHOICE {
        c1 CHOICE{
            ueRadioAccessCapabilityInformation-r13 UERadioAccessCapabilityInformation-NB-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture SEQUENCE {}
    }
}

UERadioAccessCapabilityInformation-NB-IEs ::= SEQUENCE {
    ue-RadioAccessCapabilityInfo-r13 OCTET STRING (CONTAINING UE-Capability-NB-r13),
    nonCriticalExtension UERadioAccessCapabilityInformation-NB-v1380-IEs OPTIONAL
}

UERadioAccessCapabilityInformation-NB-v1380-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    nonCriticalExtension SEQUENCE {} OPTIONAL
} -- ASN1STOP

UERadioAccessCapabilityInformation-NB field descriptions

ue-RadioAccessCapabilityInfo
The NB-IoT UE Radio Access Capability Parameters, see TS 36.306 [5].

-- UERadioPagingInformation-NB

This message is used to transfer NB-IoT radio paging information, covering both upload to and download from the EPC.

Direction: eNB to/ from EPC

UERadioPagingInformation-NB message

-- ASN1START

UERadioPagingInformation-NB ::= SEQUENCE {
    criticalExtensions CHOICE {
        c1 CHOICE{
            ueRadioPagingInformation-r13 UERadioPagingInformation-NB-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        }
    }
}

UERadioPagingInformation-NB-IEs ::= SEQUENCE {
    nonCriticalExtension SEQUENCE {} OPTIONAL
} -- ASN1STOP
UERadioPagingInformation-NB-IEs ::= SEQUENCE {
  ue-RadioPagingInfo-r13  OCTET STRING (CONTAINING UE-RadioPagingInfo-NB-r13),
  nonCriticalExtension    SEQUENCE {}         OPTIONAL
}

-- ASN1STOP

<table>
<thead>
<tr>
<th>UERadioPagingInformation-NB field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ue-RadioPagingInfo</strong></td>
</tr>
<tr>
<td>The field is used to transfer UE NB-IoT capability information used for paging. The eNB generates the <strong>ue-RadioPagingInfo</strong> and the contained UE capability information is absent when not supported by the UE.</td>
</tr>
</tbody>
</table>

## 10.7 Inter-node NB-IoT RRC information element definitions

### AS-Config-NB

The **AS-Config-NB** IE contains information about NB-IoT RRC configuration information in the source eNB which can be utilized by target eNB.

#### AS-Config-NB information element

```asn1
-- ASN1START
AS-Config-NB ::= SEQUENCE {
  sourceRadioResourceConfig-r13   RadioResourceConfigDedicated-NB-r13, 
  sourceSecurityAlgorithmConfig-r13  SecurityAlgorithmConfig, 
  sourceUE-Identity-r13     C-RNTI, 
  sourceDL-CarrierFreq-r13    CarrierFreq-NB-r13, 
  ... 
}
-- ASN1STOP
```

<table>
<thead>
<tr>
<th>AS-Config-NB field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>sourceDL-CarrierFreq</strong></td>
</tr>
<tr>
<td>Provides the parameter Downlink EARFCN in the source PCell, see TS 36.101 [42].</td>
</tr>
<tr>
<td><strong>sourceRadioResourceConfig</strong></td>
</tr>
<tr>
<td>Radio configuration in the source PCell. The radio resource configuration for all radio bearers existing in the source PCell shall be included. See 10.9.</td>
</tr>
<tr>
<td><strong>sourceSecurityAlgorithmConfig</strong></td>
</tr>
<tr>
<td>This field provides the AS integrity protection (SRBs) and AS ciphering (SRBs and DRBs) algorithm configuration used in the source PCell.</td>
</tr>
</tbody>
</table>

### AS-Context-NB

The **AS-Context-NB** is used to transfer the UE context required by the target eNB.

#### AS-Context-NB information element

```asn1
-- ASN1START
AS-Context-NB ::= SEQUENCE {
  reestablishmentInfo-r13     ReestablishmentInfo-NB   OPTIONAL, 
  ... 
}
-- ASN1STOP
```
### AS-Context-NB field descriptions

Including information needed for the RRC connection re-establishment.

---

**ReestablishmentInfo-NB**

The **ReestablishmentInfo-NB** IE contains information needed for the RRC connection re-establishment.

**ReestablishmentInfo-NB information element**

```
-- ASN1START
ReestablishmentInfo-NB ::= SEQUENCE {
  sourcePhysCellId-r13     PhysCellId,
  targetCellShortMAC-I-r13    ShortMAC-I,
  additionalReestabInfoList-r13   AdditionalReestabInfoList    OPTIONAL,
  ...
}
-- ASN1STOP
```

**ReestablishmentInfo-NB field descriptions**

- **additionalReestabInfoList**
  Contains a list of shortMAC-I and KeNB* for cells under control of the target eNB, required for potential re-establishment by the UE in these cells to succeed.

- **sourcePhysCellId**
  The physical cell identity of the source PCell, used to determine the UE context in the target eNB at re-establishment.

- **targetCellShortMAC-I**
  The ShortMAC-I for the target PCell, in order for potential re-establishment to succeed.

---

**RRM-Config-NB**

The **RRM-Config-NB** IE contains information about UE specific RRM information which can be utilized by target eNB.

**RRM-Config-NB information element**

```
-- ASN1START
RRM-Config-NB ::= 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,
    hr1min30, 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,
  ...
}
-- ASN1STOP
```

**RRM-Config-NB field descriptions**

- **ue-InactiveTime**
  Duration while UE has not received or transmitted any user data. 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.
10.8 Inter-node RRC multiplicity and type constraint values

– Multiplicity and type constraints definitions

– End of NB-IoT-InterNodeDefinitions

10.9 Mandatory information in AS-Config-NB

The AS-Config-NB transferred between source eNB and target-eNB shall include all IEs necessary to describe the AS context. The conditional presence in section 6 is only applicable for eNB to UE communication.

The "Need" or "Cond" statements are not applied in case of sending the IEs from source eNB to target eNB. Some information elements shall be included regardless of the "Need" or "Cond" e.g. discardTimer. The AS-Config-NB reuses information elements primarily created to cover the radio interface signalling requirements.

Within the sourceRadioResourceConfig, the source eNB shall include fields that are optional for eNB to UE communication, if the functionality is configured unless explicitly specified otherwise in the following:

- in accordance with a condition that is explicitly stated to be applicable; or
- a default value is defined for the concerned field; and the configured value is the same as the default value that is defined; or
- the need of the field is OP and the current UE configuration corresponds with the behaviour defined for absence of the field;

11 UE capability related constraints and performance requirements

11.1 UE capability related constraints

The following table lists constraints regarding the UE capabilities that E-UTRAN is assumed to take into account.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Value</th>
<th>NB-IoT</th>
</tr>
</thead>
<tbody>
<tr>
<td>#DRBs</td>
<td>The number of DRBs that a UE shall support</td>
<td>8</td>
<td>(0, 1, 2) NOTE1</td>
</tr>
<tr>
<td>#RLC-AM</td>
<td>The number of RLC AM entities that a UE shall support</td>
<td>10</td>
<td>(2, 3) NOTE1</td>
</tr>
<tr>
<td>#minCellperMeasObjectEUTRA</td>
<td>The minimum number of neighbour cells (excluding black list cells) that a UE shall be able to store within a MeasObjectEUTRA. NOTE.</td>
<td>32</td>
<td>N/A</td>
</tr>
<tr>
<td>#minBlackCellRangeperMeasObjectEUTRA</td>
<td>The minimum number of blacklist cell PCI ranges that a UE shall be able to store within a MeasObjectEUTRA.</td>
<td>32</td>
<td>N/A</td>
</tr>
<tr>
<td>#minCellperMeasObjectUTRA</td>
<td>The minimum number of neighbour cells that a UE shall be able to store within a MeasObjectUTRA. NOTE.</td>
<td>32</td>
<td>N/A</td>
</tr>
</tbody>
</table>
### 11.2 Processing delay requirements for RRC procedures

The UE performance requirements for RRC procedures are specified in the following tables, by means of a value N:

\[
N = \text{the number of } 1\text{ms subframes from the end of reception of the E-UTRAN -> UE message on the UE physical layer up to when the UE shall be ready for the reception of uplink grant for the UE -> E-UTRAN response message with no access delay other than the TTI-alignment (e.g. excluding delays caused by scheduling, the random access procedure or physical layer synchronisation).}
\]

