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Evolved Universal Terrestrial Radio Access (E-UTRA);
Radio Resource Control (RRC);
Protocol specification
(3GPP TS 36.331 version 10.19.0 Release 10)
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- CellGlobalIdGERAN
- CellGlobalIdCDMA2000
- CSG-Identity
- FreqBandIndicator
- MobilityControlInfo
- MobilityParametersCDMA2000 (1xRTT)
- MobilityStateParameters
- MultiBandInfoList
- PhysCellId
- PhysCellIdRange
- PhysCellIdRangeUTRA-FDDList
- PhysCellIdCDMA2000
- PhysCellIdGERAN
- PhysCellIdUTRA-FDD
- PhysCellIdUTRA-TDD
- PLMN-Identity
- PreRegistrationInfoHRPD
- Q-QualMin
- Q-RxLevMin
- Q-OffsetRange
- Q-OffsetRangeInterRAT
- ReselectionThreshold
- ReselectionThresholdQ
- SCellIndex
- ServCellIndex
- SpeedStateScaleFactors
- SystemInfoListGERAN
- SystemTimeInfoCDMA2000
- TrackingAreaCode
- T-Reselection

6.3.4 Mobility control information elements

- ShortMAC-I
- AdditionalSpectrumEmission
- ARFCN-ValueCDMA2000
- ARFCN-ValueUTRA
- ARFCN-ValueGERAN
- ARFCN-ValueUTRA
- BandclassCDMA2000
- CellGlobalIdGERAN
- CellGlobalIdEUTRA
- CellGlobalIdUTRA
- CSG-Identity
- FreqBandIndicator
- MobilityControlInfo
- MobilityParametersCDMA2000 (1xRTT)
- MobilityStateParameters
- MultiBandInfoList
- PhysCellId
- PhysCellIdRange
- PhysCellIdRangeUTRA-FDDList
- PhysCellIdCDMA2000
- PhysCellIdGERAN
- PhysCellIdUTRA-FDD
- PhysCellIdUTRA-TDD
- PLMN-Identity
- PreRegistrationInfoHRPD
- Q-QualMin
- Q-RxLevMin
- Q-OffsetRange
- Q-OffsetRangeInterRAT
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- ReselectionThresholdQ
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Foreword

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

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

Version x.y.z

where:

x  the first digit:
    1  presented to TSG for information;
    2  presented to TSG for approval;
    3 or greater indicates TSG approved document under change control.

y  the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z  the third digit is incremented when editorial only changes have been incorporated in the document.
1 Scope

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

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
[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".


[16] 3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management".

[17] 3GPP TS 25.101: "Universal Terrestrial Radio Access (UTRA); User Equipment (UE) radio transmission and reception (FDD)".

[18] 3GPP TS 25.102: "Universal Terrestrial Radio Access (UTRA); User Equipment (UE) radio transmission and reception (TDD)".


[20] 3GPP TS 45.005: "Radio transmission and reception".

[21] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation".

[22] 3GPP TS 36.212: "Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and channel coding".

[23] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures".


[26] 3GPP2 C.S0024-A v3.0: "cdma2000 High Rate Packet Data Air Interface Specification".

[27] 3GPP TS 23.003: "Numbering, addressing and identification".

[28] 3GPP TS 45.008: "Radio subsystem link control".

[29] 3GPP TS 25.133: "Requirements for Support of Radio Resource Management (FDD)".


[31] 3GPP TS 36.401: "Evolved Universal Terrestrial Radio Access (E-UTRA); Architecture description".

[32] 3GPP TS 33.401: "3GPP System Architecture Evolution (SAE); Security architecture".

[33] 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".

[34] 3GPP2 C.S0004-A v6.0: "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems – Addendum 2".

[35] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

[36] 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".


[16] 3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management".

[17] 3GPP TS 25.101: "Universal Terrestrial Radio Access (UTRA); User Equipment (UE) radio transmission and reception (FDD)".

[18] 3GPP TS 25.102: "Universal Terrestrial Radio Access (UTRA); User Equipment (UE) radio transmission and reception (TDD)".


[20] 3GPP TS 45.005: "Radio transmission and reception".

[21] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation".

[22] 3GPP TS 36.212: "Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and channel coding".

[23] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures".


[26] 3GPP2 C.S0024-A v3.0: "cdma2000 High Rate Packet Data Air Interface Specification".

[27] 3GPP TS 23.003: "Numbering, addressing and identification".

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[36] 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".
[37] 3GPP TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".

[38] 3GPP TS 23.038: "Alphabets and Language".

[39] 3GPP TS 36.413: "Evolved Universal Terrestrial Radio Access (E-UTRAN); S1 Application Protocol (S1 AP)".

[40] 3GPP TS 25.304: "Universal Terrestrial Radio Access (UTRAN); User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode".


[42] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".

[43] 3GPP TS 44.005: "Data Link (DL) Layer General Aspects".


[45] 3GPP TS 44.018: "Mobile radio interface layer 3 specification; Radio Resource Control (RRC) protocol".

[46] 3GPP TS 25.223: "Spreading and modulation (TDD)".

[47] 3GPP TS 36.104: "Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception".


[49] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core network protocols; Stage 3".

[50] 3GPP TS 45.010: "Radio subsystem synchronization".

[51] 3GPP TS 23.272: "Circuit Switched Fallback in Evolved Packet System; Stage 2".

[52] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".

[53] 3GPP2 C.S0097-0 v2.0: "E-UTRAN - cdma2000 1x Connectivity and Interworking Air Interface Specification".

[54] 3GPP TS 36.355: "LTE Positioning Protocol (LPP)".


[56] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".

[57] 3GPP TS 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

[58] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".

[59] 3GPP TS 22.368: "Service Requirements for Machine Type Communications; Stage 1".

[60] 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".

[61] 3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC); Stage 2".

[62] 3GPP TS 22.146: "Multimedia Broadcast/Multicast Service (MBMS); Stage 1".
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].

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

CSG member cell: for a UE in RRC_CONNECTED, a cell broadcasting the identity of the Registered PLMN or Equivalent PLMN and for which CSG whitelist of the UE includes an entry comprising of cell’s CSG ID and the respective PLMN identity.

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 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.

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

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.

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.

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

3.2 Abbreviations

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

1xRTT  CDMA2000 1x Radio Transmission Technology
AM  Acknowledged Mode
ASN.1  Abstract Syntax Notation One
ARQ  Automatic Repeat Request
AS  Access Stratum
BCCH  Broadcast Control Channel
BCD  Binary Coded Decimal
BCH  Broadcast Channel
CA  Carrier Aggregation
CCCH  Common Control Channel
CCO  Cell Change Order
CMAS  Commercial Mobile Alert Service
CP  Control Plane
C-RNTI  Cell RNTI
CSFB  CS fallback
CSG  Closed Subscriber Group
DCCH  Dedicated Control Channel
DRB  (user) Data Radio Bearer
DRX  Discontinuous Reception
DTCH  Dedicated Traffic Channel
DL  Downlink
DL-SCH  Downlink Shared Channel
ETWS  Earthquake and Tsunami Warning System
E-UTRA  Evolved Universal Terrestrial Radio Access
E-UTRAN  Evolved Universal Terrestrial Radio Access Network
ENB  Evolved Node B
EPC  Enhanced Packet Core
EHPLMN  Equivalent Home Public Land Mobile Network
EPS  Enhanced Packet System
FDD  Frequency Division Duplex
FFS  For Further Study
GERAN  GSM/EDGE Radio Access Network
GSM  Global System for Mobile Communications
HARQ  Hybrid Automatic Repeat Request
HPLMN  Home Public Land Mobile Network
HRPD  CDMA2000 High Rate Packet Data
IE  Information element
IMEI  International Mobile Equipment Identity
IMSI  International Mobile Subscriber Identity
kB  Kilobyte (1000 bytes)
L1  Layer 1
L2  Layer 2
L3  Layer 3
MAC  Medium Access Control
MBMS  Multimedia Broadcast Multicast Service
MBSFN  Multimedia Broadcast multicast service Single Frequency Network
MDT  Minimization of Drive Tests
MIB  Master Information Block
MO  Mobile Originating
MT  Mobile Terminating
MRB  MBMS Point to Multipoint Radio Bearer
MSI  MCH Scheduling Information
N/A  Not Applicable
NACC  Network Assisted Cell Change
NAS  Non Access Stratum
PCCH  Paging Control Channel
PCell  Primary Cell
PDU  Protocol Data Unit
PDCP  Packet Data Convergence Protocol
PLMN  Public Land Mobile Network
QoS  Quality of Service
RACH  Random Access CHannel
RAT  Radio Access Technology
RB  Radio Bearer
RLC  Radio Link Control
RN  Relay Node
RNTI  Radio Network Temporary Identifier
RPLMN  Registered Public Land Mobile Network
RRC  Radio Resource Control
RSCP  Received Signal Code Power
RSRP  Reference Signal Received Power
RSSI  Received Signal Strength Indicator
SAE  System Architecture Evolution
SAP  Service Access Point
SCell  Secondary Cell
SFN  System Frame Number
SI  System Information
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.

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.
- 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;
  - Network controlled mobility, i.e. handover and cell change order with optional network assistance (NACC) to GERAN;
  - 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;
    - Monitors control channels associated with the shared data channel to determine if data is scheduled for it;
    - Provides channel quality and feedback information;
    - Performs neighbouring cell measurements and measurement reporting;
    - Acquires system information.

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](image-url)
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.

![Mobility Procedures Diagram](image)

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).

### 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 three SRBs are defined:

- SRB0 is for RRC messages using the CCCH logical channel;
- SRB1 is for RRC messages (which may include a piggybacked NAS message) as well as for NAS messages prior to the establishment of SRB2, all using DCCH logical channel;
- SRB2 is for 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.

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.
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;
- RRC connection control:
  - Paging;
  - Establishment/ modification/ release of RRC connection, including e.g. assignment/ modification of UE identity (C-RNTI), establishment/ modification/ release of SRB1 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;
  - 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 and addition/ modification/ release of SCell(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;
- Recovery from radio link failure;
- Inter-RAT mobility including e.g. security activation, transfer of RRC context information;
- Measurement configuration and reporting:
  - 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;
- Support of measurement logging and reporting for network performance optimisation [60];
NOTE: Random access is specified entirely in the MAC including initial transmission power estimation.

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 and sub-clause 5.9 covers RN-specific procedures.

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:
apply the corresponding received configuration and start using the associated resources, unless explicitly
specified otherwise;

upon receiving a choice value set to release:

clear the corresponding configuration and stop using the associated resources;

upon handover to E-UTRA; or

upon receiving an **RRCConnectionReconfiguration** message including the **fullConfig**:

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.

### 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, only SIBs having the same scheduling requirement (periodicity) can be
mapped to the same SI message, and **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.

**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].

The UE applies the system information acquisition and change monitoring procedures for the PCell only. For an SCell,
E-UTRAN provides, via dedicated signalling, all system information relevant for operation in RRC_CONNECTED
when adding the SCell. 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.

**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 **RNReconfiguration** 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.

The SystemInformationBlockType1 uses a fixed schedule with a periodicity of 80 ms and repetitions made within 80 ms. The first transmission of SystemInformationBlockType1 is scheduled in subframe #5 of radio frames for which the SFN mod 8 = 0, and repetitions are scheduled in subframe #5 of all other radio frames for which SFN mod 2 = 0.

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]).

A single 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.

5.2.1.3 System information validity and notification of changes

Change of system information (other than for ETWS and CMAS) 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.

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 acquires the new system information immediately from the start of the next modification period. The UE applies the previously acquired system information until the UE acquires the new system information.

![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 receives a Paging message including the systemInfoModification, it knows that the system information will change at the next modification 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.

SystemInformationBlockType1 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, the UE considers stored system information to be invalid after 3 hours from the moment it was successfully confirmed as valid, unless specified otherwise.

E-UTRAN may not update systemInfoValueTag upon change of some system information e.g. ETWS information, CMAS information, regularly changing parameters like CDMA2000 system time (see 6.3). Similarly, E-UTRAN may not include the systemInfoModification within the Paging message upon change of some system information.
The UE verifies that stored system information remains valid by either checking `systemInfoValueTag` in `SystemInformationBlockType1` 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 and CMAS information will occur in the next modification period or not.

ETWS and/or CMAS capable UEs in RRC_CONNECTED 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].
5.2.2  System information acquisition

5.2.2.1  General

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.

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 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.

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> the MasterInformationBlock and SystemInformationBlockType1 as well as SystemInformationBlockType2 through SystemInformationBlockType8, depending on support of the concerned RATs;

2> if in RRC_CONNECTED:

3> the MasterInformationBlock, SystemInformationBlockType1 and SystemInformationBlockType2 as well as SystemInformationBlockType8, depending on support of CDMA2000;

1> delete any stored system information after 3 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 and systemInformationBlockType12 to be invalid if systemInfoValueTag included in the SystemInformationBlockType1 is different from the one of the stored system information;

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

2> 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 procedure nor initiate transmission of the RRCConnectionReestablishmentRequest message until the UE has a valid version of the MasterInformationBlock and SystemInformationBlockType1 messages as well as SystemInformationBlockType2;

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 and upon connection re-establishment:

3> if schedulingInfoList indicates that SystemInformationBlockType10 is present:

4> 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; and

1> if schedulingInfoList indicates that SystemInformationBlockType13 is present and the UE does not have stored a valid version of this system information block:
2> acquire SystemInformationBlockType13;

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 4: 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 or the SystemInformationBlockType1:
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:
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;

5.2.2.7 Actions upon reception of the SystemInformationBlockType1 message

Upon receiving the SystemInformationBlockType1 message the UE shall:

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 \textit{freqBandIndicator} is part of the frequency bands supported by the UE; or

2> if the UE supports \textit{multiBandInfoList}, and if one or more of the frequency bands indicated in the \textit{multiBandInfoList} are part of the frequency bands supported by the UE:

3> forward the \textit{cellIdentity} to upper layers;

3> forward the \textit{trackingAreaCode} to upper layers;

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

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

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

5> apply the \textit{additionalPmax};

4> else:

5> apply the \textit{p-Max};

3> else:

4> apply the \textit{additionalSpectrumEmission} in \textit{SystemInformationBlockType2} and the \textit{p-Max};

2> else:

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

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

5.2.2.8 Actions upon reception of SystemInformation messages

No UE requirements related to the contents of the \textit{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 \textit{SystemInformationBlockType2}, the UE shall:

1> apply the configuration included in the \textit{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 \textit{defaultPagingCycle} included in the \textit{radioResourceConfigCommon};

1> if the \textit{mbsfn-SubframeConfigList} is included:

2> consider that DL assignments may occur in the MBSFN subframes indicated in the \textit{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 \textit{timeAlignmentTimerCommon};

1> if in RRC\_CONNECTED and UE is configured with RLF timer and constants values received within \textit{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 multiNS-Pmax:

2> disregard the additionalSpectrumEmission and ul-CarrierFreq, if received, while in RRC_CONNECTED;

5.2.2.10 Actions upon reception of SystemInformationBlockType3
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.

5.2.2.11 Actions upon reception of SystemInformationBlockType4
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.

5.2.2.12 Actions upon reception of SystemInformationBlockType5
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.

5.2.2.13 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 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;

1> if the parameters1XRTT is included:

2> if the csfb-RegistrationParam1XRTT is included:

3> 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;

2> else:
3> indicate to CDMA2000 upper layers that CSFB Registration to CDMA2000 1xRTT is not allowed;

2> if the longCodeState1XRTT is included:
   3> forward the longCodeState1XRTT to CDMA2000 upper layers;

2> if the cellReselectionParameters1XRTT is included:
   3> forward the neighCellList to the CDMA2000 upper layers;

2> if the csfb-SupportForDualRxUEs is included:
   3> forward csfb-SupportForDualRxUEs to the CDMA2000 upper layers;

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

2> forward the ac-BarringConfig1XRTT to CDMA2000 upper layers, if included;

2> if the csfb-DualRxTxSupport is included:
   3> forward csfb-DualRxTxSupport to the CDMA2000 upper layers;

2> else
   3> 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:

1> 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:

1> 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:

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

1> 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:

2> discard any previously buffered warningMessageSegment;

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

   3> assemble the warning message from the received warningMessageSegment;

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

   3> stop reception of SystemInformationBlockType11;

   3> discard the current values of messageIdentifier and serialNumber for SystemInformationBlockType11;

2> else:
3> store the received warningMessageSegment;
3> continue reception of SystemInformationBlockType11;

1> else if all segments of a warning message have been received:
2> assemble the warning message from the received warningMessageSegment;
2> forward the received complete warning message, messageIdentifier, serialNumber and dataCodingScheme to upper layers;
2> stop reception of SystemInformationBlockType11;
2> discard the current values of messageIdentifier and serialNumber for SystemInformationBlockType11;
1> else:
2> store the received warningMessageSegment;
2> continue reception of SystemInformationBlockType11;

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;
3> if all segments of a warning message have been received:
4> assemble the warning message from the received warningMessageSegment;
4> forward the received 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;
3> 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.