**NOTE:** No processing delay requirements are specified for RN-specific procedures.

**Figure 11.2-1:** Illustration of RRC procedure delay

---

**Table 11.2-1:** UE performance requirements for RRC procedures for UEs other than NB-IoT UEs
<table>
<thead>
<tr>
<th>Procedure title:</th>
<th>E-UTRAN -&gt; UE</th>
<th>UE -&gt; E-UTRAN</th>
<th>N</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RRC Connection Control Procedures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RRC connection establishment</td>
<td>RRCConnectionSetup</td>
<td>RRCConnectionSetupComplete or RRCConnectionResumeComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection release</td>
<td>RRCConnectionRelease</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-configuration (radio resource configuration)</td>
<td>RRCConnectionReconfiguration</td>
<td>RRCConnectionReconfigurationComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-configuration (measurement configuration)</td>
<td>RRCConnectionReconfiguration</td>
<td>RRCConnectionReconfigurationComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-configuration (intra-LTE mobility)</td>
<td>RRCConnectionReconfiguration</td>
<td>RRCConnectionReconfigurationComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection reconfiguration (SCell addition/release)</td>
<td>RRCConnectionReconfiguration</td>
<td>RRCConnectionReconfigurationComplete</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>RRC connection reconfiguration (SCG establishment/ release, SCell addition/ release)</td>
<td>RRCConnectionReconfiguration</td>
<td>RRCConnectionReconfigurationComplete</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-establishment</td>
<td>RRCConnectionReestablishment</td>
<td>RRCConnectionReestablishmentComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Initial security activation</td>
<td>SecurityModeCommand</td>
<td>SecurityModeCommandComplete/SecurityModeCommandFailure</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Initial security activation + RRC connection re-configuration (RB establishment)</td>
<td>SecurityModeCommand, RRCConnectionReconfiguration</td>
<td>RRCConnectionReconfigurationComplete</td>
<td>20</td>
<td>The two DL messages are transmitted in the same TTI</td>
</tr>
<tr>
<td>Paging</td>
<td>Paging</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td><strong>Inter RAT mobility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handover to E-UTRA</td>
<td>RRCConnectionReconfiguration</td>
<td>RRCConnectionReconfigurationComplete</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Handover from E-UTRA</td>
<td>MobilityFromEUTRACommand</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Handover from E-UTRA to CDMA2000</td>
<td>HandoverFromEUTRAAPreparationRequest (CDMA2000)</td>
<td></td>
<td>NA</td>
<td>Used to trigger the handover preparation procedure with a CDMA2000 RAT. The performance of this procedure is specified in [16]</td>
</tr>
<tr>
<td><strong>Measurement procedures</strong></td>
<td>MeasurementReport</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td><strong>Other procedures</strong></td>
<td>UECapabilityEnquiry</td>
<td>UECapabilityInformation</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Counter check</td>
<td>CounterCheck</td>
<td>CounterCheckResponse</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Proximity indication</td>
<td>ProximityIndication</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>
### Table 11.2-2: UE performance requirements for RRC procedures for NB-IoT UEs

<table>
<thead>
<tr>
<th>Procedure title</th>
<th>E-UTRAN -&gt; UE</th>
<th>UE -&gt; E-UTRAN</th>
<th>N</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RRC Connection Control Procedures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RRC connection establishment</td>
<td>RRCCConnectionSetup-NB or RRCCConnectionResume-NB</td>
<td>RRCCConnectionSetupComplete-NB or RRCCConnectionResumeComplete-NB</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>RRC connection release</td>
<td>RRCCConnectionRelease-NB</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-configuration (radio resource configuration)</td>
<td>RRCCConnectionReconfiguration-NB</td>
<td>RRCCConnectionReconfigurationComplete-NB</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-establishment</td>
<td>RRCCConnectionReestablishment-NB</td>
<td>RRCCConnectionReestablishmentComplete-NB</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Initial security activation</td>
<td>SecurityModeCommand</td>
<td>SecurityModeCommandComplete/SecurityModeCommandFailure</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Initial security activation + RRC connection re-configuration (RB establishment)</td>
<td>SecurityModeCommand, RRCCConnectionReconfiguration-NB</td>
<td>RRCCConnectionReconfigurationComplete-NB</td>
<td>55</td>
<td>The two DL messages are transmitted in the same TTI</td>
</tr>
<tr>
<td>Paging</td>
<td>Paging-NB</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td><strong>Other procedures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE capability transfer</td>
<td>UECapabilityEnquiry-NB</td>
<td>UECapabilityInformation-NB</td>
<td>35</td>
<td></td>
</tr>
</tbody>
</table>

11.3 Void
Annex A (informative): Guidelines, mainly on use of ASN.1

Editor's note No agreements have been reached concerning the extension of RRC PDUs so far. Any statements in this section about the protocol extension mechanism should be considered as FFS.

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 section 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 send to E-UTRAN 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 sub-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 sections

The RRC PDU contents are formally and completely described using abstract syntax notation (ASN.1), see X.680 [13], X.681 (02/2002) [14].

The complete ASN.1 code is divided into a number of ASN.1 sections in the specifications. In order to facilitate the extraction of the complete ASN.1 code from the specification, each ASN.1 section begins with a 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). Each ASN.1 section ends with a text paragraph consisting entirely of an ASN.1 stop tag, which consists of a double hyphen followed by a single space and the text "ASN1STOP" (in all upper case letters):

```asn1
-- ASN1START
-- ASN1STOP
```
The text paragraphs containing the ASN.1 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. 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 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 sub-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 suffixes 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.
Table A.3.1.2-1: Examples of typical abbreviations used in ASN.1 identifiers

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Abbreviated word</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comm</td>
<td>Communication</td>
</tr>
<tr>
<td>Conf</td>
<td>Confirmation</td>
</tr>
<tr>
<td>Config</td>
<td>Configuration</td>
</tr>
<tr>
<td>Disc</td>
<td>Discovery</td>
</tr>
<tr>
<td>DL</td>
<td>Downlink</td>
</tr>
<tr>
<td>Ext</td>
<td>Extension</td>
</tr>
<tr>
<td>Freq</td>
<td>Frequency</td>
</tr>
<tr>
<td>Id</td>
<td>Identity</td>
</tr>
<tr>
<td>Ind</td>
<td>Indication</td>
</tr>
<tr>
<td>Info</td>
<td>Information</td>
</tr>
<tr>
<td>Meas</td>
<td>Measurement</td>
</tr>
<tr>
<td>Neigh</td>
<td>Neighbour(ing)</td>
</tr>
<tr>
<td>Param(s)</td>
<td>Parameter(s)</td>
</tr>
<tr>
<td>Persist</td>
<td>Persistent</td>
</tr>
<tr>
<td>Phys</td>
<td>Physical</td>
</tr>
<tr>
<td>Proc</td>
<td>Process</td>
</tr>
<tr>
<td>Reestab</td>
<td>Reestablishment</td>
</tr>
<tr>
<td>Req</td>
<td>Request</td>
</tr>
<tr>
<td>Rx</td>
<td>Reception</td>
</tr>
<tr>
<td>Sched</td>
<td>Scheduling</td>
</tr>
<tr>
<td>Sync</td>
<td>Synchronisation</td>
</tr>
<tr>
<td>Thresh</td>
<td>Threshold</td>
</tr>
<tr>
<td>Tx/ Transm</td>
<td>Transmission</td>
</tr>
<tr>
<td>UL</td>
<td>Uplink</td>
</tr>
</tbody>
</table>

NOTE: The table A.3.1.2-1 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 or type identifier of the referenced element. 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 type should be made using the corresponding ASN.1 type identifier followed by the word "message", e.g., a reference to the RRCConnectionRelease 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.

```asn1
-- /example/A SN1START
LogicalChannelConfig ::= SEQUENCE {
    ul-SpecificParameters ::= SEQUENCE {
        priority             ::= Priority,
        prioritisedBitRate   ::= PrioritisedBitRate,
        bucketSizeDuration   ::= BucketSizeDuration,
        logicalChannelGroup  ::= INTEGER (0..3)
    }
} OPTIONAL
-- ASN1STOP
```

NOTE: All the ASN.1 start tags in the ASN.1 sections, 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.

```asn1
DL-DCCH-Message ::= SEQUENCE {
  message     DL-DCCH-MessageType
}
DL-DCCH-MessageType ::= CHOICE {
  c1      CHOICE {
    dlInformationTransfer     DLInformationTransfer,
    handoverFromEUTRAPreparationRequest  HandoverFromEUTRAPreparationRequest,
    mobilityFromEUTRACommand    MobilityFromEUTRACommand,
    rrcConnectionReconfiguration   RRCConnectionReconfiguration,
    rrcConnectionRelease     RRCConnectionRelease,
    securityModeCommand      SecurityModeCommand,
    ueCapabilityEnquiry      UECapabilityEnquiry,
  spare1 NULL
  },
  messageClassExtension SEQUENCE {}
}
```

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 section similar to the one shown in the example below.

```asn1
RRCConnectionReconfiguration ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1         CHOICE{
      rrcConnectionReconfiguration-r8  RRCConnectionReconfiguration-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
  }
RRCConnectionReconfiguration-r8-IEs ::= SEQUENCE {
  -- Enter the IEs here.
  ...
}
```

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 sub-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., \( \text{spare3} \) down to \( \text{spare1} \) 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 \textit{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

RRCConnectionReconfigurationComplete ::= SEQUENCE {
   rrc-TransactionIdentifier   RRC-TransactionIdentifier,
   criticalExtensions     CHOICE {
      rrcConnectionReconfigurationComplete-r8
         RRCConnectionReconfigurationComplete-r8-IEs,
      criticalExtensionsFuture   SEQUENCE {}
   }
}

RRCConnectionReconfigurationComplete-r8-IEs ::= SEQUENCE {
   -- Enter the IEs here. --
   ...
}

-- ASN1STOP
```

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 are facilitated by use of an empty sequence that is marked \texttt{OPTIONAL} e.g. as shown in the following example:

```
-- /example/ ASN1START

RRCMessage-r8-IEs ::= SEQUENCE {
   field1         InformationElement1,
   field2         InformationElement2,
   nonCriticalExtension     SEQUENCE {}      OPTIONAL
}

-- ASN1STOP
```

The ASN.1 section specifying the contents of a PDU type may be followed by a \textit{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-TypeIdentifier% 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 section similar to the one shown in the example below.

```
-- /example/ ASN1START

PRACH-ConfigSIB ::= SEQUENCE {
    rootSequenceIndex       INTEGER {0..1023},
    prach-ConfigInfo        PRACH-ConfigInfo
}
PRACH-Config ::= SEQUENCE {
    rootSequenceIndex       INTEGER {0..1023},
    prach-ConfigInfo        PRACH-ConfigInfo
    OPTIONAL    -- Need ON
}
PRACH-ConfigInfo ::= SEQUENCE {
    prach-ConfigIndex       ENUMERATED {ffs},
    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 an ASN.1 definition into 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 section. 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 sub-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 sub-clause A.4). The new version, or the extension version, of the IE is included in the same ASN.1 section defining the original. A suffix is added to the type identifier, using the naming conventions defined in sub-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 section and be referenced in the other IE types defined in the same ASN.1 section. 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 sections in the RRC specification. An IE type which is referenced in more than one ASN.1 section should be defined in a separate sub-clause, with a separate heading and a separate ASN.1 section (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 section, 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 section 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 sub-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 sub-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:

```
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:

```
PRACH-Config ::=    SEQUENCE {
    rootSequenceIndex     INTEGER (0..1023),
    prach-ConfigInfo     PRACH-ConfigInfo     OPTIONAL -- Need ON
} -- 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 statement. The need statement includes the keyword "Need", followed by one of the predefined semantics tags (OP, ON or OR) defined in sub-clause 6.1. If the semantics tag OP is used, the semantics of the absent field are further specified either in the field description table following the ASN.1 section, 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):

```
LogicalChannelConfig ::=   SEQUENCE {
    ul-SpecificParameters    SEQUENCE {
        priority       INTEGER (0),
        ...                   
    } OPTIONAL                 -- Cond UL
} -- ASN1STOP
```

When conditionally present fields are included in an ASN.1 section, the field description table after the ASN.1 section 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 section.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL</td>
<td>Specification of the conditions for including the field associated with the condition tag = &quot;UL&quot;. Semantics in case of optional presence under certain conditions may also be specified.</td>
</tr>
</tbody>
</table>
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 section 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 section 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:

```
-- /example/ ASN1START
PLMN-IdentityInfoList ::= SEQUENCE {SIZE (1..6)} OF PLMN-IdentityInfo
PLMN-IdentityInfo ::= SEQUENCE {plmn-Identity PLMN-Identity, cellReservedForOperatorUse ENUMERATED {reserved, notReserved}}
-- ASN1STOP
```

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.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 likelyhood 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 -- Original release
RRCMessage ::= SEQUENCE {
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  criticalExtensions CHOICE {
    c1 CHOICE{
      rrcMessage-r8 RRCMessage-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {}  
  }
}
-- /example/ ASN1STOP

-- /example/ ASN1START -- Later release
RRCMessage ::= SEQUENCE {
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  criticalExtensions CHOICE {
    c1 CHOICE{
      rrcMessage-r8 RRCMessage-r8-IEs,
      rrcMessage-r10 RRCMessage-r10-IEs,
      rrcMessage-r11 RRCMessage-r11-IEs,
      rrcMessage-r14 RRCMessage-r14-IEs
    },
  }
}
```
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, EUTRAN 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 ::= SEQUENCE {
  rrc-TransactionIdentifier  RRC-TransactionIdentifier,
  criticalExtensions  CHOICE {
    c1  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 ON
  field2-rN  InformationElement2-rN  OPTIONAL, -- Need ON
  nonCriticalExtension  RRCConnectionReconfiguration-vMxy-IEs OPTIONAL
}

RRCConnectionReconfiguration-vMxy-IEs ::= SEQUENCE {
  field2-rM  InformationElement2-rM  OPTIONAL, -- Cond NoField2rN
  nonCriticalExtension  SEQUENCE {}  OPTIONAL
}
--- ASN1STOP

--- /example/ ASN1START --- Later release

RRCMessage ::= CHOICE {
  c2  CHOICE{
    rrcMessage-r16  RRCMessage-r16-IEs,
    spare7 NULL, spare6 NULL, spare5 NULL, spare4 NULL,
    spare3 NULL, spare2 NULL, spare1 NULL
  },
  criticalExtensionsFuture  SEQUENCE {}
}

--- ASN1STOP

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 E-UTRAN in deciding whether or not to use the critically extension.

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 unless a 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. <TBD: ref to separate example>

- 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 section 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 section. <TBD: ref to separate example>

A.4.3.2 Further guidelines

Further to the general principles defined in the previous section, 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 are used until the number of values reaches the next power of 2, while the extension marker caters for extension beyond that limit
  - 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" statement 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" statement when the field is not actually used either.
Further, more general, guidelines:

- In case a need statement is not provided for a group, a "Need" statement 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 ::= SEQUENCE {
  field1        ENUMERATED {
    value1, value2, value3, value4-v880,
    ... value5-v960 },
  field2        CHOICE {
    field2a        BOOLEAN,
    field2b        InformationElement2b,
    ...,
    field2c-v960    InformationElement2c-r9
  },
  ...,
  [[ field3-r9    InformationElement3-r9 OPTIONAL -- Need OR
  ]],
  [[ field3-v9a0  InformationElement3-v9a0 OPTIONAL, -- Need OR
    field4-r9    InformationElement4 OPTIONAL -- Need OR
  ]]
}

InformationElement1-r10 ::= SEQUENCE {
  field1        ENUMERATED {
    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 OR
  field4-r9    InformationElement4 OPTIONAL, -- Need OR
  field5-r10   InformationElement5-r10 OPTIONAL, -- Need OR
  field6-r10   InformationElement6-r10 OPTIONAL, -- Need OR
  ...,
  [[ field3-v1170 InformationElement3-v1170 OPTIONAL -- Need OR
  ]]
}

-- 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.

```asn1
-- /example/ ASN1START
RRCMessage-r8-IEs ::= SEQUENCE {
  field1       InformationElement1,  OPTIONAL,  -- Need ON
  field2       InformationElement2,  OPTIONAL,  -- Need ON
  field3       InformationElement3     OPTIONAL, -- Need ON
  nonCriticalExtension   RRCMessage-v860-IEs     OPTIONAL
}

RRCMessage-v860-IEs ::= SEQUENCE {
  field4-v860      InformationElement4     OPTIONAL, -- Need ON
  field5-v860      BOOLEAN        OPTIONAL, -- Cond C54
  nonCriticalExtension   RRCMessage-v940-IEs     OPTIONAL
}

RRCMessage-v940-IEs ::= SEQUENCE {
  field6-v940      InformationElement6-r9     OPTIONAL, -- Need ON
  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.

#### ParentIE-WithEM information element

```asn1
-- /example/ ASN1START
ParentIE-WithEM ::=     SEQUENCE {
  -- Root encoding, including:
  childIE1-WithoutEM     ChildIE1-WithoutEM    OPTIONAL,  -- Need ON
  childIE2-WithoutEM     ChildIE2-WithoutEM    OPTIONAL,  -- Need ON
  ...,
  [ [ childIE1-WithoutEM-vNx0 ChildIE1-WithoutEM-vNx0 OPTIONAL, -- Need ON
     childIE2-WithoutEM-vNx0 ChildIE2-WithoutEM-vNx0 OPTIONAL -- Need ON
   ] ]
}
-- 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 elements**

```asn1
ChildIE1-WithoutEM ::= SEQUENCE {
  chIE1-ConfigurableFeature   ChIE1-ConfigurableFeature  OPTIONAL  -- Need ON
}

ChildIE1-WithoutEM-vNx0 ::=  SEQUENCE {
  chIE1-ConfigurableFeature-vNx0  ChIE1-ConfigurableFeature-vNx0 OPTIONAL  -- Cond ConfigF
}

ChIE1-ConfigurableFeature ::=  CHOICE {
  release        NULL,
  setup        SEQUENCE {
    -- Root encoding
  }
}

ChIE1-ConfigurableFeature-vNx0 ::= SEQUENCE {
  chIE1-NewField-rN     INTEGER (0..31)
}
```

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ConfigF</code></td>
<td>The field is optional present, need OR, in case of <code>chIE1-ConfigurableFeature</code> is included and set to &quot;setup&quot;; otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

---

**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**

```asn1
-- /example/ ASN1START
```

```asn1
ChildIE2-WithoutEM ::= SEQUENCE {
  -- Root encoding, including:
  chIE1-ConfigurableFeature   ChIE1-ConfigurableFeature  OPTIONAL  -- Need ON
}