5.2.3 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 \( T = \) 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;

5.3 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.

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.

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.

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 and/or connection re-establishment.

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_{SNB} key. The K_{SNB} 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_{SNB}, K_{RRCint}, K_{RRCenc} and K_{UPenc}) change upon every handover and connection re-establishment. The keyChangeIndicator is used upon handover and indicates whether the UE should use the keys associated with the latest available K_{ASME} key. The nextHopChainingCount parameter is used upon handover and connection re-establishment by the UE when deriving the new K_{SNB} that is used to generate K_{RRCint}, K_{RRCenc} 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. 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 $K_{\text{eNB}}$, 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.

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 $K_{\text{UP}}$ key is derived from the $K_{\text{eNB}}$ key as described in TS33.401 [32]. The same integrity protection algorithm used for SRBs also applies to the DRBs. The $K_{\text{UP}}$ changes at every handover and RRC connection re-establishment and is based on an updated $K_{\text{eNB}}$ 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. 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.

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-UTRA 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, 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. cell global 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).

5.3.2 Paging

5.3.2.1 General

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 about a system information change and/ or;
- to inform about an ETWS primary notification and/ or ETWS secondary notification and/ or;
- to inform about a CMAS notification.

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 the cn-Domain to the upper layers;

1> if the systemInfoModification 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;

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;

5.3.3 RRC connection establishment

5.3.3.1 General

Figure 5.3.3.1-1: RRC connection establishment, successful
The purpose of this procedure is to establish an RRC connection. RRC connection establishment involves SRB1 establishment. The procedure is also used to transfer the initial NAS dedicated information/message from the UE to E-UTRAN.

E-UTRAN applies the procedure as follows:
- to establish SRB1 only.

### 5.3.3.2 Initiation

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

Upon initiation of the procedure, the UE shall:

1. 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 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]:
               
               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;
            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, 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 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 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 and that access barring for mobile originating signalling is applicable, upon which the procedure ends;

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

2> if SystemInformationBlockType2 includes ac-BarringForCSFB:

3> perform access barring check as specified in 5.3.3.11, using T306 as "Tbarring" and 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 and that access barring for mobile originating CS fallback is applicable, due to 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 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 and that access barring for mobile originating CS fallback and mobile originating calls is applicable, due to ac-BarringForMO-Data, upon which the procedure ends;

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> apply the CCCH configuration as specified in 9.1.1.2;

1> apply the timeAlignmentTimerCommon included in SystemInformationBlockType2;

1> start timer T300;

1> initiate transmission of the RRCConnectionRequest 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.
5.3.3.3 Actions related to transmission of \textit{RRCConnectionRequest} 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;

NOTE 1: Upper layers provide the S-TMSI if the UE is registered in the TA of the current cell.

1> set the \textit{establishmentCause} in accordance with the information received from upper layers;

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.

5.3.3.4 Reception of the \textit{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:

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

1> if stored, discard the cell reselection priority information provided by the \textit{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> perform the actions as specified in 5.3.3.7;

1> stop timer T320, 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 \textit{RRCConnectionSetupComplete} message as follows:

2> set the \textit{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 \textit{plmn-IdentityList} in \textit{SystemInformationBlockType1};

2> if upper layers provide the 'Registered MME', include and set the \textit{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> if upper layers provided the 'Registered MME':
3> include and set the gummei-Type to the value provided by the 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> if the UE has radio link failure or handover failure information available in VarRLF-Report and plmn-Identity stored in VarRLF-Report is equal to the RPLMN:
3> include rlf-InfoAvailable;
2> if the UE has logged measurements available for E-UTRA and plmn-Identity stored in VarLogMeasReport is equal to the RPLMN:
3> include logMeasAvailable;
2> submit the RRCConnectionSetupComplete message to lower layers for transmission, upon which the procedure ends;

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

The UE shall:
1> if cell reselection occurs while T300, T302, T303, T305 or T306 is running:
2> if timer T302, T303, T305 and/or T306 is running:
3> stop timer T302, T303, T305 and T306, 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> 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;

5.3.3.6 T300 expiry

The UE shall:
1> if timer T300 expires:
2> reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established;
2> inform upper layers about the failure to establish the RRC connection, upon which the procedure ends;

5.3.3.7 T302, T303, T305 or T306 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;
5.3.3.8 Reception of the RRCConnectionReject by the UE

The UE shall:

1> stop timer T300;

2> reset MAC and release the MAC configuration;

1> start timer T302, with the timer value set to the waitTime;

1> if the extendedWaitTime is present and the UE supports delay tolerant access:

2> forward the extendedWaitTime to upper layers;

1> inform upper layers about the failure to establish the RRC connection and that access barring for mobile originating calls, mobile originating signalling, mobile terminating access and mobile originating CS fallback is applicable, upon which the procedure ends;

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

2> if the UE is in RRC_IDLE and ssac-BarringForMMTEL-Voice 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-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 the UE is in RRC_IDLE and 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

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;

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.

2> for at least one of these valid Access Classes the corresponding bit in the ac-BarringForSpecialAC contained in "AC barring parameter" is set to zero:

3> consider access to the cell as not barred;

2> else:

3> draw a random number 'rand' uniformly distributed in the range: 0 ≤ rand < 1;

3> if 'rand' is lower than the value indicated by ac-BarringFactor included in "AC barring parameter":

4> consider access to the cell as not barred;
else:
    consider access to the cell as not barred;

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

5.3.4 Initial security activation

5.3.4.1 General

![Diagram of Security Mode Command, Successful](image1)

**Figure 5.3.4.1-1: Security mode command, successful**

![Diagram of Security Mode Command, Failure](image2)

**Figure 5.3.4.1-2: Security mode command, failure**

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

5.3.4.2 Initiation

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 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 $K_{\text{ENB}}$ key, as specified in TS 33.401 [32];

1> derive the $K_{\text{RRCint}}$ key associated with the $\text{integrityProtAlgorithm}$ 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 $\text{integrityProtAlgorithm}$ as included in the SecurityModeCommand message and the $K_{\text{RRCint}}$ key;

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

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

2> if connected as an RN:

3> derive the $K_{\text{UPint}}$ key associated with the $\text{integrityProtAlgorithm}$ indicated in the SecurityModeCommand message, as specified in TS 33.401 [32];

2> configure lower layers to apply integrity protection using the indicated 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 SecurityModeComplete message;

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

2> if connected as an RN:

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

2> consider AS security to be activated;

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

1> else:

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

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

5.3.5 RRC connection reconfiguration

5.3.5.1 General

![Diagram](image.png)

**Figure 5.3.5.1-1: RRC connection reconfiguration, successful**
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 section 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 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 reportProximityConfig:
   2> perform the proximity indication in accordance with the received reportProximityConfig;

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> start timer T304 with the timer value set to t304, as included in the mobilityControlInfo;

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> reset MAC;

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 RLC for all RBs that are established;
1> configure lower layers to consider the SCell(s), 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 section 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 RRCConnectionReconfiguration message includes the radioResourceConfigDedicated:
   2> perform the radio resource configuration procedure as specified in section 5.3.5.8;

1> if the keyChangeIndicator received in the securityConfigHO is set to TRUE:
   2> update the $K_{\text{NB}}$ key based on the fresh $K_{\text{ASME}}$ key taken into use with the previous successful NAS SMC procedure, as specified in TS 33.401 [32];

1> else:
   2> update the $K_{\text{NB}}$ key based on the current $K_{\text{NB}}$ 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 $K_{\text{RRCint}}$ key associated with the integrityProtAlgorithm, as specified in TS 33.401 [32];
   2> if connected as an RN:
     3> derive the $K_{\text{UPenc}}$ key associated with the integrityProtAlgorithm, as specified in TS 33.401 [32];
   2> derive the $K_{\text{RRCenc}}$ key and the $K_{\text{UPenc}}$ key associated with the cipheringAlgorithm, as specified in TS 33.401 [32];

1> else:
   2> derive the $K_{\text{RRCint}}$ key associated with the current integrity algorithm, as specified in TS 33.401 [32];
   2> if connected as an RN:
     3> derive the $K_{\text{UPenc}}$ key associated with the current integrity algorithm, as specified in TS 33.401 [32];
   2> derive the $K_{\text{RRCenc}}$ key and the $K_{\text{UPenc}}$ 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 $K_{\text{RRCint}}$ 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 $K_{\text{RRCenc}}$ key and the $K_{\text{UPenc}}$ 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 $K_{\text{UPenc}}$ key, for current or subsequently established DRBs that are configured to apply integrity protection, if any;

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> 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 **reportProximityConfig**:

2> perform the proximity indication in accordance with the received **reportProximityConfig**;

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 **plmn-Identity** stored in **VarRLF-Report** is equal to the RPLMN:

3> include **rlf-InfoAvailable**;

2> if the UE has logged measurements available for E-UTRA and **plmn-Identity** stored in **VarLogMeasReport** is equal to the RPLMN:

3> include the **logMeasAvailable**;

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> 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.

### 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: 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-Identity to 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;

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 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;

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 target PCell of the failed handover;

3> include previousPCellId and set it to the global cell identity of the PCell where the last RRCConnectionReconfiguration message including mobilityControlInfo was received;

3> set the timeConnFailure to the elapsed time since reception of the last RRCConnectionReconfiguration message including the mobilityControlInfo;
3> set the `connectionFailureType` to 'hof';

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 2: 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

5.3.5.8 Radio Configuration involving full configuration option

The UE shall:

1> release/ clear all current dedicated radio configurations except the C-RNTI, the 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`;

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> 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.

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

![Counter Check Procedure 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> 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;

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

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.

![Figure 5.3.7.1-1: RRC connection re-establishment, successful](image1)

![Figure 5.3.7.1-2: RRC connection re-establishment, failure](image2)
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
1> upon mobility from E-UTRA failure, in accordance with 5.4.3.5; or
1> upon integrity check failure indication from lower layers; or
1> upon an RRC connection reconfiguration failure, in accordance with 5.3.5.5;

Upon initiation of the procedure, the UE shall:

1> stop timer T310, if running;
1> start timer T311;
1> suspend all RBs except SRB0;
1> reset MAC;
1> release the SCell(s), if configured, in accordance with 5.3.10.3a;
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> release reportProximityConfig and clear any associated proximity status reporting timer;
1> release measSubframePatternPCell, if configured;
1> if connected as an RN and configured with an RN subframe configuration:
   2> release the RN subframe configuration;
1> 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;
1> start timer T301;
1> apply the timeAlignmentTimerCommon included in SystemInformationBlockType2;
1> initiate transmission of the RRCConnectionReestablishmentRequest 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> 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 RRCConnectionReestablishmentRequest message

If the procedure was initiated due to radio link failure or handover failure, the UE shall:
The UE shall set the contents of `RRCConnectionReestablishmentRequest` message as follows:

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

The UE shall 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`;

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 `RRCConnectionReestablishmentRequest` message to lower layers for transmission.

### 5.3.7.5 Reception of the `RRCConnectionReestablishment` 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:

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

1. update the $K_{\text{eNB}}$ key based on the $K_{\text{NAS}}$ key to which the current $K_{\text{eNB}}$ 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 $K_{RRC\text{int}}$ key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];

1> derive the $K_{RRC\text{enc}}$ key and the $K_{\text{UE\text{enc}}}$ key associated with the previously configured ciphering algorithm, as specified in TS 33.401 [32];

1> if connected as an RN:

2> derive the $K_{\text{UE\text{int}}}$ 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 $K_{RRC\text{int}}$ 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 $K_{\text{UE\text{int}}}$ 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 $K_{RRC\text{enc}}$ key and the $K_{\text{UE\text{enc}}}$ 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> set the content of $\text{RRCConnectionReestablishmentComplete}$ message as follows:

2> if the UE has radio link failure or handover failure information available in $\text{VarRLF-Report}$ and $\text{plmn-Identity}$ stored in $\text{VarRLF-Report}$ is equal to the RPLMN:

3> include the $\text{rlf-InfoAvailable}$;

2> if the UE has logged measurements available for E-UTRA and $\text{plmn-Identity}$ stored in $\text{VarLogMeasReport}$ is equal to the RPLMN:

3> include the $\text{logMeasAvailable}$;

1> perform the measurement related actions as specified in 5.5.6.1;

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

1> submit the $\text{RRCConnectionReestablishmentComplete}$ message to lower layers for transmission, upon which 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 \textit{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)

\textbf{Figure 5.3.8.1-1: RRC connection release, successful}

The purpose of this procedure is to release the RRC connection, which includes the release of the established radio bearers as well as all radio resources.

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. 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. 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 \textit{extendedWaitTime} is present and the UE supports delay tolerant access:
      3. forward the \textit{extendedWaitTime} to upper layers;
2> 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;

5.3.10.1 SRB addition/ modification

The UE shall:

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

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

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

2> establish a DTCH logical channel in accordance with the received `logicalChannelIdentity` and the received `logicalChannelConfig`;

1> if the `RRCConnectionReconfiguration` message includes the `fullConfig` IE:

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

1> else:

2> 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 `pdcp-Config` is included:

3> reconfigure the PDCP entity in accordance with the received `pdcp-Config`;

2> if the `rlc-Config` is included:

3> reconfigure the RLC entity or entities in accordance with the received `rlc-Config`;

2> if the `logicalChannelConfig` is included:

3> reconfigure the DTCH logical channel in accordance with the received `logicalChannelConfig`;

NOTE: Removal and addition of the same `drb-Identity` in single radioResourceConfiguration is not supported.

5.3.10.3a SCell release

The UE shall:

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

2> for each `sCellIndex` value included in the `sCellToReleaseList`:

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

4> release the SCell;

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 in the `sCellToAddModList` that is not part of the current UE configuration (SCell addition):

2> add the SCell, corresponding to the `cellIdentification`, in accordance with the received `radioResourceConfigCommonSCell` and `radioResourceConfigDedicatedSCell`;

2> configure lower layers to consider the SCell to be in deactivated state;
5.3.10.4 MAC main reconfiguration

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

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 section 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 not `tm3` or `tm4` or `tm8` or `tm9`; 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;
1> else if the `antennaInfo` is included and set to `defaultValue`:
   2> release `ri-ConfigIndex` in `cqi-ReportPeriodic`, if previously configured;

5.3.10.7 Radio Link Failure Timers and Constants reconfiguration

The UE shall:

1> if the received `rlf-TimersAndConstants` is set to release:
   2> use values for timers T301, T310, T311 and constants N310, N311, as included in `ue-TimersAndConstants` received in `SystemInformationBlockType2`;
1> else:
   2> reconfigure the value of timers and constants in accordance with received `rlf-TimersAndConstants`;
5.3.10.8  Time domain measurement resource restriction for serving cell

The UE shall:

1> if the received measSubframePatternPCell is set to release:
   2> release the time domain measurement resource restriction for the PCell, if previously configured

1> else:
   2> apply the time domain measurement resource restriction for the PCell in accordance with the received measSubframePatternPCell;

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;

NOTE: Physical layer monitoring and related autonomous actions do not apply to SCells.

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;

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.