ChildIE2-WithoutEM-vNx0 ::=  SEQUENCE {
  chIE1-ConfigurableFeature-vNx0  ChIE1-ConfigurableFeature-vNx0 OPTIONAL  -- Cond ConfigF
}
```

-- ASN1STOP
ChildIE2-WithoutEM ::=  
  CHOICE { 
    release
    setup 
    -- Root encoding
    }

ChildIE2-WithoutEM-vNx0 ::=  
  SEQUENCE { 
    chIE2-NewField-rN     INTEGER (0..31)     OPTIONAL -- Cond ConfigF
  }

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConfigF</td>
<td>The field is optional present, need OR, in case of chIE2-ConfigurableFeature is included and set to &quot;setup&quot;; otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

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 Protection of RRC messages (informative)

The following list provides information which messages can be sent (unprotected) prior to security activation and which messages can be sent unprotected after security activation. Those messages indicated "-" in "P" column should never be sent unprotected by eNB or UE. Further requirements are defined in the procedural text.

P…Messages that can be sent (unprotected) prior to security activation

A - I…Messages that can be sent without integrity protection after security activation

A - C…Messages that can be sent unciphered after security activation

NA… Message can never be sent after security activation
<table>
<thead>
<tr>
<th>Message</th>
<th>P</th>
<th>A-I</th>
<th>A-C</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSFBParametersRequestCDMA2000</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CSFBParametersResponseCDMA2000</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CounterCheck</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CounterCheckResponse</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>DLInformationTransfer</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>HandoverFromEUTRAPreparationRequest(CDMA2000)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>InDeviceCoexIndication</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>InterFreqRSTDMeasurementIndication</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>LoggedMeasurementsConfiguration</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MasterInformationBlock</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>MBMSCountingRequest</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>MBMSCountingResponse</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MBMSInterestIndication</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MBSFNAreaConfiguration</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>MeasurementReport</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Measurement configuration may be sent prior to security activation. But: In order to protect privacy of UEs, MEASUREMENT REPORT is only sent from the UE after successful security activation.</td>
</tr>
<tr>
<td>MobilityFromEUTRACommand</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Paging</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>ProximityIndication</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RNReconfiguration</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RNReconfigurationComplete</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCConnectionReconfiguration</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCConnectionReconfigurationComplete</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>Unprotected, if sent as response to RRCConnectionReconfiguration which was sent before security activation</td>
</tr>
<tr>
<td>RRCConnectionReestablishment</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>This message is not protected by PDCP operation.</td>
</tr>
<tr>
<td>RRCConnectionReestablishmentComplete</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCConnectionReestablishmentRject</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>One reason to send this may be that the security context has been lost, therefore sent as unprotected.</td>
</tr>
<tr>
<td>RRCConnectionReestablishmentRequest</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>This message is not protected by PDCP operation. However, a short MAC-I is included.</td>
</tr>
<tr>
<td>RRCConnectionReject</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td>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.</td>
</tr>
<tr>
<td>RRCConnectionRelease</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCConnectionRequest</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td>When this message is transmitted, security is activated but suspended. Integrity verification is done after the message received by RRC.</td>
</tr>
<tr>
<td>RRCConnectionResume</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>RRCConnectionResumeRequest</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>This message is not protected by PDCP operation. However, a short MAC-I is included.</td>
</tr>
<tr>
<td>RRCConnectionResumeComplete</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCConnectionSetup</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>RRCConnectionSetupComplete</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>SCGFailureInformation</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>SCPTMConfiguration</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Message</td>
<td>P</td>
<td>A-I</td>
<td>A-C</td>
<td>Comment</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>---</td>
<td>-----</td>
<td>-----</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>SecurityModeCommand</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td>Integrity protection applied, but no ciphering (integrity verification done after the message received by RRC)</td>
</tr>
<tr>
<td>SecurityModeComplete</td>
<td>-</td>
<td>NA</td>
<td>NA</td>
<td>Integrity protection applied, but no ciphering. Ciphering is applied after completing the procedure.</td>
</tr>
<tr>
<td>SecurityModeFailure</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td>Neither integrity protection nor ciphering applied.</td>
</tr>
<tr>
<td>SidelinkUEInformation</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>SystemInformation</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>SystemInformationBlockType1</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>UEAssistanceInformation</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>UECapabilityEnquiry</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>UECapabilityInformation</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>UEInformationRequest</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>UEInformationResponse</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>In order to protect privacy of UEs, UEInformationResponse is only sent from the UE after successful security activation</td>
</tr>
<tr>
<td>ULHandoverPreparationTransfer (CDMA2000)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>This message should follow HandoverFromEUTRAPreparationRequest</td>
</tr>
<tr>
<td>ULInformationTransfer</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>WLANConnectionStatusReport</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

A.7 Miscellaneous

The following miscellaneous conventions should be used:

- References: Whenever another specification is referenced, the specification number and optionally the relevant subclause, table or figure, should be indicated in addition to the pointer to the References section e.g. as follows: 'see TS 36.212 [22, 5.3.3.1.6]'.

- UE capabilities: TS 36.306 [5] specifies that E-UTRAN should in general respect the UE's capabilities. Hence there is no need to include statement clarifying that E-UTRAN, 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 (normative): Release 8 and 9 AS feature handling

B.1 Feature group indicators

This annex contains the definitions of the bits in fields featureGroupIndicators (in Table B.1-1) and featureGroupIndRel9Add (in Table B.1-1a).

In this release of the protocol, the UE shall include the fields featureGroupIndicators in the IE UE-EUTRA-Capability and featureGroupIndRel9Add in the IE UE-EUTRA-Capability-v9a0. All the functionalities defined within the field featureGroupIndicators defined in Table B.1-1 or Table B.1-1a are mandatory for the UE (with exceptions for category M1 UE), if the related capability (frequency band, RAT, SR-VCC or Inter-RAT ANR) is also supported. For a specific indicator, if all functionalities for a feature group listed in Table B.1-1 have been implemented and tested, the UE shall set the indicator as one (1), else (i.e. if any one of the functionalities in a feature group listed in Table B.1-1 or Table B.1-1a, which have not been implemented or tested), the UE shall set the indicator as zero (0).

The UE shall set all indicators that correspond to RATs not supported by the UE as zero (0).

The UE shall set all indicators, which do not have a definition in Table B.1-1 or Table B.1-1a, as zero (0).

If the optional fields featureGroupIndicators or featureGroupIndRel9Add are not included by a UE of a future release, the network may assume that all features pertaining to the RATs supported by the UE, respectively listed in Table B.1-1 or Table B.1-1a and deployed in the network, have been implemented and tested by the UE.

In Table B.1-1, a 'VoLTE capable UE' corresponds to a UE which is IMS voice capable and a 'MCPTT capable UE' corresponds to a UE which supports MCPTT voice application as defined in TS 23.179 [73].

The indexing in Table B.1-1a starts from index 33, which is the leftmost bit in the field featureGroupIndRel9Add.
Table B.1-1: Definitions of feature group indicators
<table>
<thead>
<tr>
<th>Index of indicator (bit number)</th>
<th>Definition (description of the supported functionality, if indicator set to one)</th>
<th>Notes</th>
<th>If indicated &quot;Yes&quot; the feature shall be implemented and successfully tested for this version of the specification</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
</table>
| 1 (leftmost bit)                | - Intra-subframe frequency hopping for PUSCH scheduled by UL grant
- DCI format 3a (TPC commands for PUCCH and PUSCH with single bit power adjustments)
- Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected subband CQI without PMI
- Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected subband CQI with multiple PMI | set to 1 by category M1 UE that has implemented and successfully tested "Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected subband CQI without PMI" | Yes |                          |
| 2                               | - Simultaneous CQI and ACK/NACK on PUCCH, i.e. PUCCH format 2a and 2b
- Absolute TPC command for PUSCH
- Resource allocation type 1 for PDSCH
- Periodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected subband CQI without PMI
- Periodic CQI/PMI/RI reporting on PUSCH: Mode 2-1 – UE selected subband CQI with single PMI | If a category M1 UE does not support this feature group, this bit shall be set to 0. | Yes |                          |
| 3                               | - 5bit RLC UM SN
- 7bit PDCP SN | can only be set to 1 if the UE has set bit number 7 to 1. | Yes, if UE supports VoLTE, MCPTT, or both. Yes, if UE supports SRVCC to EUTRAN from GERAN. | No |
| 4                               | - Short DRX cycle | can only be set to 1 if the UE has set bit number 5 to 1. - not supported by category M1 UE | Yes |                          |
| 5                               | - Long DRX cycle
- DRX command MAC control element | | Yes | No |
| 6                               | - Prioritised bit rate | | Yes | No |
| 7                               | - RLC UM | can only be set to 0 if the UE does neither support VoLTE nor MCPTT | Yes, if UE supports VoLTE, MCPTT, or both. Yes, if UE supports SRVCC to EUTRAN from GERAN. | No |
| 8                               | - EUTRA RRC_CONNECTED to UTRA FDD or UTRA TDD CELL_DCH PS handover, if the UE supports either only UTRAN FDD or only UTRAN TDD
- EUTRA RRC_CONNECTED to UTRA FDD CELL_DCH PS handover, if the UE supports both UTRAN FDD and UTRAN TDD | can only be set to 1 if the UE has set bit number 22 to 1 | Yes (except for category M1 UE) for FDD, if UE supports UTRA FDD. | Yes |
| 9                               | - EUTRA RRC_CONNECTED to GERAN GSM_Dedicated handover | - related to SR-VCC | Yes (except for category M1 UE), if UE supports SRVCC to EUTRAN from GERAN. | Yes |
| 10                              | - EUTRA RRC_CONNECTED to GERAN (Packet_Idle by Cell Change Order
- EUTRA RRC_CONNECTED to GERAN (Packet_Idle by Cell Change Order with NACC (Network Assisted Cell Change) | | Yes |                          |
<table>
<thead>
<tr>
<th></th>
<th>Feature Description</th>
<th>Condition</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>- EUTRA RRC_CONNECTED to CDMA2000 1xRTT CS Active handover</td>
<td>- related to SR-VCC - can only be set to 1 if the UE has set bit number 24 to 1</td>
<td>Yes</td>
</tr>
<tr>
<td>12</td>
<td>- EUTRA RRC_CONNECTED to CDMA2000 HRPD Active handover</td>
<td>- can only be set to 1 if the UE has set bit number 26 to 1</td>
<td>Yes</td>
</tr>
<tr>
<td>13</td>
<td>- Inter-frequency handover (within FDD or TDD)</td>
<td>- can only be set to 1 if the UE has set bit number 25 to 1</td>
<td>No</td>
</tr>
<tr>
<td>14</td>
<td>- Measurement reporting event: Event A4 – Neighbour &gt; threshold</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>- Measurement reporting event: Event A5 – Serving &lt; threshold1 &amp; Neighbour &gt; threshold2</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>15</td>
<td>- Measurement reporting event: Event B1 – Neighbour &gt; threshold for UTRAN FDD or UTRAN TDD, if the UE supports either only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1</td>
<td>- Measurement reporting event: Event B1 – Neighbour &gt; threshold for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively - Measurement reporting event: Event B1 – Neighbour &gt; threshold for GERAN, 1xRTT or HRPD, if the UE has set bit number 23, 24 or 26 to 1, respectively - can only be set to 1 if the UE has set at least one of the bit number 22, 23, 24, 26 or 39 to 1. - even if the UE sets bits 41, it shall still set bit 15 to 1 if measurement reporting event B1 is tested for all RATs supported by UE - If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td>Yes for FDD, if UE supports only UTRAN FDD and does not support UTRAN TDD or GERAN or 1xRTT or HRPD</td>
</tr>
<tr>
<td></td>
<td>Intra-frequency periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportStrongestCells</code></td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inter-frequency periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportStrongestCells</code>, if the UE has set bit number 25 to 1</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Inter-RAT periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportStrongestCells</code> for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inter-RAT periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportStrongestCells</code> for GERAN, 1xRTT or HRPD, if the UE has set bit number 23, 24 or 26 to 1, respectively.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOTE: Event triggered periodical reporting (i.e., with <code>triggerType</code> set to <code>event</code> and with <code>reportAmount</code> &gt; 1) is a mandatory functionality of event triggered reporting and therefore not the subject of this bit.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Intra-frequency ANR features including:</td>
<td>- can only be set to 1 if the UE has set bit number 5 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Intra-frequency periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportCGI</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Intra-frequency periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportStrongestCells</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Inter-frequency periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportCGI</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Inter-frequency periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportStrongestCells</code> for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inter-frequency ANR features including:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 25 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>- Inter-frequency periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportStrongestCells</code></td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Inter-frequency periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportCGI</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Inter-frequency periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportStrongestCells</code> for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inter-frequency ANR features including:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 25 to 1.</td>
<td>Yes, unless UE only supports band 13</td>
<td>No</td>
</tr>
</tbody>
</table>
Inter-RAT ANR features including:
- Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCells for GERAN, if the UE has set bit number 23 to 1
- Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON for UTRAN FDD or UTRAN TDD, if the UE supports either only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1
- Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively
- Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON for 1xRTT or HRPD, if the UE has set bit number 24 or 26 to 1, respectively
- Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI for UTRAN FDD or UTRAN TDD, if the UE supports either only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1
- Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively
- Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI for GERAN, 1xRTT or HRPD, if the UE has set bit number 23, 24 or 26 to 1, respectively
- can only be set to 1 if the UE has set bit number 5 to 1 and the UE has set at least one of the bit number 22, 23, 24 or 26 to 1.
- even if the UE sets bits 33 to 37, it shall still set bit 19 to 1 if inter-RAT ANR features are tested for all RATs for which inter-RAT measurement reporting is indicated as tested.

If bit number 7 is set to 0:
- SRB1 and SRB2 for DCCH + 8x AM DRB
If bit number 7 is set to 1:
- SRB1 and SRB2 for DCCH + 8x AM DRB
- SRB1 and SRB2 for DCCH + 5x AM DRB + 3x UM DRB

NOTE: UE which indicate support for a DRB combination also support all subsets of the DRB combination. Therefore, release of DRB(s) never results in an unsupported DRB combination.

Regardless of what bit number 7 and bit number 20 is set to, UE shall support at least SRB1 and SRB2 for DCCH + 4x AM DRB
- Regardless of what bit number 20 is set to, if bit number 7 is set to 1, UE shall support at least SRB1 and SRB2 for DCCH + 4x AM DRB + 1x UM DRB
<table>
<thead>
<tr>
<th>Feature Group</th>
<th>Description</th>
<th>Requirement</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Predefined intra- and inter-subframe frequency hopping for PUSCH with $N_{sb} &gt; 1$</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td>No</td>
</tr>
<tr>
<td>22</td>
<td>UTRAN FDD or UTRAN TDD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode, if the UE supports either only UTRAN FDD or only UTRAN TDD</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td>Yes for FDD, if UE supports UTRA FDD</td>
</tr>
<tr>
<td>23</td>
<td>GERAN measurements, reporting and measurement reporting event B2 in E-UTRA connected mode</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td>Yes</td>
</tr>
<tr>
<td>24</td>
<td>1xRTT measurements, reporting and measurement reporting event B2 in E-UTRA connected mode</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td>Yes</td>
</tr>
<tr>
<td>25</td>
<td>Inter-frequency measurements and reporting in E-UTRA connected mode</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td>Yes, unless UE only supports band 13</td>
</tr>
<tr>
<td>26</td>
<td>HRPD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td>Yes for FDD, if UE supports HRPD</td>
</tr>
<tr>
<td>27</td>
<td>EUTRA RRC_CONNECTED to UTRA FDD or UTRA TDD CELL_DCH CS handover, if the UE supports either only UTRAN FDD or only UTRAN TDD</td>
<td>- related to SR-VCC - can only be set to 1 if the UE has set bit number 8 to 1 and supports SR-VCC from EUTRA defined in TS 24.008 [49] - If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td>Yes for FDD, if UE supports VoLTE and UTRA FDD</td>
</tr>
<tr>
<td>28</td>
<td>TTI bundling</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td>Yes for FDD</td>
</tr>
<tr>
<td>29</td>
<td>Semi-Persistent Scheduling</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td>Yes</td>
</tr>
<tr>
<td>30</td>
<td>Handover between FDD and TDD</td>