5.3.11.3  Detection of radio link failure

The UE shall:

1> upon T310 expiry; or
1> upon random access problem indication from MAC while neither T300, T301, T304 nor T311 is running; or
1> upon indication from RLC that the maximum number of retransmissions has been reached:
   2> consider radio link failure to be detected;
   2> 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-Identity to 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;

NOTE: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. 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> if an RRCConnectionReconfiguration message including the mobilityControlInfo concerning an intra E-UTRA handover was received before the connection failure:

4> include previousPCellId and set it to the global cell identity of the PCell where the last RRCConnectionReconfiguration including the mobilityControlInfo message was received;

4> set the timeConnFailure to the elapsed time since reception of the last RRCConnectionReconfiguration message including the mobilityControlInfo;

3> set the connectionFailureType to rlf;

2> if AS 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;

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 and T330;

1> release all radio resources, including release of the RLC entity, the MAC configuration and the associated PDCP entity for all established RBs;

1> 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> enter RRC_IDLE and perform procedures as specified in TS 36.304 [4, 5.2.7];

5.3.13 UE actions upon PUCCH/ SRS release request

Upon receiving a PUCCH/ SRS release request from lower layers, the UE shall:

1> apply the default physical channel configuration for \textit{cqi-ReportConfig} as specified in 9.2.4 and release \textit{cqi-ReportConfigSCell}, for each SCell that is configured, if any;

1> apply the default physical channel configuration for \textit{soundingRS-UL-ConfigDedicated} as specified in 9.2.4, for all serving cells;

1> apply the default physical channel configuration for \textit{schedulingRequestConfig} as specified in 9.2.4;

NOTE: Upon PUCCH/ SRS release request, the UE does not modify the \textit{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

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

1> 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 \textit{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 \textit{ProximityIndication} (either entering or leaving) for the RAT and frequency;

3> initiate transmission of the \textit{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):
   - set *type* to *entering*;
2. else if the UE applies the procedure to report leaving the proximity of CSG member cell(s):
   - set *type* to *leaving*;
3. if the proximity indication was triggered for one or more CSG member cell(s) on an E-UTRA frequency:
   - 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;
4. else if the proximity indication was triggered for one or more CSG member cell(s) on a UTRA frequency:
   - 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.

5.4 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

![Diagram](#)

*Figure 5.4.2.1-1: Handover to E-UTRA, successful*

The purpose of this procedure is to, under the control of the network, transfer a connection between the UE and another Radio Access Network (e.g. 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;
2. apply the default semi-persistent scheduling configuration as specified in 9.2.3;
3. apply the default MAC main configuration as specified in 9.2.2;
4. start timer T304 with the timer value set to \( t_{304} \), as included in the `mobilityControlInfo`;
5. consider the target PCell to be one on the frequency indicated by the `carrierFreq` with a physical cell identity indicated by the `targetPhysCellId`;
6. start synchronising to the DL of the target PCell;
7. set the C-RNTI to the value of the `newUE-Identity`;
8. for the target PCell, apply the downlink bandwidth indicated by the `dl-Bandwidth`;
9. for the target PCell, apply the uplink bandwidth indicated by (the absence or presence of) the `ul-Bandwidth`;
10. configure lower layers in accordance with the received `radioResourceConfigCommon`;
11. configure lower layers in accordance with any additional fields, not covered in the previous, if included in the received `mobilityControlInfo`;
12. perform the radio resource configuration procedure as specified in 5.3.10;
13. forward the `nas-SecurityParamToEUTRA` to the upper layers;
14. derive the `K_{cNB}` key, as specified in TS 33.401 [32];
15. derive the `K_{RRCcon}` key associated with the `integrityProtAlgorithm`, as specified in TS 33.401 [32];
16. derive the `K_{RRCon}` key and the `K_{UPenc}` key associated with the `cipheringAlgorithm`, as specified in TS 33.401 [32];
17. configure lower layers to apply the indicated integrity protection algorithm and the `K_{RRCon}` 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;
18. configure lower layers to apply the indicated ciphering algorithm, the `K_{RRCcon}` key and the `K_{UPenc}` 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;
19. if the received `RRCConnectionReconfiguration` includes the `scellToAddModList`:
   1. perform SCell addition as specified in 5.3.10.3b;
20. if the `RRCConnectionReconfiguration` message includes the `measConfig`:
   1. 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 reportProximityConfig:

2> perform the proximity indication configuration in accordance with the received reportProximityConfig;

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 plmn-Identity stored in VarRLF-Report is equal to the RPLMN:

3> include rlf-InfoAvailable;

2> if the UE has logged measurements available for E-UTRA and plmn-Identity stored in VarLogMeasReport is equal to the RPLMN:

3> include the logMeasAvailable;

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.

5.4.2.4 Reconfiguration 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.

5.4.2.5 T304 expiry (handover to E-UTRA failure)

The UE shall:

1> upon T304 expiry (handover to E-UTRA failure):
5.4.3 Mobility from E-UTRA

5.4.3.1 General

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 MobilityFromEUTRACCommand by the UE

The UE shall be able to receive a MobilityFromEUTRACCommand 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> if the MobilityFromEUTRACCommand 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 MobilityFromEUTRACCommand 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 MobilityFromEUTRACCommand message includes the purpose set to cellChangeOrder:

2> start timer T304 with the timer value set to t304, as included in the MobilityFromEUTRACCommand message;

2> if the targetRAT-Type is set to geran:

3> if networkControlOrder is included in the MobilityFromEUTRACCommand 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 MobilityFromEUTRACCommand 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 \textit{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 \textit{mobilityCDMA2000-HRPD} is present and is set to \textit{redirection}:

3. forward the \textit{redirectedCarrierInfoCDMA2000-HRPD} to the CDMA2000 upper layers;

\textbf{NOTE 4}: When the CDMA2000 upper layers in the UE receive both the \textit{messageContCDMA2000-1XRTT} and \textit{messageContCDMA2000-HRPD} the UE performs concurrent access to both CDMA2000 1xRTT and CDMA2000 HRPD RAT.

\subsection*{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';

\textbf{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.

\subsection*{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 \textit{MobilityFromEUTRACommand} message; or

1. if there is a protocol error in the inter RAT information included in the \textit{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 \textit{cs-FallbackIndicator} in the \textit{MobilityFromEUTRACommand} message was set to \textit{TRUE}:

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 \textit{physicalConfigDedicated}, \textit{mac-MainConfig} and \textit{sps-Config};

2. initiate the connection re-establishment procedure as specified in 5.3.7;

\textbf{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

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;
   2> forward redirectCarrierCDMA2000-1XRTT to the CDMA2000 upper layers, if included;
1> else
   2> indicate the request to prepare handover or enhanced 1xRTT CS fallback and forward the cdma2000-Type to
      the CDMA2000 upper layers;
   2> if cdma2000-Type is set to type1XRTT:
      3> forward the rand and the mobilityParameters to the CDMA2000 upper layers;
   2> if currPrepCDMA2000-HRPD is present in the received message:
      3> forward currPrepCDMA2000-HRPD to the CDMA2000 upper layers;
   2> else
      3> forward currPrepCDMA2000-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 HandoverFromEUTRANPreparationRequest 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 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 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 and a list of 'blacklisted' 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.

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.

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.

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, 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).
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 and detected cells. 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.

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;

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;

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:
5.5.2.2a  Measurement identity autonomous removal

The UE shall:

1> for each measId included in the measIdList within VarMeasConfig:
   2> if the associated reportConfig concerns an event involving a serving cell while the concerned serving cell is not configured:
      3> remove the measId from the measIdList within the VarMeasConfig;
      3> 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 and A6.

NOTE 2: When performed during re-establishment, the UE is only configured with a primary frequency (i.e. the SCell(s) 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> 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;
5> for UTRA TDD, start timer T321 with the timer value set to [1 second] for this measId;
4> else:
5> start timer T321 with the timer value set to 8 seconds for this measId;
3> else:
4> start timer T321 with the timer value set to 8 seconds for this measId;

5.5.2.4 Measurement object removal
The UE shall:
1> for each measObjectId included in the received measObjectToRemoveList that is part of the current UE configuration in VarMeasConfig:
2> remove the entry with the matching measObjectId from the measObjectList within the VarMeasConfig;
2> remove all measId associated with this measObjectId from the measIdList within the VarMeasConfig, if any;
2> if a measId is removed from the measIdList:
3> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
3> stop the periodical reporting timer or timer T321, 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:
1> for each measObjectId included in the received measObjectToAddModList:
2> if an entry with the matching measObjectId exists in the measObjectList within the VarMeasConfig, for this entry:
3> replace the entry with the value received for this measObject, except for the fields cellsToAddModList, blackCellsToAddModList, cellsToRemoveList, blackCellsToRemoveList and measSubframePatternConfigNeigh;
3> if the received measObject includes the cellsToRemoveList:
4> for each cellIndex included in the cellsToRemoveList:
5> remove the entry with the matching cellIndex from the cellsToAddModList;
3> if the received measObject includes the cellsToAddModList:
4> for each cellIndex value included in the cellsToAddModList:
5> if an entry with the matching cellIndex exists in the cellsToAddModList:
6> replace the entry with the value received for this cellIndex;
5> else:
6> add a new entry for the received `cellIndex` to the `cellsToAddModList`;

3> if the received `measObject` includes the `blackCellsToRemoveList`:

4> for each `cellIndex` included in the `blackCellsToRemoveList`:

5> remove the entry with the matching `cellIndex` from the `blackCellsToAddModList`;

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`;

3> if the received `measObject` includes `measSubframePatternConfigNeigh`:

4> set `measSubframePatternConfigNeigh` within the `VarMeasConfig` to the value of the received field

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`;

2> else:

3> add a new entry for the received `measObject` to the `measObjectList` within `VarMeasConfig`;

5.5.2.6 Reporting configuration removal

The UE shall:

1> for each `reportConfigId` included in the received `reportConfigToRemoveList` that is part of the current UE configuration in `VarMeasConfig`:

2> remove the entry with the matching `reportConfigId` from the `reportConfigList` within the `VarMeasConfig`;

2> remove all `measId` associated with the `reportConfigId` from the `measIdList` within the `VarMeasConfig`, if any;

2> if a `measId` is removed from the `measIdList`:

3> remove the measurement reporting entry for this `measId` from the `VarMeasReportList`, if included;

3> stop the periodical reporting timer or timer T321, 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> replace the entry with the value received for this `reportConfig`;
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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;

3> add a new entry for the received reportConfig to the reportConfigList within the VarMeasConfig;

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 mod T = FLOOR(gapOffset/10);
      subframe = gapOffset mod 10;
      with T = MGRP/10 as defined in TS 36.133 [16];

1> else:
   2> release the measurement gap configuration;

5.5.3 Performing measurements

5.5.3.1 General

For all measurements 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, applying for the PCell the time domain measurement resource restriction in accordance with measSubframePatternPCell, if configured;

1> for each measId included in the measIdList within VarMeasConfig:
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;

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> else:

3> if a measurement gap configuration is setup; or

3> if the UE does not require measurement gaps to perform the concerned measurements:

4> if s-Measure is not configured; or

4> if s-Measure is configured and the PCell RSRP, after layer 3 filtering, is lower than this value:
5> perform the corresponding measurements of neighbouring cells on the frequencies and RATs indicated in the concerned measObject, applying for neighbouring cells on the primary frequency the time domain measurement resource restriction in accordance with measSubframePatternConfigNeigh, if configured in the concerned measObject;

4> if the ue-RxTxTimeDiffPeriodical is configured in the associated reportConfig:

5> perform the UE Rx–Tx time difference measurements on the PCell;

2> perform the evaluation of reporting criteria as specified in 5.5.4;

NOTE 3: The s-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-Measure, e.g., to measure cells broadcasting a CSG identity following use of the autonomous search function as defined in TS 36.304 [4].

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 measurements i.e. for those type 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
- \( a = 1/2^{(k_{\text{filter}})} \), 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;
else if the corresponding reportConfig includes a purpose set to reportCGI:

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;

else:

if the corresponding measObject concerns E-UTRA:

if the ue-RxTxTimeDiffPeriodical is configured in the corresponding reportConfig:

consider only the PCell to be applicable;

else if the eventA1 or eventA2 is configured in the corresponding reportConfig:

consider only the serving cell to be applicable;

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;

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);

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;

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;

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):

include a measurement reporting entry within the VarMeasReportList for this measId;

set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;

include the concerned cell(s) in the cellsTriggeredList defined within the VarMeasReportList for this measId;

initiate the measurement reporting procedure, as specified in 5.5.5;

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):

set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;

include the concerned cell(s) in the cellsTriggeredList 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 cells included in the cellsTriggeredList defined within the VarMeasReportList for this measId for all measurements after layer 3 filtering taken during timeToTrigger defined within the VarMeasConfig for this event:

3> remove the concerned cell(s) in the cellsTriggeredList defined within the VarMeasReportList for this measId;

3> if reportOnLeave is set to TRUE for the corresponding reporting configuration 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 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> initiate the measurement reporting procedure, as specified in 5.5.5;

NOTE 1: If the purpose is set to reportStrongestCells and reportAmount > 1, the UE initiates a first measurement report immediately after the quantity to be reported becomes available for the PCell. If the purpose is set to reportStrongestCells and reportAmount = 1, the UE initiates a first measurement report immediately after the quantity to be reported becomes available for the PCell and for the strongest cell among the applicable cells. If the purpose is set to reportStrongestCellsForSON, the UE initiates a first measurement report 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)

\[ Ms - Hys > \text{Thresh} \]

Inequality A1-2 (Leaving condition)

\[ Ms + Hys < \text{Thresh} \]

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. \textit{hysteresis} as defined within reportConfigEUTRA for this event).
\( \text{Thresh} \) is the threshold parameter for this event (i.e. \textit{a1-Threshold} as defined within reportConfigEUTRA for this event).

\( Ms \) is expressed in dBm in case of RSRP, or in dB in case of RSRQ.
\( Hys \) is expressed in dB.
\( \text{Thresh} \) is expressed in the same unit as \( Ms \).

5.5.4.3 Event A2 (Serving becomes worse than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A2-1, as specified below, is fulfilled;
1> consider the leaving condition for this event to be satisfied when condition A2-2, as specified below, is fulfilled;
1> for this measurement, consider the primary or secondary cell that is configured on the frequency indicated in the associated measObjectEUTRA to be the serving cell;

Inequality A2-1 (Entering condition)

\[ Ms + Hys < \text{Thresh} \]

Inequality A2-2 (Leaving condition)

\[ Ms - Hys > \text{Thresh} \]

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. \textit{hysteresis} as defined within reportConfigEUTRA for this event).
\( \text{Thresh} \) is the threshold parameter for this event (i.e. \textit{a2-Threshold} as defined within reportConfigEUTRA for this event).

\( Ms \) is expressed in dBm in case of RSRP, or in dB in case of RSRQ.
\( Hys \) is expressed in dB.
\( \text{Thresh} \) is expressed in the same unit as \( Ms \).
5.5.4.4 Event A3 (Neighbour becomes offset better than PCell)

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;

NOTE The cell(s) that triggers the event is on the frequency indicated in the associated measObject which may be different from the (primary) frequency used by the PCell.

Inequality A3-1 (Entering condition)

\[ Mn + Ofn + Ocn - Hys > Mp + Ofp + Ocp + Off \]

Inequality A3-2 (Leaving condition)

\[ Mn + Ofn + Ocn - Hys < Mp + Ofp + Ocp + Off \]

The variables in the formula are defined as follows:

- \( Mn \) is the measurement result of the neighbouring cell, not taking into account any offsets.
- \( Ofn \) is the 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, not taking into account any offsets.
- \( Ofp \) is the frequency specific offset of the primary frequency (i.e. offsetFreq as defined within measObjectEUTRA corresponding to the primary frequency).
- \( Ocp \) is the cell specific offset of the PCell (i.e. cellIndividualOffset as defined within measObjectEUTRA corresponding to the primary frequency), and is set to zero if not configured for the PCell.
- \( Hys \) 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.
\( Ofn, Ocn, Ofp, Ocp, Hys, Off \) 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;
1> consider the leaving condition for this event to be satisfied when condition A4-2, as specified below, is fulfilled;

Inequality A4-1 (Entering condition)

\[ Mn + Ofn + Ocn - Hys > Thresh \]

Inequality A4-2 (Leaving condition)

\[ Mn + Ofn + Ocn - Hys < Thresh \]

The variables in the formula are defined as follows:

- \( Mn \) is the measurement result of the neighbouring cell, not taking into account any offsets.
- \( Ofn \) is the 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).

**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.

**Ofn, Ocn, Hys** are expressed in dB.

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

### 5.5.4.6 Event A5 (PCell 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;
2. 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;

**NOTE:** The cell(s) that triggers the event is on the frequency indicated in the associated `measObject` which may be different from the (primary) frequency used by the PCell.