<td>- can only be set to 1 if the UE has set bit number 13 to 1</td>
<td>No</td>
</tr>
<tr>
<td>31</td>
<td>Indicates whether the UE supports the mechanisms defined for cells broadcasting multi band information i.e. comprehending <em>multiBandInfoList</em>, disregarding in RRC_CONNECTED the related system information fields and understanding the EARFCN signalling for all bands, that overlap with the bands supported by the UE, and that are defined in the earliest version of TS 36.101 [42] that includes all UE supported bands.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>32</td>
<td>Undefined</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** The column FDD/TDD diff indicates if the UE is allowed to signal different values for FDD and TDD.
Table B.1-1a: Definitions of feature group indicators
<table>
<thead>
<tr>
<th>Index of indicator (bit number)</th>
<th>Definition (description of the supported functionality, if indicator set to one)</th>
<th>Notes</th>
<th>If indicated &quot;Yes&quot; the feature shall be implemented and successfully tested for this version of the specification</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 (leftmost bit)</td>
<td>Inter-RAT ANR features for UTRAN FDD including: - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI</td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 22 to 1.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Inter-RAT ANR features for GERAN including: - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCells - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI</td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 23 to 1.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Inter-RAT ANR features for 1xRTT including: - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI</td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 24 to 1.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Inter-RAT ANR features for HRPD including: - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI</td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 26 to 1.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Inter-RAT ANR features for UTRAN TDD including: - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI</td>
<td>- can only be set to 1 if the UE has set bit number 5 and at least one of the bit number 22 (for UEs supporting only UTRA TDD) or the bit number 39 to 1.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>EUTRA RRC_CONNECTED to UTRA TDD CELL_DCH PS handover, if the UE supports both UTRAN FDD and UTRAN TDD</td>
<td>- can only be set to 1 if the UE has set bit number 39 to 1</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>UTRAN TDD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode, if the UE supports both UTRAN FDD and UTRAN TDD</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 40 | - EUTRA RRC\_CONNECTED to UTRA TDD CELL\_DCH CS handover, if the UE supports both UTRAN FDD and UTRAN TDD  
|   | - related to SR-VCC  
|   | - can only be set to 1 if the UE has set bit number 38 to 1 | Yes |
| 41 | Measurement reporting event: Event B1 – Neighbour > threshold for UTRAN FDD, if the UE supports UTRAN FDD and has set bit number 22 to 1  
|   | - If a category M1 UE does not support this feature group, this bit shall be set to 0. | Yes for FDD, unless UE has set bit number 15 to 1 |
| 42 | - DCI format 3a (TPC commands for PUCCH and PUSCH with single bit power adjustments)  
|   | - If a category M1 UE supports this feature group, this bit shall be set to 1. For a UE of all other categories, this bit shall be set to 0. | Yes |
| 43 | Undefined |
| 44 | Undefined |
| 45 | Undefined |
| 46 | Undefined |
| 47 | Undefined |
| 48 | Undefined |
| 49 | Undefined |
| 50 | Undefined |
| 51 | Undefined |
| 52 | Undefined |
| 53 | Undefined |
| 54 | Undefined |
| 55 | Undefined |
| 56 | Undefined |
| 57 | Undefined |
| 58 | Undefined |
| 59 | Undefined |
| 60 | Undefined |
| 61 | Undefined |
| 62 | Undefined |
| 63 | Undefined |
| 64 | Undefined |

**NOTE:** The column FDD/ TDD diff indicates if the UE is allowed to signal different values for FDD and TDD. Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a feature for which it indicates support within the FGI signalling.

### Clarification for mobility from EUTRAN and inter-frequency handover within EUTRAN

There are several feature groups related to mobility from E-UTRAN and inter-frequency handover within EUTRAN. The description of these features is based on the assumption that we have 5 main "functions" related to mobility from E-UTRAN:

A. Support of measurements and cell reselection procedure in idle mode

B. Support of RRC release with redirection procedure in connected mode

C. Support of Network Assisted Cell Change in connected mode

D. Support of measurements and reporting in connected mode

E. Support of handover procedure in connected mode

All functions can be applied for mobility to Inter-frequency to EUTRAN, GERAN, UTRAN, CDMA2000 HRPD and CDMA2000 1xRTT except for function C) which is only applicable for mobility to GERAN. Table B.1-2 below summarises the mobility functions that are supported based on the UE capability signaling (band support) and the setting of the feature group support indicators.
### Table B.1-2: Mobility from E-UTRAN

<table>
<thead>
<tr>
<th>Feature</th>
<th>GERAN</th>
<th>UTRAN</th>
<th>HRPD</th>
<th>1xRTT</th>
<th>EUTRAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Measurements and cell reselection procedure in E-UTRA idle mode</td>
<td>Supported if GERAN band support is indicated</td>
<td>Supported if UTRAN band support is indicated</td>
<td>Supported if CDMA2000 HRPD band support is indicated</td>
<td>Supported if CDMA2000 1xRTT band support is indicated</td>
<td>Supported for supported bands</td>
</tr>
<tr>
<td>B. RRC release with blind redirection procedure in E-UTRA connected mode</td>
<td>Supported if GERAN band support is indicated</td>
<td>Supported if UTRAN band support is indicated</td>
<td>Supported if CDMA2000 HRPD band support is indicated</td>
<td>Supported if CDMA2000 1xRTT band support is indicated</td>
<td>Supported for supported bands</td>
</tr>
<tr>
<td>C. Cell Change Order (with or without) Network Assisted Cell Change in E-UTRA connected mode</td>
<td>Group 10</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>D. Inter-frequency/RAT measurements, reporting and measurement reporting event B2 (for inter-RAT) in E-UTRA connected mode</td>
<td>Group 23</td>
<td>Group 22/39</td>
<td>Group 26</td>
<td>Group 24</td>
<td>Group 25</td>
</tr>
<tr>
<td>E. Inter-frequency/RAT handover procedure in E-UTRA connected mode</td>
<td>Group 9 (GSM connected handover) Separate UE capability bit defined in TS 36.306 [5] for PS handover</td>
<td>Group 8/38 (PS handover) or Group 27/40 (SRVCC handover)</td>
<td>Group 12</td>
<td>Group 11</td>
<td>Group 13 (within FDD TDD) Group 30 (between FDD and TDD)</td>
</tr>
</tbody>
</table>

In case measurements and reporting function is not supported by UE, the network may still issue the mobility procedures redirection (B) and CCO (C) in a blind fashion.

### B.2 CSG support

In this release of the protocol, it is mandatory for the UE to support a minimum set of CSG functionality consisting of:

- Identifying whether a cell is CSG or not;
- Ignoring CSG cells in cell selection/reselection.

Additional CSG functionality in AS, i.e. the requirement to detect and camp on CSG cells when the “CSG whitelist” is available or when manual CSG selection is triggered by the user, are related to the corresponding NAS features. This additional AS functionality consists of:

- Manual CSG selection;
- Autonomous CSG search;
- Implicit priority handling for cell reselection with CSG cells.

It is possible that this additional CSG functionality in AS is not supported or tested in early UE implementations.

Note that since the above AS features relate to idle mode operations, the capability support is not signalled to the network. For these reasons, no “feature group indicator” is assigned to this feature to indicate early support in Rel-8.
Annex C (normative): Release 10 AS feature handling

C.1 Feature group indicators

This annex contains the definitions of the bits in field featureGroupIndRel10.

In this release of the protocol, the UE shall include the field featureGroupIndRel10 in the IE UE-EUTRA-Capability-v1020-IEs. All the functionalities defined within the field featureGroupIndRel10 defined in Table C.1-1 are mandatory for the UE, if the related capability (spatial multiplexing in UL, PDSCH transmission mode 9, carrier aggregation, handover to EUTRA, or RAT) is also supported. For a specific indicator, if all functionalities for a feature group listed in Table C.1-1 have been implemented and tested, the UE shall set the indicator as one (1), else (i.e. if any one of the functionalities in a feature group listed in Table C.1-1 have not been implemented or tested), the UE shall set the indicator as zero (0).

The UE shall set all indicators that correspond to RATs not supported by the UE as zero (0).

The UE shall set all indicators, which do not have a definition in Table C.1-1, as zero (0).

If the optional field featureGroupIndRel10 is not included by a UE of a future release, the network may assume that all features, listed in Table C.1-1 and deployed in the network, have been implemented and tested by the UE.

The indexing in Table C.1-1 starts from index 101, which is the leftmost bit in the field featureGroupIndRel10.

Table C.1-1: Definitions of feature group indicators

<table>
<thead>
<tr>
<th>Index of indicator</th>
<th>Definition (description of the supported functionality, if indicator set to one)</th>
<th>Notes</th>
<th>If indicated &quot;Yes&quot; the feature shall be implemented and successfully tested for this version of the specification</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>101 (leftmost bit)</td>
<td>- DMRS with OCC (orthogonal cover code) and SGH (sequence group hopping) disabling</td>
<td>- if the UE supports two or more layers for spatial multiplexing in UL, this bit shall be set to 1. - If a category 0 or 1bis UE does not support this feature, this bit shall be set to 0.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td>FDD/</td>
</tr>
<tr>
<td>102</td>
<td>- Trigger type 1 SRS (aperiodic SRS) transmission (Up to X ports)</td>