**Inequality A5-1** (Entering condition 1)

\[Mp + Hys < \text{Thresh1}\]

**Inequality A5-2** (Entering condition 2)

\[Mn + Ofn + Ocn - Hys > \text{Thresh2}\]

**Inequality A5-3** (Leaving condition 1)

\[Mp - Hys > \text{Thresh1}\]

**Inequality A5-4** (Leaving condition 2)

\[Mn + Ofn + Ocn + Hys < \text{Thresh2}\]

The variables in the formula are defined as follows:

- **Mp** is the measurement result of the PCell, not taking into account any offsets.
- **Mn** is the measurement result of the 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).
- **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).

**Mn, Mp** are expressed in dBm in case of RSRP, or in dB in case of RSRQ.
**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;
2. consider the leaving condition for this event to be satisfied when condition A6-2, as specified below, is fulfilled;
3. 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)

\[
M_n + O_{cn} + Hys > M_s + O_{cs} + Off
\]

Inequality A6-2 (Leaving condition)

\[
M_n + O_{cn} + Hys < M_s + O_{cs} + Off
\]

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.

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

Inequality B1-1 (Entering condition)

\[
M_n + O_{fn} + Hys > Thresh
\]

Inequality B1-2 (Leaving condition)

\[
M_n + O_{fn} + Hys < Thresh
\]

The variables in the formula are defined as follows:

- **Offn** is expressed in dB.
- **Thresh1** is expressed in the same unit as **Mp**.
- **Thresh2** is expressed in the same unit as **Mn**.
\( Mn \) is the measurement result of the inter-RAT neighbour cell, not taking into account any offsets. For CDMA 2000 measurement result, \( \text{pilotStrength} \) is divided by -2.

\( Ofn \) is the frequency specific offset of the frequency of the inter-RAT neighbour cell (i.e. \( \text{offsetFreq} \) as defined within the \( \text{measObject} \) corresponding to the frequency of the neighbour inter-RAT cell).

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

\( \text{Thresh} \) is the threshold parameter for this event (i.e. \( \text{b1-Threshold} \) as defined within \( \text{reportConfigInterRAT} \) for this event). For CDMA2000, \( \text{b1-Threshold} \) 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.

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

**Inequality B2-1 (Entering condition 1)**

\[ Mp + Hys < \text{Thresh1} \]

**Inequality B2-2 (Entering condition 2)**

\[ Mn + Ofn - Hys > \text{Thresh2} \]

**Inequality B2-3 (Leaving condition 1)**

\[ Mp - Hys > \text{Thresh1} \]

**Inequality B2-4 (Leaving condition 2)**

\[ Mn + Ofn + Hys < \text{Thresh2} \]

The variables in the formula are defined as follows:

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

\( Mn \) is the measurement result of the inter-RAT neighbour cell, not taking into account any offsets. For CDMA2000 measurement result, \( \text{pilotStrength} \) is divided by -2.

\( Ofn \) is the frequency specific offset of the frequency of the inter-RAT neighbour cell (i.e. \( \text{offsetFreq} \) as defined within the \( \text{measObject} \) corresponding to the frequency of the inter-RAT neighbour cell).

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

\( \text{Thresh1} \) is the threshold parameter for this event (i.e. \( \text{b2-Threshold1} \) as defined within \( \text{reportConfigInterRAT} \) for this event).

\( \text{Thresh2} \) is the threshold parameter for this event (i.e. \( \text{b2-Threshold2} \) as defined within \( \text{reportConfigInterRAT} \) for this event). For CDMA2000, \( \text{b2-Threshold2} \) is divided by -2.

\( Mp \) is expressed in dBm in case of RSRP, or in dB in case of RSRQ.
Mn 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 Mp.

Thresh2 is expressed in the same unit as Mn.

### 5.5.5 Measurement reporting

The purpose of this procedure is to transfer measurement results from the UE to E-UTRAN. 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;

1> set the measResultPCell to include the quantities of the PCell;

1> 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];

1> if the reportConfig associated with the measId that triggered the measurement reporting includes reportAddNeighMeas:

2> 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:

3> 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;

1> if there is at least one applicable neighbouring cell to report:

2> set the measResultNeighCells to include the best neighbouring cells up to maxReportCells in accordance with the following:

3> if the triggerType is set to event:

4> 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:** 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;

3> if the triggerType is set to event; or the purpose is set to reportStrongestCells or to reportStrongestCellsForSON:
for each included cell, include the layer 3 filtered measured results in accordance with the reportConfig for this measId, ordered as follows:

if the measObject associated with this measId concerns E-UTRA:

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;

if the measObject associated with this measId concerns UTRA FDD and if ReportConfigInterRAT includes the reportQuantityUTRA-FDD:

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;

if the measObject associated with this measId concerns UTRA FDD and if ReportConfigInterRAT does not include the reportQuantityUTRA-FDD; or

if the measObject associated with this measId concerns UTRA TDD, GERAN or CDMA2000:

set the measResult to the quantity as configured for the concerned RAT within the quantityConfig in order of either decreasing quantity for UTRA and GERAN or increasing quantity for CDMA2000 pilotStrength, i.e. the best cell is included first;

else if the purpose is set to reportCGI:

if the mandatory present fields of the cgi-Info for the cell indicated by the cellForWhichToReportCGI in the associated measObject have been obtained:

if the cell broadcasts a CSG identity:

include the csg-Identity;

include the csg-MemberStatus and set it to member if the cell is a CSG member cell;

if the si-RequestForHO is configured within the reportConfig associated with this measId:

include the cgi-Info containing all the fields that have been successfully acquired, except for the plmn-IdentityList;

else:

include the cgi-Info containing all the fields that have been successfully acquired;

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 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:

include the locationCoordinates;

if available, include the gnss-TOD-msec;

increment the numberOfReportsSent as defined within the VarMeasReportList for this measId by 1;

stop the periodical reporting timer, if running;

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:

start the periodical reporting timer with the value of reportInterval as defined within the corresponding reportConfig for this measId;
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> 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 the entry within the `VarMeasReportList` for this `measId`;

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 `measObjectList` 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 dependant 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

| UE | EUTRAN |
|----------------------------------|
| ![InterFreqRSTDMeasurementIndication](image) |

**Figure 5.5.7.1-1: Inter-frequency RSTD measurement indication**

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

5.6.1 DL information transfer

5.6.1.1 General

![Figure 5.6.1.1-1: DL information transfer](image)

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 dedicatedInfoType is set to dedicatedInfoNAS:
   2> forward the dedicatedInfoNAS to the NAS upper layers.

1> if the dedicatedInfoType is set to dedicatedInfoCDMA2000-1XRTT or to dedicatedInfoCDMA2000-HRPD:
   2> 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 in which case the NAS information is piggybacked to the RRCConnectionSetupComplete message. 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 ULInformationTransfer message

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

1> if there is a need to transfer NAS information:
   2> set the dedicatedInfoType to include the dedicatedInfoNAS;

1> if there is a need to transfer CDMA2000 1XRTT information:
   2> set the dedicatedInfoType to include the dedicatedInfoCDMA2000-1XRTT;

1> if there is a need to transfer CDMA2000 HRPD information:
   2> set the dedicatedInfoType to include the dedicatedInfoCDMA2000-HRPD;

1> submit the 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 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

![Diagram of UE capability transfer](image)

\textbf{Figure 5.6.3.1-1: UE capability transfer}

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.

\textbf{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 \textit{UECapabilityEnquiry} by the UE

The UE shall:

1> set the contents of \textit{UECapabilityInformation} message as follows:

2> if the \textit{ue-CapabilityRequest} includes \textit{utra}:

3> include the \textit{UE-EUTRA-Capability} within a \textit{ue-CapabilityRAT-Container} and with the \textit{rat-Type} set to \textit{utra};

3> if the UE supports FDD and TDD:

4> set all fields of \textit{UECapabilityInformation}, except field \textit{fdd-Add-UE-EUTRA-Capabilities} and \textit{idd-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 \textit{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 \textit{tdd-Add-UE-EUTRA-Capabilities} and set it to include fields reflecting the
      additional functionality applicable for TDD;

\textbf{NOTE:} The UE includes fields of \textit{XDD-Add-UE-EUTRA-Capabilities} in accordance with the following:
   - The field is included only if one or more of its sub-fields has a value that is different compared to the
     value signalled elsewhere within \textit{UE-EUTRA-Capability};
   (this value signalled elsewhere is also referred to as the \textit{Common value}, that is supported for both xDD modes)
   - For the fields that are included in \textit{XDD-Add-UE-EUTRA-Capabilities}, the UE sets:
      - the sub-fields that are not allowed to be different the same as the \textit{Common value};
      - the sub-fields that are allowed to be different to a value indicating at least the same functionality as indicated by the
        \textit{Common value};

3> else (UE supports single xDD mode):
   4> set all fields of \textit{UECapabilityInformation}, except field \textit{fdd-Add-UE-EUTRA-Capabilities} and \textit{tdd-Add-UE-EUTRA-Capabilities} (including their sub-fields), to include the values applicable for the xDD
      mode supported by the UE;

2> if the \textit{ue-CapabilityRequest} includes \textit{geran-cs} and if the UE supports GERAN CS domain:
   3> include the UE radio access capabilities for GERAN CS within a \textit{ue-CapabilityRAT-Container} and with the
      \textit{rat-Type} set to \textit{geran-cs};

2> if the \textit{ue-CapabilityRequest} includes \textit{geran-ps} and if the UE supports GERAN PS domain:
   3> include the UE radio access capabilities for GERAN PS within a \textit{ue-CapabilityRAT-Container} and with the
      \textit{rat-Type} set to \textit{geran-ps};

2> if the \textit{ue-CapabilityRequest} includes \textit{utra} and if the UE supports UTRA:
   3> include the UE radio access capabilities for UTRA within a \textit{ue-CapabilityRAT-Container} and with the
      \textit{rat-Type} set to \textit{utra};

2> if the \textit{ue-CapabilityRequest} includes \textit{cdma2000-1XRTT} and if the UE supports CDMA2000 1xRTT:
   3> include the UE radio access capabilities for CDMA2000 within a \textit{ue-CapabilityRAT-Container} and with the
      \textit{rat-Type} set to \textit{cdma2000-1XRTT};

1> submit the \textit{UECapabilityInformation} message to lower layers for transmission, upon which the procedure ends;
5.6.4 CSFB to 1x Parameter transfer

5.6.4.1 General

---

**Figure 5.6.4.1-1: CSFB to 1x Parameter transfer**

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 `CSFBParametersRequestCDMA2000` message.

5.6.4.3 Actions related to transmission of `CSFBParametersRequestCDMA2000` message

The UE shall:

1. submit the `CSFBParametersRequestCDMA2000` message to lower layers for transmission using the current configuration;

5.6.4.4 Reception of the `CSFBParametersResponseCDMA2000` message

Upon reception of the `CSFBParametersResponseCDMA2000` message, the UE shall:

1. forward the `rand` and the `mobilityParameters` to the CDMA2000 1xRTT upper layers;

5.6.5 UE Information

5.6.5.1 General

---

**Figure 5.6.5.1-1: UE information procedure**
The UE information procedure is used by E-UTRAN to request the UE to report information. E-UTRAN should initiate this procedure only after successful security activation.

5.6.5.2 Initiation

E-UTRAN initiates the procedure by sending the UEInformationRequest message.

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:

2> set the numberOfPreamblesSent to indicate the number of preambles sent by MAC for the last successfully completed random access procedure;

2> 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:

3> set the contentionDetected to true;

else:

3> set the contentionDetected to false;

1> if rlf-ReportReq is set to true and the UE has radio link failure information or handover failure information available in VarRLF-Report and plmn-Identity stored in VarRLF-Report is equal to the RPLMN, set the rlf-Report in the UEInformationResponse message to the value of rlf-Report in VarRLF-Report;

1> if the rlf-Report is included in UEInformationResponse:

2> discard the rlf-Report from VarRLF-Report upon successful delivery of the UEInformationResponse message confirmed by lower layers.

1> if the logMeasReportReq is present and the plmn-Identity stored in VarLogMeasReport is equal to the RPLMN:

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 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

![Diagram of Logged Measurement Configuration]

**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. 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;

1> store the received loggingDuration, loggingInterval and areaConfiguration, if included, in VarLogMeasConfig;

1> store the RPLMN as plmn-Identity in VarLogMeasReport;

1> store the received absoluteTimeInfo, traceReference, traceRecordingSessionRef and tce-Id in VarLogMeasReport;

1> 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.

5.6.8.2 Initiation

While T330 is running, the UE shall:

1> perform the logging in accordance with the following:
2> if the UE is camping normally on an E-UTRA cell and the RPLMN of the UE is the same as the plmn-Identity 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;
4> when adding a logged measurement entry in VarLogMeasReport, include the fields in accordance with the following:
5> if detailed location information became available during the last logging interval, set the content of the locationInfo as follows:
6> include the locationCoordinates;
7> set the servCellIdentity to indicate global cell identity of the cell the UE is camping on;
8> set the measResultServCell to include the quantities of the cell the UE is camping on;
9> 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;

NOTE: The UE includes the latest results of the available measurements as used for cell reselection evaluation, which are performed in accordance with the performance requirements as specified in TS 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;

5.7 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, PCCH, CCCH, or MCCH 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):

4> ignore the message;

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,   -- Need ON
    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)
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 MBSFNAreaConfiguration message, which indicates the MBMS sessions that are ongoing as well as the (corresponding) radio resource configuration. The MCCH may also carry the 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 SystemInformationBlock: SystemInformationBlockType13. An MBSFN area is identified solely by the mbsfn-AreaId in 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 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 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 m= 0, where m is the number of radio frames comprising the modification period. The modification period is configured by means of 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)

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 shall acquire the MCCH information from the start of each modification period. A UE that is not receiving an MBMS service, as well as UEs that are receiving an MBMS service but potentially interested to receive other services not started yet in another MBSFN area, shall verify that the stored MCCH information remains valid by attempting to find the MCCH information change notification at least \( \text{notificationRepetitionCoeff} \) 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:

---

**ETSI**
2> start acquiring the \textit{MBSFNAreaConfiguration} message and the \textit{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 \textit{MBSFNAreaConfiguration} message and the \textit{MBMSCountingRequest} message if present, at the next repetition period;

1> if the UE is receiving an MBMS service:

2> start acquiring the \textit{MBSFNAreaConfiguration} message and the \textit{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 \textit{MBSFNAreaConfiguration} message

No UE requirements related to the contents of this \textit{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 \textit{MBMSCountingRequest} message

Upon receiving \textit{MBMSCountingRequest} message, the UE shall perform the MBMS Counting procedure as specified in section 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;

1> configure an MTCH logical channel in accordance with the received \textit{logicalChannelIdentity}, applicable for the MRB, as included in the \textit{MBSFNAreaConfiguration} message;

1> configure the physical layer in accordance with the \textit{pmch-Config}, applicable for the MRB, as included in the \textit{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:

1> release the RLC entity as well as the related MAC and physical layer configuration;

1> 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

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 \textit{countingResponseList} within the \texttt{MBMSCountingResponse} message with \textit{countingResponseService} set to the index of the entry in the \textit{countingRequestList} within the received \texttt{MBMSCountingRequest} that corresponds with the MBMS service the UE is receiving or interested to receive;

2> submit the \texttt{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 \texttt{MBMSCountingRequest} messages received in each modification period independently. In the unlikely case E-UTRAN would repeat an \texttt{MBMSCountingRequest} (i.e. including the same services) in a subsequent modification period, the UE responds again.

5.9 RN procedures

5.9.1 RN reconfiguration

5.9.1.1 General

![Figure 5.9.1.1-1: RN reconfiguration](image)

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 \textit{RNReconfiguration} by the RN

The RN shall:

1> if the \texttt{rn-SystemInfo} is included:

2> if the \texttt{systemInformationBlockType1} is included:

3> act upon the received \texttt{SystemInformationBlockType1} as specified in 5.2.2.7;

2> if the \texttt{SystemInformationBlockType2} is included:
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6 Protocol data units, formats and parameters (tabular & ASN.1)

6.1 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 information elements 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 information elements to be present in a message or an abstract type, i.e., the ASN.1 fields that are specified as OPTIONAL in the abstract notation (ASN.1), is specified by means of comment text tags attached to the OPTIONAL statement in the abstract syntax. All comment text tags are available for use in the downlink direction only. The meaning of each tag is specified in table 6.1-1.

Table 6.1-1: Meaning of abbreviations used to specify the need for information elements to be present

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cond conditionTag (Used in downlink only)</td>
<td>Conditionally present An information element for which the need is specified by means of conditions. For each 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 in the description of the field itself.</td>
</tr>
<tr>
<td>Need OP (Used in downlink only)</td>
<td>Optionally present An information element that is optional to signal. For downlink messages, the UE is not required to take any special action on absence of the IE 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.</td>
</tr>
<tr>
<td>Need ON (Used in downlink only)</td>
<td>Optionally present, No action An information element that is optional to signal. If the message is received by the UE, and in case the information element is absent, the UE takes no action and where applicable shall continue to use the existing value (and/ or the associated functionality).</td>
</tr>
<tr>
<td>Need OR (Used in downlink only)</td>
<td>Optionally present, Release An information element that is optional to signal. If the message is received by the UE, and in case the information element is absent, the UE shall discontinue/ stop using/ delete any existing value (and/ or the associated functionality).</td>
</tr>
</tbody>
</table>

Any IE with Need ON in system information shall be interpreted as Need OR.

Need codes may not be specified for a group, used in downlink, which includes one or more extensions. Upon absence of such a field, the UE shall:
For each individual extension, 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 extensions included directly within the optional field, but also for extensions defined at further nesting levels;

NOTE: The above applies for groups of non-critical extensions using double brackets, 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.

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.

```asn1
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.

```asn1
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
```

– **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.

```
-- ASN1START

MCCH-Message ::= SEQUENCE {
    message MCCH-MessageType
}

MCCH-MessageType ::= CHOICE {
    c1 CHOICE {
        mbsfnAreaConfiguration-r9 MBSFNAreaConfiguration-r9
    },
    later CHOICE {
        c2 CHOICE{
            mbmsCountingRequest-r10 MBMSCountingRequest-r10
        }
    }
}
```


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.

```
-- ASN1START

PCCH-Message ::= SEQUENCE {
    message     PCCH-MessageType
}

PCCH-MessageType ::= CHOICE {
    paging         Paging
}

-- ASN1STOP

```

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.

```
-- ASN1START

DL-CCCH-Message ::= SEQUENCE {
    message     DL-CCCH-MessageType
}

DL-CCCH-MessageType ::= CHOICE {

-- ASN1STOP

```
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.

---

**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.

---

- **DL-DCCH-Message ::= SEQUENCE {**
  - **message** DL-DCCH-MessageType
- **}**

**DL-DCCH-MessageType ::= CHOICE {**
- c1 **CHOICE {**
  - **rrcConnectionReestablisment** RRCConnectionReestablisment,
  - **rrcConnectionReestablismentReject** RRCConnectionReestablismentReject,
  - **rrcConnectionReject** RRCConnectionReject,
  - **rrcConnectionSetup** RRCConnectionSetup
  **},**
- **messageClassExtension** SEQUENCE {**
- **}**
- **}**

---

**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,
  - **spare4** NULL,**
  **}**
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.

-- ASN1START

UL-CCCH-Message ::= SEQUENCE {
  message     UL-CCCH-MessageType
}

UL-CCCH-MessageType ::= CHOICE {
  c1       CHOICE {
    rrcConnectionReestablishmentRequest  RRCConnectionReestablishmentRequest,
    rrcConnectionRequest     RRCConnectionRequest
  },
  messageClassExtension SEQUENCE {}
}

-- ASN1STOP

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.

-- ASN1START

UL-DCCH-Message ::= SEQUENCE {
  message     UL-DCCH-MessageType
}

-- ASN1STOP
UL-DCCH-MessageType ::= CHOICE {
  c1              CHOICE {
    csfbParametersRequestCDMA2000     CSFBParametersRequestCDMA2000,
    measurementReport     MeasurementReport,
    rrcConnectionReconfigurationComplete RRCConnectionReconfigurationComplete,
    rrcConnectionReestablishmentComplete RRCConnectionReestablishmentComplete,
    rrcConnectionSetupComplete    RRCConnectionSetupComplete,
    securityModeComplete  SecurityModeComplete,
    securityModeFailure    SecurityModeFailure,
    ueCapabilityInformation UECapabilityInformation,
    ulHandoverPreparationTransfer ULHandoverPreparationTransfer,
    ulInformationTransfer    ULInformationTransfer,
    counterCheckResponse CounterCheckResponse,
    ueInformationResponse-r9 UEInformationResponse-r9,
    proximityIndication-r9  ProximityIndication-r9,
    rnReconfigurationComplete-r10 RNReconfigurationComplete-r10,
    mbmsCountingResponse-r10 MBMSCountingResponse-r10,
    interFreqRSTDMeasurementIndication-r10 InterFreqRSTDMeasurementIndication-r10
  },
  messageClassExtension 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 message

-- ASN1START
CounterCheck ::= SEQUENCE {
  rrc-TransactionIdentifier    RRC-TransactionIdentifier,
  criticalExtensions            CHOICE {
    c1                       CHOICE {
      counterCheck-r8    CounterCheck-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}},
}

CounterCheck-r8-IEs ::= SEQUENCE {
  drb-CountMSB-InfoList    DRB-CountMSB-InfoList,
  nonCriticalExtension    CounterCheck-v8a0-IEs       OPTIONAL
}

CounterCheck-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension  OCTET STRING      OPTIONAL, -- Need OP
  nonCriticalExtension    SEQUENCE {}       OPTIONAL -- Need OP
}

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>count-MSB-Downlink</td>
<td>Indicates the value of 25 MSBs from downlink COUNT associated to this DRB.</td>
</tr>
<tr>
<td>count-MSB-Uplink</td>
<td>Indicates the value of 25 MSBs from uplink COUNT associated to this DRB.</td>
</tr>
<tr>
<td>drb-CountMSB-InfoList</td>
<td>Indicates the MSBs of the COUNT values of the DRBs.</td>
</tr>
</tbody>
</table>

---

### 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

```asn1
CounterCheckResponse ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    counterCheckResponse-r8    CounterCheckResponse-r8-IEs,
    criticalExtensionsFuture   SEQUENCE {}  
  }
}

CounterCheckResponse-r8-IEs ::= SEQUENCE {
  drb-CountInfoList     DRB-CountInfoList,
  nonCriticalExtension    CounterCheckResponse-v8a0-IEs       OPTIONAL
}

CounterCheckResponse-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

DRB-CountInfoList ::= SEQUENCE (SIZE (0..maxDRB)) OF DRB-CountInfo
```

### DRB-CountInfo

```asn1
DRB-CountInfo ::= SEQUENCE {
  counter-MSB-Downlink     INTEGER,
  counter-MSB-Uplink        INTEGER,
}
```
CounterCheckResponse field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>count-Downlink</td>
<td>Indicates the value of downlink COUNT associated to this DRB.</td>
</tr>
<tr>
<td>count-Uplink</td>
<td>Indicates the value of uplink COUNT associated to this DRB.</td>
</tr>
<tr>
<td>drb-CountInfoList</td>
<td>Indicates the COUNT values of the DRBs.</td>
</tr>
</tbody>
</table>

---

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 message

-- ASN1START

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 message

-- ASN1START

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, -- Need OP
    nonCriticalExtension SEQUENCE {} OPTIONAL -- Need OP
}
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**

---

\[
DLInformationTransfer ::= \text{SEQUENCE} \{ \\
\quad \text{rrc-TransactionIdentifier} \quad RRC-TransactionIdentifier, \\
\quad \text{criticalExtensions} \quad \text{CHOICE} \{ \\
\quad\quad \text{c1} \quad \text{CHOICE} \{ \\
\quad\quad\quad \text{DLInformationTransfer-r8} \quad \text{DLInformationTransfer-r8-IEs}, \\
\quad\quad\quad \text{spare3 \ NULL, spare2 \ NULL, spare1 \ NULL} \\
\quad\quad \}, \\
\quad\quad \text{criticalExtensionsFuture} \quad \text{SEQUENCE} \{ \} \\
\quad \}, \\
\}
\]

\[
DLInformationTransfer-r8-IEs ::= \text{SEQUENCE} \{ \\
\quad \text{dedicatedInfoType} \quad \text{CHOICE} \{ \\
\quad\quad \text{dedicatedInfoNAS} \quad \text{DedicatedInfoNAS}, \\
\quad\quad \text{dedicatedInfoCDMA2000-1XRTT} \quad \text{DedicatedInfoCDMA2000-1XRTT}, \\
\quad\quad \text{dedicatedInfoCDMA2000-HRPD} \quad \text{DedicatedInfoCDMA2000-HRPD} \\
\quad\}, \\
\quad \text{nonCriticalExtension} \quad \text{DLInformationTransfer-v8a0-IEs} \quad \text{OPTIONAL} \\
\}
\]

\[
DLInformationTransfer-v8a0-IEs ::= \text{SEQUENCE} \{ \\
\quad \text{lateNonCriticalExtension} \quad \text{OCTET \ STRING} \quad \text{OPTIONAL}, -- \text{Need \ OP} \\
\}
\]
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**

```
nonCriticalExtension  SEQUENCE {}   OPTIONAL  -- Need OP
}

-- ASN1STOP

-- HandoverFromEUTRAPreparationRequest (CDMA2000)

HandoverFromEUTRAPreparationRequest ::= SEQUENCE {
    rrc-TransactionIdentifier  RRC-TransactionIdentifier,
    criticalExtensions     CHOICE {
        c 1          CHOICE {
            handoverFromEUTRAPreparationRequest-r8
                HandoverFromEUTRAPreparationRequest-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture   SEQUENCE {}
    }
}

HandoverFromEUTRAPreparationRequest-r8-IEs ::= SEQUENCE {
    cdma2000-Type     CDMA2000-Type,
    rand       RAND-CDMA2000    OPTIONAL, -- Cond cdma2000-Type
    mobilityParameters    MobilityParametersCDMA2000   OPTIONAL, -- Cond cdma2000-Type
    nonCriticalExtension    HandoverFromEUTRAPreparationRequest-v890-IEs OPTIONAL
}
```
HandoverFromEUTRAPreparationRequest-v890-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING OPTIONAL, -- Need OP
  nonCriticalExtension HandoverFromEUTRAPreparationRequest-v920-IEs OPTIONAL
}

HandoverFromEUTRAPreparationRequest-v920-IEs ::= SEQUENCE {
  concurrPrepCDMA2000-HRPD-r9 BOOLEAN OPTIONAL, -- Cond cdma2000-Type
  nonCriticalExtension HandoverFromEUTRAPreparationRequest-v1020-IEs OPTIONAL
}

HandoverFromEUTRAPreparationRequest-v1020-IEs ::= SEQUENCE {
  dualRxTxRedirectIndicator-r10 ENUMERATED {true} OPTIONAL, -- Cond dualRxTxRedirect
  redirectCarrierCDMA2000-1XRTT-r10 CarrierFreqCDMA2000 OPTIONAL, -- Cond dualRxTxRedirect
  nonCriticalExtension SEQUENCE {} OPTIONAL -- Need OP
}

-- ASN1STOP

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.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>cdma2000-1XRTT</td>
<td>The field is optionally present, need ON, if the cdma2000-Type = type1XRTT; otherwise it is not present.</td>
</tr>
<tr>
<td>cdma2000-Type</td>
<td>The field is mandatory present if the cdma2000-Type = type1XRTT; otherwise it is not present.</td>
</tr>
<tr>
<td>dualRxTxRedirect</td>
<td>The field is optionally present, need ON, if dualRxTxRedirect is present; otherwise it is not present.</td>
</tr>
</tbody>
</table>

---

**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 {}
}

InterFreqRSTDMeasurementIndication-r10-IEs ::= SEQUENCE {
rstd-InterFreqIndication-r10     CHOICE {
  start     SEQUENCE {
    rstd-InterFreqInfoList-r10    RSTD-InterFreqInfoList-r10
  },
  stop     NULL
},
lateNonCriticalExtension     OCTET STRING     OPTIONAL,
nonCriticalExtension         SEQUENCE {}       OPTIONAL
}

RSTD-InterFreqInfoList-r10 ::= SEQUENCE (SIZE(1..maxRSTD-Freq-r10)) OF RSTD-InterFreqInfo-r10

RSTD-InterFreqInfo-r10 ::= SEQUENCE {
carrierFreq-r10     ARFCN-ValueEUTRA,
measPRS-Offset-r10     INTEGER (0..39),
...,  
carrierFreq-v1090     ARFCN-ValueEUTRA-v9e0     OPTIONAL
```

---
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.

---

LoggedMeasurementConfiguration

The `LoggedMeasurementConfiguration` message is used by E-UTRAN to configure the UE to perform logging of measurement results while in RRC_IDLE. 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

-- ASN1START

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 SEQUENCE {} OPTIONAL -- Need OP
}

-- ASN1STOP

---

LoggedMeasurementConfiguration field descriptions

absoluteTimeInfo
Indicates the absolute time in the current cell.

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**

--- ASN1START

**MasterInformationBlock** ::= SEQUENCE {
  dl-Bandwidth ENUMERATED {
    n6, n15, n25, n50, n75, n100},
  phich-Config PHICH-Config,
  systemFrameNumber BIT STRING (SIZE (8)),
  spare BIT STRING (SIZE (10))
}

--- ASN1STOP

--- MasterInformationBlock field descriptions

### dl-Bandwidth
Parameter: transmission bandwidth configuration, \(N_{RB}\) 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.

### 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 (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

---
MBMSCountingRequest-r10 ::= SEQUENCE {
countingRequestList-r10             CountingRequestList-r10,
lateNonCriticalExtension          OCTET STRING OPTIONAL, -- Need OP
nonCriticalExtension               SEQUENCE {} OPTIONAL -- Need OP
}

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

-- ASN1START

MBMSCountingResponse-r10 ::= SEQUENCE {
criticalExtensions               CHOICE {
c1                              CHOICE {
countingResponse-r10             MBMSCountingResponse-r10-IEs,
spare3 NULL, spare2 NULL, spare1 NULL
},
criticalExtensionsFuture        SEQUENCE {}
}
}
**MBMSCountingResponse-r10-IEs ::=**

```
SEQUENCE {
  mbsfn-AreaIndex-r10 INTEGER (0..maxMBSFN-Area-1) OPTIONAL,
  countingResponseList-r10 CountingResponseList-r10 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),
  ...
}

---

### MBMSCountingResponse field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>countingResponseList</td>
<td>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.</td>
</tr>
<tr>
<td>mbsfn-AreaIndex</td>
<td>Index of the entry in field mbsfn-AreaInfoList within SystemInformationBlockType13. Value 0 corresponds to the first entry in mbsfn-AreaInfoList within SystemInformationBlockType13, value 1 corresponds to the second entry in this list and so on.</td>
</tr>
</tbody>
</table>

---

### MBSFNAreaConfiguration

The **MBSFNAreaConfiguration** message contains the MBMS control information applicable for an MBSFN area. E-UTRAN configures an MCCH for each MBSFN area i.e. the MCCH identifies the MBSFN area.

- Signalling radio bearer: N/A
- RLC-SAP: UM
- Logical channel: MCCH
- Direction: E-UTRAN to UE

---

### MBSFNAreaConfiguration message