<td>NOTE: X = number of supported layers on given band</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>TDD</td>
</tr>
<tr>
<td>103</td>
<td>- PDSCH transmission mode 9 when up to 4 CSI reference signal ports are configured and when not operating in CE mode</td>
<td>- for Category 8 UEs, this bit shall be set to 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>diff</td>
</tr>
<tr>
<td>104</td>
<td>- PDSCH transmission mode 9 for TDD when 8 CSI reference signal ports are configured and when not operating in CE mode</td>
<td>- if the UE does not support TDD, this bit is irrelevant (capability signalling exists for FDD for this feature), and this bit shall be set to 0. - for Category 8 UEs, this bit shall be set to 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>105</td>
<td>- Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-0 – UE selected subband CQI without PMI, when PDSCH transmission mode 9 is configured - Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-1 – UE selected subband CQI with single PMI, when PDSCH transmission mode 9 and up to 4 CSI reference signal ports are configured</td>
<td>- this bit can be set to 1 only if indices 2 (Table B.1-1) and 103 are set to 1. - For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if index 2 is set to 1 for both FDD and TDD, and index 103 is set to 1 for at least one of FDD and TDD duplex modes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------</td>
<td>----------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>106</strong></td>
<td>- Periodic CQI/PMI/RI/PTI reporting on PUCCH: Mode 2-1 – UE selected subband CQI with single PMI, when PDSCH transmission mode 9 and 8 CSI reference signal ports are configured</td>
<td>- this bit can be set to 1 only if the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports (i.e., for TDD, if index 104 is set to 1, and for FDD, if tm9-With-8Tx-FDD-r10 is set to 'supported') and if index 2 (Table B.1-1) is set to 1.  - For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if at least one of index 104 and tm9-With-8Tx-FDD-r10 is set to 1/‘supported’, and if index 2 is set to 1 for both FDD and TDD.</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
| **107** | - Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected subband CQI without PMI, when PDSCH transmission mode 9 is configured  
- Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected subband CQI with multiple PMI, when PDSCH transmission mode 9 and up to 4 CSI reference signal ports are configured | - this bit can be set to 1 only if indices 1 (Table B.1-1) and 103 are set to 1.  - For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if index 1 is set to 1 for both FDD and TDD, and index 103 is set to 1 for at least one of FDD and TDD duplex modes. | Yes |
| **108** | - Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected subband CQI with multiple PMI, when PDSCH transmission mode 9 and 8 CSI reference signal ports are configured | - this bit can be set to 1 only if the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports (i.e., for TDD, if index 104 is set to 1, and for FDD, if tm9-With-8Tx-FDD-r10 is set to 'supported') and if index 1 (Table B.1-1) is set to 1.  - For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if at least one of index 104 and tm9-With-8Tx-FDD-r10 is set to 1/‘supported’, and if index 1 is set to 1 for both FDD and TDD. | Yes |
| **109** | - Periodic CQI/PMI/RI reporting on PUCCH Mode 1-1, submode 1 | - this bit can be set to 1 only if the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports (i.e., for TDD, if index 104 is set to 1, and for FDD, if tm9-With-8Tx-FDD-r10 is set to 'supported').  - For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if at least one of index 104 and tm9-With-8Tx-FDD-r10 is set to 1/‘supported’. | Yes |
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**Table 110: Periodic CQI/PMI/RI reporting on PUCCH Mode 1-1, submode 2**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Periodic CQI/PMI/RI reporting on PUCCH Mode 1-1, submode 2</td>
<td>- this bit can be set to 1 only if the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports (i.e., for TDD, if index 104 is set to 1, and for FDD, if ( tm9-\text{With}-8Tx-FDD-r10 ) is set to 'supported'). For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if at least one of index 104 and ( tm9-\text{With}-8Tx-FDD-r10 ) is set to 1/'supported'.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Table 111: Measurement reporting trigger Event A6**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Measurement reporting trigger Event A6</td>
<td>- this bit can be set to 1 only if the UE supports carrier aggregation.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Table 112: SCell addition within the handover to EUTRA procedure**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>- SCell addition within the handover to EUTRA procedure</td>
<td>- this bit can be set to 1 only if the UE supports carrier aggregation.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Table 113: Trigger type 0 SRS (periodic SRS) transmission on X Serving Cells**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Trigger type 0 SRS (periodic SRS) transmission on X Serving Cells</td>
<td>NOTE: ( X ) = number of supported component carriers in a given band combination</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Table 114: Reporting of both UTRA CPICH RSCP and Ec/N0 in a Measurement Report**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Reporting of both UTRA CPICH RSCP and Ec/N0 in a Measurement Report</td>
<td>- this bit can be set to 1 only if index 22 (Table B.1-1) is set to 1.</td>
<td>No</td>
</tr>
</tbody>
</table>

**Table 115: time domain ICIC RLM/RRM measurement subframe restriction for the serving cell**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>- time domain ICIC RLM/RRM measurement subframe restriction for the serving cell</td>
<td>- time domain ICIC RLM/RRM measurement subframe restriction for neighbour cells</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Table 116: Relative transmit phase continuity for spatial multiplexing in UL**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Relative transmit phase continuity for spatial multiplexing in UL</td>
<td>- this bit can be set to 1 only if the UE supports two or more layers for spatial multiplexing in UL.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Table 117: Undefined**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>117</td>
<td>Undefined</td>
</tr>
<tr>
<td>118</td>
<td>Undefined</td>
</tr>
<tr>
<td>119</td>
<td>Undefined</td>
</tr>
<tr>
<td>120</td>
<td>Undefined</td>
</tr>
<tr>
<td>121</td>
<td>Undefined</td>
</tr>
<tr>
<td>122</td>
<td>Undefined</td>
</tr>
<tr>
<td>123</td>
<td>Undefined</td>
</tr>
<tr>
<td>124</td>
<td>Undefined</td>
</tr>
<tr>
<td>125</td>
<td>Undefined</td>
</tr>
<tr>
<td>126</td>
<td>Undefined</td>
</tr>
<tr>
<td>127</td>
<td>Undefined</td>
</tr>
<tr>
<td>128</td>
<td>Undefined</td>
</tr>
<tr>
<td>129</td>
<td>Undefined</td>
</tr>
<tr>
<td>130</td>
<td>Undefined</td>
</tr>
<tr>
<td>131</td>
<td>Undefined</td>
</tr>
<tr>
<td>132</td>
<td>Undefined</td>
</tr>
</tbody>
</table>

**NOTE:** The column FDD/TDD diff indicates if the UE is allowed to signal different values for FDD and TDD. Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a feature for which it indicates support within the FGI signalling.
Annex D (informative): Descriptive background information

D.1 Signalling of Multiple Frequency Band Indicators (Multiple FBI)

D.1.1 Mapping between frequency band indicator and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the E-UTRA frequency bands in SystemInformationBlockType1 by means of an example as shown in Figure D.1.1-1. In this example:

- E-UTRAN cell belongs to band B90 and also bands B6, B7, B91, and B92.
- The freqBandIndicatorPriority field is not present in SystemInformationBlockType1.
- E-UTRAN uses B64 to indicate the presence of B90 in freqBandIndicator-v9e0.
- For the MFBI list of this cell, E-UTRAN uses B64 in MultiBandInfoList to indicate the position and priority of the bands in MultiBandInfoList-v9e0.
- The UE, after reading SystemInformationBlockType1, generates an MFBI list with priority of B91, B6, B92, and B7. If the UE supports the frequency band in the freqBandIndicator-v9e0 IE it applies that frequency band. Otherwise, the UE applies the first listed band in the MFBI list which it supports.

![Figure D.1.1-1: Mapping of frequency bands to MultiBandInfoList/MultiBandInfoList-v9e0](image)

D.1.2 Mapping between inter-frequency neighbour list and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the E-UTRA frequencies signalled in SystemInformationBlockType5 by means of an example as shown in Figure D.1.2-1. In this example:

- E-UTRAN includes 4 frequencies (EARFCNs): the bands associated with f1 and f4 belong to bands lower than 64; the bands associated with f2 and f3 belong to bands larger than 64. The reserved EARFCN value of 65535 is used to indicate the presence of ARFCN-ValueEUTRA-v9e0.
- The band associated with f1 has two overlapping bands, B1 and B2 (lower than 64); the band associated with f2 has one overlapping band, B91; the band associated with f3 has four overlapping bands B3, B4, B92, and B93; the band associated with f4 does not have overlapping bands.
- E-UTRAN includes 4 lists in both `interFreqCarrierFreqList-v8h0` and `interFreqCarrierFreqList-v9e0` and ensure the order of the lists is matching. Each list corresponds to one EARFCN and contains up to 8 bands. The first list corresponds to f1, the second list corresponds to f2, and so on. The grey lists mean not including `MultiBandInfoList` or `MultiBandInfoList-v9e0`, i.e. the corresponding EARFCN does not have any overlapping frequency bands in `MultiBandInfoList` or `MultiBandInfoList-v9e0`.

D.1.3 Mapping between UTRA FDD frequency list and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the UTRA FDD frequencies signalled in `SystemInformationBlockType6` by means of an example as shown in Figure D.1.3-1. In this example:

- E-UTRAN includes 4 UTRA FDD frequencies (UARFCNs).
- The bands associated with f1 and f4 have no overlapping bands. The band associated with f2 has two overlapping bands, B1 and B2. The band associated with f3 has one overlapping band, B3.