```
MBSFNAreaConfiguration-r9 ::= SEQUENCE {
  commonSF-Alloc-r9 CommonSF-AllocPatternList-r9,
  commonSF-AllocPeriod-r9 ENUMERATED {
    "0.19.0 (2016-01)"}
```
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, -- Need OP
   nonCriticalExtension     SEQUENCE {} OPTIONAL -- Need OP
}

CommonSF-AllocPatternList-r9 ::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig

---

**MBSFNAreaConfiguration field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>commonSF-Alloc</td>
<td>Indicates the subframes allocated to the MBSFN area</td>
</tr>
<tr>
<td>commonSF-AllocPeriod</td>
<td>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. The commonSF-AllocPeriod starts in the radio frames for which: SFN mod commonSF-AllocPeriod = 0.</td>
</tr>
</tbody>
</table>

---

**MeasurementReport**

The *MeasurementReport* message is used for the indication of measurement results.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

---

**MeasurementReport message**

MeasurementReport ::= SEQUENCE {
   criticalExtensions CHOICE {
      c1 CHOICE {
         measurementReport-r8 MeasurementReport-r8-IEs,
         spare7 NULL,
         spare6 NULL, spare5 NULL, spare4 NULL,
      }
   }
}

---
The MobilityFromEUTRACommand 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
MobilityFromEUTRACommand-r8-IEs ::= SEQUENCE {
  cs-FallbackIndicator BOOLEAN,
  purpose CHOICE{
    handover Handover,
    cellChangeOrder CellChangeOrder
  },
  nonCriticalExtension MobilityFromEUTRACommand-v8a0-IEs OPTIONAL
}

MobilityFromEUTRACommand-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING OPTIONAL, -- Need OP
  nonCriticalExtension MobilityFromEUTRACommand-v8d0-IEs OPTIONAL
}

MobilityFromEUTRACommand-v8d0-IEs ::= SEQUENCE {
  bandIndicator BandIndicatorGERAN OPTIONAL, -- Cond GERAN
  nonCriticalExtension SEQUENCE {} OPTIONAL -- Need OP
}

MobilityFromEUTRACommand-r9-IEs ::= SEQUENCE {
  cs-FallbackIndicator BOOLEAN,
  purpose CHOICE{
    handover Handover,
    cellChangeOrder CellChangeOrder,
    e-CSFB-r9 E-CSFB-r9,
    ...
  },
  nonCriticalExtension MobilityFromEUTRACommand-v930-IEs OPTIONAL
}
MobilityFromEUTRACommand-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING OPTIONAL, -- Need OP
    nonCriticalExtension MobilityFromEUTRACommand-v960-IEs OPTIONAL
}  

MobilityFromEUTRACommand-v960-IEs ::= SEQUENCE {
    bandIndicator BandIndicatorGERAN OPTIONAL, -- Cond GERAN
    nonCriticalExtension SEQUENCE {} OPTIONAL -- Need OP
}  

Handover ::= SEQUENCE {
    targetRAT-Type ENUMERATED {
        utra, geran, cdma2000-1XRTT, cdma2000-HRPD,
        spare4, spare3, spare2, spare1, ...
    },
    targetRAT-MessageContainer OCTET STRING,
    nas-SecurityParamFromEUTRA OCTET STRING (SIZE (1)) OPTIONAL, -- Cond UTRAGERAN
    systemInformation SI-OrPSI-GERAN OPTIONAL -- Cond PSHO
}  

CellChangeOrder ::= SEQUENCE {
    t304 ENUMERATED {
        ms100, ms200, ms500, ms1000,
        ms2000, ms4000, ms8000, spare1,
    },
    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-HRPD-r9           ENUMERATED {
    handover, redirection
  }                                      OPTIONAL, -- Need OP
  messageContCDMA2000-HRPD-r9        OCTET STRING  OPTIONAL,  -- Cond concHO
  redirectCarrierCDMA2000-HRPD-r9    CarrierFreqCDMA2000 OPTIONAL  -- Cond concRedir
}

-- ASN1STOP
**MobilityFromEUTRACommand field descriptions**

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>bandIndicator</code></td>
<td>Indicates how to interpret the ARFCN of the BCCH carrier.</td>
</tr>
<tr>
<td><code>carrierFreq</code></td>
<td>contains the carrier frequency of the target GERAN cell.</td>
</tr>
<tr>
<td><code>cs-FallbackIndicator</code></td>
<td>Value <code>true</code> indicates that the CS Fallback procedure to UTRAN or GERAN is triggered.</td>
</tr>
<tr>
<td><code>messageContCDMA2000-1XRTT</code></td>
<td>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.</td>
</tr>
<tr>
<td><code>messageContCDMA2000-HRPD</code></td>
<td>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.</td>
</tr>
<tr>
<td><code>mobilityCDMA2000-HRPD</code></td>
<td>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.</td>
</tr>
<tr>
<td><code>nas-SecurityParamFromEUTRA</code></td>
<td>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.</td>
</tr>
<tr>
<td><code>networkControlOrder</code></td>
<td>Parameter NETWORK_CONTROL_ORDER in TS 44.060 [36].</td>
</tr>
<tr>
<td><code>purpose</code></td>
<td>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).</td>
</tr>
<tr>
<td><code>redirectCarrierCDMA2000-HRPD</code></td>
<td>The redirectCarrierCDMA2000-HRPD indicates a CDMA2000 carrier frequency and is used to redirect the UE to a HRPD carrier frequency.</td>
</tr>
<tr>
<td><code>SystemInfoListGERAN</code></td>
<td>If <code>purpose = CellChangeOrder</code> and if the field is not present, the UE has to acquire SI/PSI from the GERAN cell.</td>
</tr>
<tr>
<td><code>t304</code></td>
<td>Timer T304 as described in section 7.3. Value ms100 corresponds with 100 ms, ms200 corresponds with 200 ms and so on.</td>
</tr>
<tr>
<td><code>targetRAT-Type</code></td>
<td>Indicates the target RAT type.</td>
</tr>
<tr>
<td><code>targetRAT-MessageContainer</code></td>
<td>The field contains a message specified in another standard, as indicated by the <code>targetRAT-Type</code>, and carries information about the target cell identifier(s) and radio parameters relevant for the target radio access technology.</td>
</tr>
</tbody>
</table>

**Conditional presence**

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>concHO</code></td>
<td>The field is mandatory present if the <code>mobilityCDMA2000-HRPD</code> is set to 'handover'; otherwise the field is optional present, need ON.</td>
</tr>
<tr>
<td><code>concRedir</code></td>
<td>The field is mandatory present if the <code>mobilityCDMA2000-HRPD</code> is set to 'redirection'; otherwise the field is not present.</td>
</tr>
<tr>
<td><code>GERAN</code></td>
<td>The field should be present if the <code>purpose</code> is set to 'handover' and the <code>targetRAT-Type</code> is set to 'geran'; otherwise the field is not present.</td>
</tr>
<tr>
<td><code>PSHO</code></td>
<td>The field is mandatory present if <code>PSHO</code> is set to 'utr' or 'ger', otherwise the field is not present.</td>
</tr>
<tr>
<td><code>UTRAGERAN</code></td>
<td>The field is mandatory present if the <code>targetRAT-Type</code> is set to 'utr' or 'ger', 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:
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**

```
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, -- Need OP
nonCriticalExtension Paging-v920-IEs OPTIONAL
}
Paging-v920-IEs ::= SEQUENCE {
cmas-Indication-r9 ENUMERATED {true} OPTIONAL, -- Need ON
nonCriticalExtension SEQUENCE {} OPTIONAL -- Need OP
}
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

IMSI-Digit ::= INTEGER (0..9)

-- ASN1STOP

### Paging field descriptions

**cmas-Indication**
If present: indication of a CMAS notification.

**cn-Domain**
Indicates the origin of paging.

**etws-Indication**
If present: indication of an ETWS primary notification and/ or ETWS secondary notification.

**imsi**
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.

**systemInfoModification**
If present: indication of a BCCH modification other than SIB10, SIB11 and SIB12.

**ue-Identity**
Provides the NAS identity of the UE that is being paged.

---

**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

```
-- ASN1START

ProximityIndication-r9 ::= SEQUENCE {
   criticalExtensions CHOICE {
      c1 CHOICE {
         proximityIndication-r9 ProximityIndication-r9-IEs,
         spare3 NULL, spare2 NULL, spare1 NULL
      },
      criticalExtensionsFuture SEQUENCE {
      }
   }
}

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,
   nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP
```
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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<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**

```
-- ASN1START

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, -- Need OP
  nonCriticalExtension      SEQUENCE {}       OPTIONAL -- Need OP
}

RN-SystemInfo-r10 ::= SEQUENCE {
  ... }
```

---
systemInformationBlockType1-r10  OCTET STRING (CONTAINING SystemInformationBlockType1) OPTIONAL, -- Need ON
systemInformationBlockType2-r10  SystemInformationBlockType2  OPTIONAL, -- Need ON
...
}

-- ASN1STOP

-- RNReconfigurationComplete

The \textit{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

\textbf{RNReconfigurationComplete message}

-- ASN1START

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
}

-- ASN1STOP
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 {
    c 1          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-v10i0-IEs OPTIONAL
}

RRCConnectionReconfiguration-v10i0-IEs ::= SEQUENCE {
  antennaInfoDedicatedPCell-v10i0 AntennaInfoDedicated-v10i0 OPTIONAL, -- Need ON
  -- Following field is only for late non-critical extensions from REL-10
  nonCriticalExtension SEQUENCE {} 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 SEQUENCE {} OPTIONAL -- Need OP
}

SCellToAddModList-r10 ::= SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellToAddMod-r10

SCellToAddMod-r10 ::= SEQUENCE {
  sCellIndex-r10 SCellIndex-r10,
cellIdentification-r10    SEQUENCE {
    physCellId-r10      PhysCellId,
    dl-CarrierFreq-r10  ARFCN-ValueEUTRA
}               OPTIONAL, -- Cond SCellAdd

radioResourceConfigDedicatedSCell-r10 RadioResourceConfigDedicatedSCell-r10 OPTIONAL, -- Cond SCellAdd2

..., [[ dl-CarrierFreq-v1090 ARFCN-ValueEUTRA-v9e0 OPTIONAL -- Cond EARFCN-max ]],
[[ antennaInfoDedicatedSCell-v10i0 AntennaInfoDedicated-v10i0 OPTIONAL -- Need ON ]]
}

SCellToReleaseList-r10 ::=   SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellIndex-r10

SecurityConfigHO ::=    SEQUENCE {
    handoverType       CHOICE {
        intraLTE       SEQUENCE {
            securityAlgorithmConfig SecurityAlgorithmConfig OPTIONAL, -- Cond fullConfig
            keyChangeIndicator BOOLEAN,
            nextHopChainingCount NextHopChainingCount
        },
        interRAT        SEQUENCE {
            securityAlgorithmConfig SecurityAlgorithmConfig,
            nas-SecurityParamToEUTRA OCTET STRING (SIZE(6))
        }
    }
},
...

-- ASN1STOP
**RRConnectionReconfiguration 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.

**keyChangeIndicator**
true is used only in an intra-cell handover when a $K_{\text{ENB}}$ key is derived from a native $K_{\text{ASME}}$ key taken into use through the successful NAS SMC, as described in TS 33.401 [32] for $K_{\text{ENB}}$ re-keying. false is used in an intra-LTE handover when the new $K_{\text{ENB}}$ key is obtained from the current $K_{\text{ENB}}$ key or from the NH as described in TS 33.401 [32].

**nas-securityParamToEUTRA**
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.

**nextHopChainingCount**
Parameter NCC: See TS 33.401 [32]

<table>
<thead>
<tr>
<th>Conditional presence</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>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>

---

**RRConnectionReconfigurationComplete**

The RRConnectionReconfigurationComplete 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

**RRConnectionReconfigurationComplete message**

```asn1
RRConnectionReconfigurationComplete ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    rrcConnectionReconfigurationComplete-r8
      RRConnectionReconfigurationComplete-r8-IEs,
  }
}
```

---

**ETSI**
criticalExtensionsFuture  SEQUENCE {}  

}

}

RRCCConnectionReconfigurationComplete-r8-IEs ::= SEQUENCE {
    nonCriticalExtension  RRCCConnectionReconfigurationComplete-v8a0-IEs OPTIONAL
}

RRCCConnectionReconfigurationComplete-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension  OCTET STRING OPTIONAL,
    nonCriticalExtension  RRCCConnectionReconfigurationComplete-v1020-IEs OPTIONAL
}

RRCCConnectionReconfigurationComplete-v1020-IEs ::= SEQUENCE {
    rlf-InfoAvailable-r10  ENUMERATED {true} OPTIONAL,
    logMeasAvailable-r10  ENUMERATED {true} OPTIONAL,
    nonCriticalExtension  SEQUENCE {} OPTIONAL
}

-- ASN1STOP

-- RRCConnectionReestablishment

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

-- ASN1START

RRCCConnectionReestablishment ::= SEQUENCE {
    rrc-TransactionIdentifier  RRC-TransactionIdentifier,
    criticalExtensions  CHOICE {
        c 1  CHOICE {

            }
    }

    }

}
The RRCConnectionReestablishmentComplete 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

**RRCConnectionReestablishmentComplete message**

-- ASN1START

RRCConnectionReestablishmentComplete ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions   CHOICE {
    RadioResourceConfigDedicated  RadioResourceConfigDedicated,
    NextHopChainingCount    NextHopChainingCount,
    RRCConnectionReestablishment-v8a0-IEs OPTIONAL
  }
}

-- ASN1STOP
**RRConnectionReestablishmentComplete-r8**

RRConnectionReestablishmentComplete-r8-IEs,
criticalExtensionsFuture SEQUENCE {}

**RRConnectionReestablishmentComplete-r8-IEs** ::= SEQUENCE {
    nonCriticalExtension RRConnectionReestablishmentComplete-v920-IEs OPTIONAL
}

**RRConnectionReestablishmentComplete-v920-IEs** ::= SEQUENCE {
    rlf-InfoAvailable-r9 ENUMERATED {true} OPTIONAL,
    nonCriticalExtension RRConnectionReestablishmentComplete-v8a0-IEs OPTIONAL
}

**RRConnectionReestablishmentComplete-v8a0-IEs** ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    nonCriticalExtension RRConnectionReestablishmentComplete-v1020-IEs OPTIONAL
}

**RRConnectionReestablishmentComplete-v1020-IEs** ::= SEQUENCE {
    logMeasAvailable-r10 ENUMERATED {true} OPTIONAL,
    nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP

---

**RRConnectionReestablishmentComplete field descriptions**

**rlf-InfoAvailable**
This field is used to indicate the availability of radio link failure or handover failure related measurements

---

**RRConnectionReestablishmentReject**

The **RRConnectionReestablishmentReject** 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

**RRConnectionReestablishmentReject message**

```
RRConnectionReestablishmentReject ::= SEQUENCE {
criticalExtensions           CHOICE {
  rrcConnectionReestablishmentReject-r8
    RRCConnectionReestablishmentReject-r8-IEs,
  criticalExtensionsFuture   SEQUENCE {}
}
}

RRConnectionReestablishmentReject-r8-IEs ::= SEQUENCE {
  nonCriticalExtension      RRCConnectionReestablishmentReject-v8a0-IEs  OPTIONAL
}

RRCConnectionReestablishmentReject-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension  OCTET STRING    OPTIONAL, -- Need OP
  nonCriticalExtension      SEQUENCE {}     OPTIONAL -- Need OP
}
```

**RRConnectionReestablishmentRequest message**

The **RRConnectionReestablishmentRequest** 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 ::= SEQUENCE {
  requestToEUTRAN           SEQUENCE {
    cause      ENUMERATED {
      relocationFailure, -- New OP
      other, -- New OP
    } OPTIONAL
  } OPTIONAL
}
```
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
}

-- ASN1STOP

**RRCConnectionReestablishmentRequest field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>physCellId</strong></td>
<td>The Physical Cell Identity of the PCell the UE was connected to prior to the failure.</td>
</tr>
<tr>
<td><strong>reestablishmentCause</strong></td>
<td>Indicates the failure cause that triggered the re-establishment procedure.</td>
</tr>
<tr>
<td><strong>ue-Identity</strong></td>
<td>UE identity included to retrieve UE context and to facilitate contention resolution by lower layers.</td>
</tr>
</tbody>
</table>

--

**RRCConnectionReject**

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 {
  rrcConnectionReject-r8    RRCConnectionReject-r8-IEs,
spare3 NULL, spare2 NULL, spare1 NULL
},
criticalExtensionsFuture SEQUENCE {}
}
}

RRCConnectionReject-r8-IEs ::= SEQUENCE {
  waitTime       INTEGER (1..16),
  nonCriticalExtension    RRCConnectionReject-v8a0-IEs  OPTIONAL
}

RRCConnectionReject-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension    OCTET STRING      OPTIONAL, -- Need OP
  nonCriticalExtension   RRCConnectionReject-v1020-IEs  OPTIONAL
}

RRCConnectionReject-v1020-IEs ::= SEQUENCE {
  extendedWaitTime-r10    INTEGER (1..1800)  OPTIONAL, -- Need ON
  nonCriticalExtension   SEQUENCE {}    OPTIONAL -- Need OP
}
```

---

**ASN1STOP**
**RRConnectionReject field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>extendedWaitTime</td>
<td>Value in seconds for the wait time for Delay Tolerant access requests.</td>
</tr>
<tr>
<td>waitTime</td>
<td>Wait time value in seconds.</td>
</tr>
</tbody>
</table>

---

**RRConnectionReject**

The **RRConnectionReject** 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

**RRConnectionReject message**

```asn1
RRConnectionRelease ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1          CHOICE {
      rrcConnectionRelease-r8    RRCConnectionRelease-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}
```

```asn1
RRCConnectionRelease-r8-IEs ::= SEQUENCE {
  releaseCause      ReleaseCause,
  redirectedCarrierInfo    RedirectedCarrierInfo    OPTIONAL, -- Need ON
  idleModeMobilityControlInfo    IdleModeMobilityControlInfo    OPTIONAL, -- Need OP
  nonCriticalExtension    RRCConnectionRelease-v890-IEs  OPTIONAL
}
```

```asn1
RRCConnectionRelease-v890-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING (CONTAINING RRCConnectionRelease-v9e0-IEs)
  OPTIONAL, -- Need OP
  nonCriticalExtension    RRCConnectionRelease-v920-IEs  OPTIONAL
}
RRConnectionRelease-v9e0-IEs ::= SEQUENCE {
  redirectedCarrierInfo-v9e0  RedirectedCarrierInfo-v9e0  OPTIONAL, -- Cond NoRedirect-r8
  idleModeMobilityControlInfo-v9e0 IdleModeMobilityControlInfo-v9e0 OPTIONAL, -- Cond
  IdleInfoEUTRA
  nonCriticalExtension  SEQUENCE {}  OPTIONAL  -- Need OP
}

RRConnectionRelease-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  RRConnectionRelease-v1020-IEs  OPTIONAL
}

RRConnectionRelease-v1020-IEs ::= SEQUENCE {
  extendedWaitTime-r10  INTEGER (1..1800)  OPTIONAL, -- Need ON
  nonCriticalExtension  SEQUENCE {}  OPTIONAL  -- Need OP
}

ReleaseCause ::= ENUMERATED {loadBalancingTAUrequired,
  other, cs-FallbackHighPriority-v1020, spare1}

RedirectedCarrierInfo ::= CHOICE {
  eutra  ARFCN-ValueEUTRA,
  geran  CarrierFreqsGERAN,
  utra-FDD  ARFCN-ValueUTRA,
  utra-TDD  ARFCN-ValueUTRA,
  cdma2000-HRPD  CarrierFreqCDMA2000,
  cdma2000-1xRTT  CarrierFreqCDMA2000,
IdleModeMobilityControlInfo ::= SEQUENCE {
  freqPriorityListEUTRA FreqPriorityListEUTRA OPTIONAL, -- Need ON
  freqPriorityListGERAN FreqsPriorityListGERAN OPTIONAL, -- Need ON
  freqPriorityListUTRA-FDD FreqPriorityListUTRA-FDD OPTIONAL, -- Need ON
  freqPriorityListUTRA-TDD FreqPriorityListUTRA-TDD OPTIONAL, -- Need ON
  bandClassPriorityListHRPD BandClassPriorityListHRPD OPTIONAL, -- Need ON
  bandClassPriorityList1XRTT BandClassPriorityList1XRTT OPTIONAL, -- Need ON
  t320 EnumERATED {
    min5, min10, min20, min30, min60, min120, min180,
    spare1} OPTIONAL, -- Need OR
  ...
}

IdleModeMobilityControlInfo-v9e0 ::= SEQUENCE {
  freqPriorityListEUTRA-v9e0 SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-v9e0
}

FreqPriorityListEUTRA ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA

FreqPriorityEUTRA ::= SEQUENCE {
  carrierFreq ARFCN-ValueEUTRA,
  cellReselectionPriority CellReselectionPriority
}
FreqPriorityEUTRA-v9e0 ::= SEQUENCE {
  carrierFreq-v9e0     ARFCN-ValueEUTRA-v9e0  OPTIONAL  -- Cond EARFCN-max
}

FreqsPriorityListGERAN ::= SEQUENCE (SIZE (1..maxGNFG)) OF FreqsPriorityGERAN

FreqsPriorityGERAN ::= SEQUENCE {
  carrierFREQsCarrierFreqs  ARFCN-ValueGERAN,
  cellReselectionPriority    CellReselectionPriority
}

FreqPriorityListUTRA-FDD ::= SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF FreqPriorityUTRA-FDD

FreqPriorityUTRA-FDD ::= SEQUENCE {
  carrierFreq       ARFCN-ValueUTRA,
  cellReselectionPriority    CellReselectionPriority
}

FreqPriorityListUTRA-TDD ::= SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF FreqPriorityUTRA-TDD

FreqPriorityUTRA-TDD ::= SEQUENCE {
  carrierFreq       ARFCN-ValueUTRA,
  cellReselectionPriority    CellReselectionPriority
}

BandClassPriorityListHRPD ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandClassPriorityHRPD

BandClassPriorityHRPD ::= SEQUENCE {
  bandClass       BandclassCDMA2000,
  cellReselectionPriority    CellReselectionPriority
}

BandClassPriorityList1XRTT ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandClassPriority1XRTT

BandClassPriority1XRTT ::= SEQUENCE {


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**

**carrierFreq or bandClass**
The carrier frequency (UTRA and E-UTRA) and band class (HRPD and 1xRTT) for which the associated cellReselectionPriority is applied.

**carrierFreqs**
The list of GERAN carrier frequencies organised into one group of GERAN carrier frequencies.

**cellInfoList**
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 valueutra-TDD-r10 in case redirectedCarrierInfo is set toutra-TDD-r10.

**extendedWaitTime**
Value in seconds for the wait time for Delay Tolerant access requests.

**freqPriorityListX**
Provides a cell reselection priority for each frequency, by means of separate lists for each RAT (including E-UTRA). If E-UTRAN includes freqPriorityListEUTRA-v9e0 it includes the same number of entries, and listed in the same order, as in freqPriorityListEUTRA (i.e. without suffix).

**idleModeMobilityControlInfo**
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).

**redirectedCarrierInfo**
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].

**releaseCause**
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 toutra-FDD, utra-TDD orutra-TDD-r10.

E-UTRAN should not set the releaseCause toloadBalancingTAURequired or to cs-FallbackHighPriority if the extendedWaitTime is present.

**systemInformation**
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].

**t320**
Timer T320 as described in section 7.3. Value minN corresponds to N minutes.

**utra-BCCH-Container**
Contains System Information Container message as defined in TS 25.353 [19].

<table>
<thead>
<tr>
<th>Conditional presence</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 orutra-TDD-r10; otherwise the field is not present.</td>
</tr>
</tbody>
</table>

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**

-- ASN1START

```asn1
RRCConnectionRequest ::= SEQUENCE {
  criticalExtensions CHOICE {
    rrcConnectionRequest-r8 RRCConnectionRequest-r8-IEs,
    criticalExtensionsFuture SEQUENCE {}"\n  }
}

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, spare2, spare1
}
```

-- ASN1STOP
### RRCConnectionRequest field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>establishmentCause</td>
<td>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, &quot;mt&quot; stands for &quot;Mobile Terminating&quot; and &quot;mo&quot; for &quot;Mobile Originating.&quot;</td>
</tr>
<tr>
<td>randomValue</td>
<td>Integer value in the range 0 to $2^{40} - 1$.</td>
</tr>
<tr>
<td>ue-identity</td>
<td>UE identity included to facilitate contention resolution by lower layers.</td>
</tr>
</tbody>
</table>

### 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

```
-- ASN1START

RRCConnectionSetup ::= SEQUENCE {
  rrc-TransactionIdentifier                 RRC-TransactionIdentifier,
  criticalExtensions                      CHOICE {
    c 1 CHOICE {
      rrcConnectionSetup-r8                  RRCConnectionSetup-r8-IEs,
      spare7 NULL,                           
      spare6 NULL, spare5 NULL, spare4 NULL, 
      spare3 NULL, spare2 NULL, spare1 NULL  
    },
    criticalExtensionsFuture                SEQUENCE { }
  }
}

RRCConnectionSetup-r8-IEs ::= SEQUENCE {
  radioResourceConfigDedicated             RadioResourceConfigDedicated,
  nonCriticalExtension                    RRCConnectionSetup-v8a0-IEs       OPTIONAL
}

RRCConnectionSetup-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension                OCTET STRING       OPTIONAL, -- Need OP

-- ASN1END
```
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

**RRCConnectionSetupComplete message**

```asn1
RRCConnectionSetupComplete ::= SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier,  
    criticalExtensions     CHOICE {
        rrcConnectionSetupComplete-r8  RRCConnectionSetupComplete-r8-IEs,  
        spare3 NULL, spare2 NULL, spare1 NULL  
    },  
    criticalExtensionsFuture   SEQUENCE {}  
}  

RRCConnectionSetupComplete-r8-IEs ::= SEQUENCE {
    selectedPLMN-Identity    INTEGER (1..6),  
    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 SEQUENCE {} OPTIONAL
}

RegisteredMME ::= SEQUENCE {
plmn-Identity PLMN-Identity OPTIONAL,
mmegi BIT STRING (SIZE (16)),
mmeec MMEC
}

-- ASN1STOP

<table>
<thead>
<tr>
<th><strong>RRCConnectionSetupComplete field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>gummei-Type</strong></td>
</tr>
<tr>
<td><strong>mmegi</strong></td>
</tr>
<tr>
<td><strong>registeredMME</strong></td>
</tr>
<tr>
<td><strong>rn-SubframeConfigReq</strong></td>
</tr>
<tr>
<td><strong>selectedPLMN-Identity</strong></td>
</tr>
</tbody>
</table>

– **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
-- ASN1START

SecurityModeCommand ::= SEQUENCE {
  rrc-TransactionIdentifier     RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1          CHOICE {
      securityModeCommand-r8    SecurityModeCommand-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}

SecurityModeCommand-r8-IEs ::= SEQUENCE {
  securityConfigSMC     SecurityConfigSMC,
  nonCriticalExtension    SecurityModeCommand-v8a0-IEs       OPTIONAL
}

SecurityModeCommand-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL, -- Need OP
  nonCriticalExtension    SEQUENCE {}       OPTIONAL -- Need OP
}

SecurityConfigSMC ::= SEQUENCE {
  securityAlgorithmConfig     SecurityAlgorithmConfig,
  ...}

-- 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**

```asn1
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
}
```

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

-- ASN1START

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

– SystemInformation

The SystemInformation message is used to convey one or more System Information Blocks. All the SIBs included are transmitted with the same periodicity.

Signalling radio bearer: N/A
RLC-SAP: TM
Logical channel: BCCH
Direction: E-UTRAN to UE

SystemInformation message

-- ASN1START
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
    },
    nonCriticalExtension SystemInformation-v8a0-IEs OPTIONAL
}

SystemInformation-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING OPTIONAL, -- Need OP
    nonCriticalExtension SEQUENCE {} OPTIONAL -- Need OP
}

-- 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.

Signalling radio bearer: N/A
RLC-SAP: TM
Logical channel: BCCH
Direction: E-UTRAN to UE

SystemInformationBlockType1 message

```asn1
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 - R x L e v M i n        Q - R x L e v M i n ,
    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-v8h0-IEs) OPTIONAL, -- Need OP
  nonCriticalExtension SystemInformationBlockType1-v920-IEs OPTIONAL
}

-- Late non critical extensions
SystemInformationBlockType1-v8h0-IEs ::= SEQUENCE {
  multiBandInfoList MultiBandInfoList OPTIONAL, -- Need OR
  nonCriticalExtension SystemInformationBlockType1-v9e0-IEs OPTIONAL -- Need OP
}

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 -- Need OP
}

SystemInformationBlockType1-v10j0-IEs ::= SEQUENCE {
  freqBandInfo-r10 NS-PmaxList-r10 OPTIONAL, -- Need OR
  multiBandInfoList-v10j0 MultiBandInfoList-v10j0 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 SEQUENCE {} OPTIONAL -- Need OP
}

PLMN-IdentityList ::= SEQUENCE (SIZE (1..6)) 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
}

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, spare5,
    spare4, spare3, spare2, spare1, ...}

CellSelectionInfo-v920 ::= SEQUENCE {
    q-QualMin-r9 Q-QualMin-r9,
    q-QualMinOffset-r9 INTEGER (1..8) OPTIONAL -- Need OP
}

-- ASN1STOP
### SystemInformationBlockType1 field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cellBarred</td>
<td>barred means the cell is barred, as defined in TS 36.304 [4].</td>
</tr>
<tr>
<td>cellReservedForOperatorUse</td>
<td>As defined in TS 36.304 [4].</td>
</tr>
<tr>
<td>csg-Identity</td>
<td>Identity of the Closed Subscriber Group the cell belongs to.</td>
</tr>
<tr>
<td>csg-Indication</td>
<td>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].</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 the frequency band in freqBandIndicator.</td>
</tr>
<tr>
<td>ims-EmergencySupport</td>
<td>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.</td>
</tr>
<tr>
<td>intraFreqReselection</td>
<td>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].</td>
</tr>
<tr>
<td>multiBandInfoList</td>
<td>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 IE it shall apply that frequency band. Otherwise, the UE shall apply the first listed band which it supports in the multiBandInfoList IE. 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.</td>
</tr>
<tr>
<td>multiBandInfoList-v10j0</td>
<td>A list of additionalPmax and additionalSpectrumEmission values as defined in TS 36.101 [42, table 6.2.4-1] 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).</td>
</tr>
<tr>
<td>plmn-IdentityList</td>
<td>List of PLMN identities. The first listed PLMN-Identity is the primary PLMN.</td>
</tr>
<tr>
<td>p-Max</td>
<td>Value applicable for the cell. If absent the UE applies the maximum power according to the UE capability.</td>
</tr>
<tr>
<td>q-QualMin</td>
<td>Parameter 'Qquam' in TS 36.304 [4]. If cellSelectionInfo-v920 is not present, the UE applies the (default) value of negative infinity for Qquam.</td>
</tr>
<tr>
<td>q-QualMinOffset</td>
<td>Parameter 'Qquamoffset' in TS 36.304 [4]. Actual value Qquamoffset = IE value [dB]. If cellSelectionInfo-v920 is not present or the field is not present, the UE applies the (default) value of 0 dB for Qquamoffset. Affects the minimum required quality level in the cell.</td>
</tr>
<tr>
<td>q-RxLevMinOffset</td>
<td>Parameter Qrxlevminoffset in TS 36.304 [4]. Actual value Qrxlevminoffset = IE value * 2 [dB]. If absent, the UE applies the (default) value of 0 dB for Qrxlevminoffset. Affects the minimum required Rx level in the cell.</td>
</tr>
<tr>
<td>sib-MappingInfo</td>
<td>List of the SIBs mapped to this SystemInformation message. There is no mapping information of SIB2; it is always present in the first SystemInformation message listed in the schedulingInfoList list.</td>
</tr>
<tr>
<td>si-Periodicty</td>
<td>Periodicity of the SI-message in radio frames, such that rf8 denotes 8 radio frames, rf16 denotes 16 radio frames, and so on.</td>
</tr>
<tr>
<td>si-WindowLength</td>
<td>Common SI scheduling window for all SIs. Unit in milliseconds, where ms1 denotes 1 millisecond, ms2 denotes 2 milliseconds and so on.</td>
</tr>
<tr>
<td>systemInfoValueTag</td>
<td>Common for all SIBs other than MIB, SIB1, SIB10, SIB11 and SIB12. Change of MIB and SIB1 is detected by acquisition of the corresponding message.</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>FBI-max</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>mFBI-max</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>RSRQ</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>TDD</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>
</tbody>
</table>

--

**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 { }
  } ENDED
}

UECapabilityEnquiry-r8-IEs ::= SEQUENCE {
  ue-CapabilityRequest  UE-CapabilityRequest,
  nonCriticalExtension UECapabilityEnquiry-v8a0-IEs OPTIONAL
}

UECapabilityEnquiry-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING OPTIONAL, -- Need OP
  nonCriticalExtension   SEQUENCE { } OPTIONAL -- Need OP
}
```
UE-CapabilityRequest ::= SEQUENCE (SIZE (1..maxRAT-Capabilities)) OF RAT-Type

-- ASN1STOP

--- UECapabilityEnquiry field descriptions ---

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ue-CapabilityRequest</td>
<td>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.</td>
</tr>
</tbody>
</table>

---

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

---

UECapabilityInformation ::= SEQUENCE {
  rrc-TransactionIdentifier    RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1                      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
-- 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**

```asn1
UEInformationRequest-r9  ::=    SEQUENCE {
    rrc-TransactionIdentifier  RRC-TransactionIdentifier,  
    criticalExtensions  CHOICE {
        c 1         C H O I C E  {
            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
}
```

---

```
UECapabilityInformation-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension   OCTET STRING      OPTIONAL,
    nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
```