- E-UTRAN includes 4 lists in `carrierFreqListUTRA-FDD-v8h0` with the first and fourth entry not including `MultiBandInfoList`.

---

**Figure D.1.2-1: Mapping of EARFCNs to MultiBandInfoList/MultiBandInfoList-v9e0**

---

**Figure D.1.3-1: Mapping between UTRA FDD frequency list and multiple frequency band indicator**

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the UTRA FDD frequencies signalled in `SystemInformationBlockType6` by means of an example as shown in Figure D.1.3-1. In this example:
Figure D.1.3-1: Mapping of UARFCNs to MultiBandInfoList
Annex E (normative):
TDD/FDD differentiation of FGIs/capabilities in TDD-FDD CA

Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a feature/capability for which it indicates support within the FGI/capability signalling.

A UE that indicates support for TDD/ FDD CA:

- For the fields for which the UE is allowed to indicate different support for FDD and TDD, the UE shall support the feature on the PCell and/or SCell(s), as specified in tables E-1, E-2 and E-3 in accordance to the following rules:
  - PCell: the UE shall support the feature for the PCell, if the UE indicates support of the feature for the PCell duplex mode;
  - SCell: the UE shall support the feature for SCell(s), if the UE indicates support of the feature for the SCell duplex mode;
  - Per serving cell: the UE shall support the feature for a serving cell if the UE indicates support of the feature for the serving cell's duplex mode;
  - All serving cells: UE shall support the feature if the UE indicates support of the feature for both TDD and FDD duplex modes;
- For the fields where the UE is not allowed to indicate different support for FDD and TDD, the UE shall support the feature for PCell and SCell(s) if the UE indicates support of the feature via the common FGI/capability bit.

Table E-1: Rel-8/9 FGIs for which FDD/TDD differentiation is allowed (from Annex B)

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<thead>
<tr>
<th>Index of indicator</th>
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<td>2</td>
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### Table E-2: Rel-10 FGIs for which FDD/TDD differentiation is allowed (from Annex C)

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<td>116</td>
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</table>

### Table E-3: Rel-12 UE-EUTRA capabilities for which FDD/TDD differentiation is allowed

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<td>crossCarrierScheduling</td>
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<tr>
<td>e-CSFB-1XRTT</td>
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</tr>
<tr>
<td>e-CSFB-ConcPS-Mob1XRTT</td>
<td>PCell</td>
</tr>
<tr>
<td>e-CSFB-dual-1XRTT</td>
<td>PCell</td>
</tr>
<tr>
<td>ePDCCH</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>e-RedirectionUTRA</td>
<td>PCell</td>
</tr>
<tr>
<td>e-RedirectionUTRA-TDD</td>
<td>PCell</td>
</tr>
<tr>
<td>inDeviceCoexInd</td>
<td>All serving cells</td>
</tr>
<tr>
<td>interFreqRSTD-Measurement</td>
<td>PCell</td>
</tr>
<tr>
<td>interFreqSI-AcquisitionForHO</td>
<td>PCell</td>
</tr>
<tr>
<td>interRAT-PS-HO-ToGERAN</td>
<td>PCell</td>
</tr>
<tr>
<td>intraFreqSI-AcquisitionForHO</td>
<td>PCell</td>
</tr>
<tr>
<td>mbms-Scell</td>
<td>SCell</td>
</tr>
<tr>
<td>mbms-NonServingCell</td>
<td>SCell</td>
</tr>
<tr>
<td>multiACK-CSIreporting</td>
<td>PCell</td>
</tr>
<tr>
<td>multiClusterPUSCH-WithinCC</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>oldoa-UE-Assisted</td>
<td>PCell</td>
</tr>
<tr>
<td>pmi-Disabling</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>rsrqMeasWideband</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>simultaneousPUCCH-PUSCH</td>
<td>All serving cells</td>
</tr>
<tr>
<td>ss-CCH-InterHandl</td>
<td>PCell</td>
</tr>
<tr>
<td>txDiv-PUCCH1b-ChSelect</td>
<td>PCell</td>
</tr>
<tr>
<td>ue-TxAntennaSelectionSupported</td>
<td>All serving cells</td>
</tr>
<tr>
<td>utran-SI-AcquisitionForHO</td>
<td>PCell</td>
</tr>
</tbody>
</table>
Annex F (normative): UE requirements on ASN.1 comprehension

This subclause 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 X+ N (i.e. early UE implementation) additional requirements apply.

Critical extensions (dedicated signaling)

If the early implemented feature involves one or more critical extensions (i.e. case of dedicated signaling), the UE shall comprehend the parts of the transfer syntax (ASN.1) of release X+ N that are related to the feature implemented early. This in particular concerns the ASN.1 parts related to configuration of the feature. The UE obviously also has to support the ASN.1 parts related to indicating support of the feature (in UE capabilities).

If configuration of an early implemented feature introduced in release X+ N 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 need however not 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 associated with fields A1, A3 and A5 of InformationElementA (see ASN.1 below). The feature implemented early is associated with field A5, and can only be configured by the –rX+N version of InformationElementA. In such case, the UE should support configuration of the features associated with fields A1, A3 and A5 by the –rX+N version of InformationElementA. If however one of the features was modified, e.g. the feature associated with field A3, E-UTRAN should assume the UE only supports the feature according to the release it indicated in field accessStratumRelease (X). I.e. UE is neither required to support the additional code-point (n80-vX+N0) nor the additional sub-field (fieldA3a).

InformationElementA-rX ::=  SEQUENCE {
  fieldA1-rX      InformationElementA1-rX    OPTIONAL, -- Need ON
  fieldA2-rX      InformationElementA2-rX    OPTIONAL, -- Need OR
  fieldA3-rX      InformationElementA3-rX    OPTIONAL -- Need OR
}

InformationElementA-rX+N ::= SEQUENCE {
  fieldA1-rX+N     InformationElementA1-rX    OPTIONAL, -- Need ON
  fieldA2-rX+N     InformationElementA2-rX    OPTIONAL, -- Need OR
  fieldA3-rX+N     InformationElementA3-rX+N   OPTIONAL, -- Need OR
  fieldA4-rX+N     InformationElementA4-rX+N   OPTIONAL, -- Need OR
  fieldA5-rX+N     InformationElementA5-rX+N   OPTIONAL -- Need OR
}

InformationElementA3-rX+N ::= SEQUENCE {
  fieldA1a-rX+N     InformationElementA1a-rX   OPTIONAL, -- Need ON
  fieldA2a-rX+N     ENUMERATED {n10, n20, n40, n80-vX+N0}      OPTIONAL, -- Need OR
  fieldA3a-rX+N     InformationElementA3a-rX+N   OPTIONAL -- Need OR
}

Non-critical extensions (broadcast signaling)

If the early implemented feature involves one or more non-critical extensions in broadcast signaling (i.e. system information), the UE shall comprehend the parts of the transfer syntax (ASN.1) of release X+ N that are related to the feature implemented early. The SIB(s) containing the release X+ N fields related to the early implemented features may also include other extensions concerning releases from X upto X+N. 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 G (informative):
Change history
3GPP TS 36.331 version 13.12.0 Release 13

625

ETSI TS 136 331 V13.12.0 (2019-01)

Change history
Date

TSG # TSG Doc.

CR

Rev Cat

12/2007
03/2008
03/2008
05/2008
09/2008
12/2008
03/2009

RP-38
RP-39
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Subject/Comment
Approved at TSG-RAN #38 and placed under Change Control
CR to 36.331 with Miscellaneous corrections
CR to 36.331 to convert RRC to agreed ASN.1 format
CR to 36.331 on Miscellaneous clarifications/ corrections
CR on Miscellaneous corrections and clarifications
Miscellaneous corrections and clarifications
Correction to the Counter Check procedure
CR to 36.331-UE Actions on Receiving SIB11
Spare usage on BCCH
Issues in handling optional IE upon absence in GERAN NCL
CR to 36.331 on Removal of useless RLC re-establishment at RB release
Clarification to RRC level padding at PCCH and BCCH
Removal of Inter-RAT message
Padding of the SRB-ID for security input
Validity of ETWS SIB
Configuration of the Two-Intervals-SPS
Corrections on Scaling Factor Values of Qhyst
Optionality of srsMaxUppts
CR for discussion on field name for common and dedicated IE
Corrections to Connected mode mobility
Clarification regarding the measurement reporting procedure
Corrections on s-Measure
R1 of CR0023 (R2-091029) on combination of SPS and TTI bundling for
TDD
L3 filtering for path loss measurements
S-measure handling for reportCGI
Measurement configuration clean up
Alignment of measurement quantities for UTRA
CR to 36.331 on L1 parameters ranges alignment
Default configuration for transmissionMode
CR to 36.331 on RRC Parameters for MAC, RLC and PDCP
CR to 36.331 - Clarification on Configured PRACH Freq Offset
Clarification on TTI bundling configuration
Update of R2-091039 on Inter-RAT UE Capability
Feature Group Support Indicators
Corrections to RLF detection
Indication of Dedicated Priority
Security Clean up
Correction of TTT value range
Correction on CDMA measurement result IE
Clarification of Measurement Reporting
Spare values in DL and UL Bandwidth in MIB and SIB2
Clarifications to System Information Block Type 8
Reception of ETWS secondary notification
Validity time for ETWS message Id and Sequence No
CR for Timers and constants values used during handover to E-UTRA
Inter-RAT Security Clarification
CR to 36.331 on consistent naming of 1xRTT identifiers
Capturing RRC behavior regarding NAS local release
Report CGI before T321 expiry and UE null reporting
System Information and 3 hour validity
Inter-Node AS Signalling
Set of values for the parameter "messagePowerOffsetGroupB"
CR to paging reception for ETWS capable UEs in RRC_CONNECTED
CR for CSG related items in 36.331
SRS common configuration
RRC processing delay
CR for HNB Name
Handover to EUTRA delta configuration
Delivery of Message Identifier and Serial Number to upper layers for
ETWS
Clarification on the maximum size of cell lists
Missing RRC messages in 'Protection of RRC messages'
Clarification on NAS Security Container
Extension of range of CQI/PMI configuration index
Access barring alleviation in RRC connection establishment
Corrections to feature group support indicators
CR from email discussion to capture DRX and TTT handling
Need Code handling on BCCH messages
Unification of T300 and T301 and removal of miscallaneous FFSs

ETSI

New
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