---

```asn1
UEInformationRequest-r9  ::=    SEQUENCE {
    rrc-TransactionIdentifier  RRC-TransactionIdentifier,  
    criticalExtensions  CHOICE {
        c 1         C H O I C E  {
            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, -- Need OP
    nonCriticalExtension UEInformationRequest-v1020-IEs OPTIONAL
}

UEInformationRequest-v1020-IEs ::= SEQUENCE {
    logMeasReportReq-r10 ENUMERATED {true} OPTIONAL, -- Need ON
    nonCriticalExtension SEQUENCE {} OPTIONAL -- Need OP
}

-- ASN1STOP

<table>
<thead>
<tr>
<th><strong>UEInformationRequest field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>rach-ReportReq</strong></td>
</tr>
<tr>
<td>This field is used to indicate whether the UE shall report information about the random access procedure.</td>
</tr>
</tbody>
</table>

**-- 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**

-- ASN1START

UEInformationResponse-r9 ::= SEQUENCE {
    rrc-TransactionIdentifier RRC-TransactionIdentifier,  
    criticalExtensions CHOICE {
        c1 CHOICE {
            ueInformationResponse-r9 UEInformationResponse-r9-IEs, 
            spare3 NULL, spare2 NULL, spare1 NULL
        }
    },
    criticalExtensionsFuture SEQUENCE {}
}

-- ASN1STOP
UEInformationResponse-r9-IEs ::= SEQUENCE {
  rach-Report-r9           SEQUENCE {
    numberOfPreamblesSent-r9 INTEGER (1..200),
    contentionDetected-r9   BOOLEAN
                          } OPTIONAL,
  rlf-Report-r9           RLF-Report-r9 OPTIONAL,
  nonCriticalExtension    UEInformationResponse-v930-IEs OPTIONAL
}

UEInformationResponse-v930-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING (CONTAINING UEInformationResponse-v9e0-IEs)
                         OPTIONAL,
  nonCriticalExtension    UEInformationResponse-v1020-IEs OPTIONAL
}

UEInformationResponse-v9e0-IEs ::= SEQUENCE {
  rlf-Report-v9e0         RLF-Report-v9e0 OPTIONAL,
  nonCriticalExtension    SEQUENCE {} OPTIONAL
}

UEInformationResponse-v1020-IEs ::= SEQUENCE {
  logMeasReport-r10       LogMeasReport-r10 OPTIONAL,
  nonCriticalExtension    SEQUENCE {} OPTIONAL
}

RLF-Report-r9 ::= SEQUENCE {
  measResultLastServCell-r9 SEQUENCE {
    rsrpResult-r9         RSRP-Range,
    rsrqResult-r9         RSRQ-Range OPTIONAL
  },
  measResultNeighCells-r9 SEQUENCE {
    measResultListEUTRA-r9 MeasResultList2EUTRA-r9 OPTIONAL,
    measResultListUTRA-r9  MeasResultList2UTRA-r9 OPTIONAL,
    measResultListGERAN-r9 MeasResultListGERAN OPTIONAL
  }
}
MeasResult2EUTRA-v9e0 ::= SEQUENCE {
  carrierFreq-v9e0 ARFCN-ValueEUTRA-v9e0 OPTIONAL
}

MeasResultList2UTRA-r9 ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2UTRA-r9

MeasResult2UTRA-r9 ::= SEQUENCE {
  carrierFreq-r9 ARFCN-ValueUTRA,
  measResultList-r9 MeasResultListUTRA
}

MeasResultList2CDMA2000-r9 ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2CDMA2000-r9

MeasResult2CDMA2000-r9 ::= SEQUENCE {
  carrierFreq-r9 CarrierFreqCDMA2000,
  measResultList-r9 MeasResultsCDMA2000
}

LogMeasReport-r10 ::= SEQUENCE {
  absoluteTimeStamp-r10 AbsoluteTimeInfo-r10,
  traceReference-r10 TraceReference-r10,
  traceRecordingSessionRef-r10 OCTET STRING (SIZE (2)),
  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 {
  carrierFreq-r9 CarrierFreqCDMA2000,
  measResultList-r9 MeasResultsCDMA2000
}
rsrpResult-r10       RSRP-Range,
rsrqResult-r10       RSRQ-Range
}
measResultNeighCells-r10   SEQUENCE {
   measResultListEUTRA-r10  MeasResultList2EUTRA-r9  OPTIONAL,
   measResultListUTRA-r10   MeasResultList2UTRA-r9  OPTIONAL,
   measResultListGERAN-r10  MeasResultList2GERAN-r10 OPTIONAL,
   measResultListCDMA2000-r10 MeasResultList2CDMA2000-r9  OPTIONAL
} OPTIONAL,
...

MeasResultList2GERAN-r10 ::= SEQUENCE (SIZE (1..maxCellListGERAN)) OF MeasResultListGERAN

-- ASN1STOP
### UEInformationResponse field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>absoluteTimeStamp</code></td>
<td>Indicates the absolute time when the logged measurement configuration logging is provided, as indicated by E-UTRAN within <code>absoluteTimeInfo</code>.</td>
</tr>
<tr>
<td><code>carrierFreq</code></td>
<td>In case the UE includes <code>carrierFreq-v9e0</code> and/ or <code>carrierFreq-v1090</code>, the UE shall set the corresponding entry of <code>carrierFreq-r9</code> and/ or <code>carrierFreq-r10</code> respectively to <code>maxEARFCN</code>. 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><code>connectionFailureType</code></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><code>contentionDetected</code></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><code>failedPCellId</code></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><code>measResultLastServCell</code></td>
<td>This field refers to the last measurement results taken in the PCell, where radio link failure or handover failure happened.</td>
</tr>
<tr>
<td><code>measResultListEUTRA</code></td>
<td>If <code>measResultListEUTRA-v9e0</code>, <code>measResultListEUTRA-v1090</code> or <code>measResultListEUTRA-v11x0</code> is included, the UE shall include the same number of entries, and listed in the same order, as in <code>measResultListEUTRA-r9</code>, <code>measResultListEUTRA-r10</code> and/ or <code>measResultListEUTRA-r11</code> respectively.</td>
</tr>
<tr>
<td><code>numberOfPreamblesSent</code></td>
<td>This field is used to indicate the number of RACH preambles that were transmitted. Corresponds to parameter <code>PREAMBLE_TRANSMISSION_COUNTER</code> in TS 36.321 [6].</td>
</tr>
<tr>
<td><code>previousPCellId</code></td>
<td>This field is used to indicate the source PCell of the last handover (source PCell when the last <code>RRC-Connection-Reconfiguration</code> message including <code>mobilityControlInfo</code> was received).</td>
</tr>
<tr>
<td><code>reestablishmentCellId</code></td>
<td>This field is used to indicate the cell in which the re-establishment attempt was made after connection failure.</td>
</tr>
<tr>
<td><code>relativeTimeStamp</code></td>
<td>Indicates the time of logging measurement results, measured relative to the <code>absoluteTimeStamp</code>. Value in seconds.</td>
</tr>
<tr>
<td><code>tce-Id</code></td>
<td>Parameter <code>Trace Collection Entity Id</code>: See TS 32.422 [58].</td>
</tr>
<tr>
<td><code>timeConnFailure</code></td>
<td>This field is used to indicate the time elapsed since the last HO initialization until connection failure. Actual value = IE value * 100ms. The maximum value 1023 means 102.3s or longer.</td>
</tr>
<tr>
<td><code>traceRecordingSessionRef</code></td>
<td>Parameter <code>Trace Recording Session Reference</code>: See TS 32.422 [58].</td>
</tr>
</tbody>
</table>

---

**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
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,
  nonCriticalExtension ::=
    SEQUENCE {} OPTIONAL
}

-- ASN1STOP

### ULHandoverPreparationTransfer field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>meid</td>
<td>The 56 bit mobile identification number provided by the CDMA2000 Upper layers.</td>
</tr>
</tbody>
</table>

---

### 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 ::= SEQUENCE {

-- 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-
        1XRTT, dedicatedInfoCDMA2000-HRPD DedicatedInfoCDMA2000-
        HRPD
    },
    nonCriticalExtension ULInformationTransfer-v8a0-IEs OPTIONAL
}

ULInformationTransfer-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP

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, 
    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, 
  freqInfo 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, -- Need OP 
  [ ssac-BarringForMMTEL-Voice-r9 AC-BarringConfig OPTIONAL, -- Need OP 
    ssac-BarringForMMTEL-Video-r9 AC-BarringConfig OPTIONAL -- Need OP 
  ], 
  [ ac-BarringForCSFB-r10 AC-BarringConfig OPTIONAL -- Need OP 
  ] 
} 

SystemInformationBlockType2-v8h0-IEs ::= SEQUENCE { 
  multiBandInfoList SEQUENCE (SIZE (1..maxMultiBands)) OF AdditionalSpectrumEmission OPTIONAL, -- Need OR 
  nonCriticalExtension SystemInformationBlockType2-v9e0-IEs OPTIONAL -- Need OP 
} 

SystemInformationBlockType2-v9e0-IEs ::= SEQUENCE { 
  ul-CarrierFreq-v9e0 ARFCN-ValueEUTRA-v9e0 OPTIONAL, -- Cond ul-FreqMax 
  nonCriticalExtension SEQUENCE {} OPTIONAL -- Need OP 
}
AC-BarringConfig ::= SEQUENCE {
    ac-BarringFactor     ENUMERATED {
        p00, p05, p10, p15, p20, p25, p30, p40,
        p50, p60, p70, p75, p80, p85, 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

SystemInformationBlockType2 field descriptions

ac-BarringFactor
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.

ac-BarringForCSFB
Access class barring for mobile originating CS fallback.

ac-BarringForEmergency
Access class barring for AC 10.

ac-BarringForMO-Data
Access class barring for mobile originating calls.

ac-BarringForMO-Signalling
Access class barring for mobile originating signalling.

ac-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.

ac-BarringTime
Mean access barring time value in seconds.

additionalSpectrumEmission
The UE requirements related to IE AdditionalSpectrumEmission are defined in TS 36.101 [42, table 6.2.4.1].

mbsfn-SubframeConfigList
Defines the subframes that are reserved for MBSFN in downlink.

multiBandInfoList
A list of additionalSpectrumEmission I.E. one for each additional frequency band included in multiBandInfoList in SystemInformationBlockType1, listed in the same order.

ssac-BarringForMMTEL-Video
Service specific access class barring for MMTEL video originating calls.

ssac-BarringForMMTEL-Voice
Service specific access class barring for MMTEL voice originating calls.

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.
Conditional presence | Explanation
--- | ---
ul-FreqMax | The field is mandatory present if ul-CarrierFreq (i.e. without suffix) is present and set to maxEARFCN. Otherwise the field is not present.

-- 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**

```asn1
SystemInformationBlockType3 ::= SEQUENCE {
cellReselectionInfoCommon
  SEQUENCE {
    q-Hyst
      ENUMERATED {
        dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
        dB12, dB14, dB16, dB18, dB20, dB22, dB24},
speedStateReselectionPars
      SEQUENCE {
        mobilityStateParameters
          MobilityStateParameters,
        q-HystSF
          SEQUENCE {
            sf-Medium
              ENUMERATED {
                dB-6, dB-4, dB-2, dB0},
            sf-High
              ENUMERATED {
                dB-6, dB-4, dB-2, dB0}
          }
      }  OPTIONAL  -- Need OP
  }  ,
cellReselectionServingFreqInfo
  SEQUENCE {
    s-NonIntraSearch
      ReselectionThreshold  OPTIONAL,  -- Need OP
    threshServingLow
      ReselectionThreshold,
cellReselectionPriority
      CellReselectionPriority
  },
intraFreqCellReselectionInfo
  SEQUENCE {
    q-RxLevMin
      Q-RxLevMin,
p-Max
      P-Max  OPTIONAL,  -- Need OP
    s-IntraSearch
      ReselectionThreshold  OPTIONAL,  -- Need OP
    allowedMeasBandwidth
      AllowedMeasBandwidth  OPTIONAL,  -- Need OP
    presenceAntennaPort1
      PresenceAntennaPort1, 
  }
}
```
neighCellConfig NeighCellConfig,
t-ReselectionEUTRA T-Reselection,
t-ReselectionEUTRA-SF SpeedStateScaleFactors OPTIONAL -- Need OP,
}
...

lateNonCriticalExtension OCTET STRING (CONTAINING SystemInformationBlockType3-v10j0-IEs) OPTIONAL, -- Need OP
[[
  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
]
]]

-- Late non critical extensions

SystemInformationBlockType3-v10j0-IEs ::= SEQUENCE {
  freqBandInfo-r10 NS-PmaxList-r10 OPTIONAL, -- Need OR
  multiBandInfoList-v10j0 MultiBandInfoList-v10j0 OPTIONAL, -- Need OR
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP
**SystemInformationBlockType3 field descriptions**

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>allowedMeasBandwidth</code></td>
<td>If absent, the value corresponding to the downlink bandwidth indicated by the <code>dl-Bandwidth</code> in included <code>MasterInformationBlock</code> applies.</td>
</tr>
<tr>
<td><code>cellReselectionInfoCommon</code></td>
<td>Cell re-selection information common for cells.</td>
</tr>
<tr>
<td><code>cellReselectionServingFreqInfo</code></td>
<td>Information common for Cell re-selection to inter-frequency and inter-RAT cells.</td>
</tr>
<tr>
<td><code>freqBandInfo</code></td>
<td>A list of <code>additionalPmax</code> and <code>additionalSpectrumEmission</code> values as defined in TS 36.101 [42, table 6.2.4-1] applicable for the intra-frequency neighbouring E-UTRA cells if the UE selects the frequency band from <code>freqBandIndicator</code> in <code>SystemInformationBlockType1</code>.</td>
</tr>
<tr>
<td><code>intraFreqCellReselectionInfo</code></td>
<td>Cell re-selection information common for intra-frequency cells.</td>
</tr>
<tr>
<td><code>multiBandInfoList-v10j0</code></td>
<td>A list of <code>additionalPmax</code> and <code>additionalSpectrumEmission</code> values as defined in TS 36.101 [42, table 6.2.4-1] applicable for the intra-frequency neighbouring E-UTRA cells if the UE selects the frequency bands in <code>multiBandInfoList</code> (i.e. without suffix) or <code>multiBandInfoList-v9e0</code>. If E-UTRAN includes <code>multiBandInfoList-v10j0</code>, it includes the same number of entries, and listed in the same order, as in <code>multiBandInfoList</code> (i.e. without suffix).</td>
</tr>
<tr>
<td><code>p-Max</code></td>
<td>Value applicable for the intra-frequency neighbouring E-UTRA cells. If absent the UE applies the maximum power according to the UE capability.</td>
</tr>
<tr>
<td><code>q-Hyst</code></td>
<td>Parameter <code>Q_{hyst}</code> in 36.304 [4]. Value in dB. Value dB1 corresponds to 1 dB, dB2 corresponds to 2 dB and so on.</td>
</tr>
<tr>
<td><code>q-HystSF</code></td>
<td>Parameter ‘Speed dependent ScalingFactor for <code>Q_{hyst}</code>’ 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 <code>Q_{hyst}</code> as defined in TS 36.304 [4]. In dB. Value dB-6 corresponds to -6dB, dB-4 corresponds to -4dB and so on.</td>
</tr>
<tr>
<td><code>q-QualMin</code></td>
<td>Parameter ‘Q_{qualmin}’ 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 <code>Q_{qualmin}</code>.</td>
</tr>
<tr>
<td><code>q-RxLevMin</code></td>
<td>Parameter ‘Q_{rxlevmin}’ in TS 36.304 [4], applicable for intra-frequency neighbour cells.</td>
</tr>
<tr>
<td><code>s-IntraSearch</code></td>
<td>Parameter ‘S_{IntraSearchP}’ in TS 36.304 [4]. If the field <code>s-IntraSearchP</code> is present, the UE applies the value of <code>s-IntraSearchP</code> instead. Otherwise if neither <code>s-IntraSearch nor s-IntraSearchP</code> is present, the UE applies the (default) value of infinity for <code>S_{IntraSearchP}</code>.</td>
</tr>
<tr>
<td><code>s-IntraSearchQ</code></td>
<td>Parameter ‘S_{IntraSearchQ}’ in TS 36.304 [4]. See descriptions under <code>s-IntraSearch</code>.</td>
</tr>
<tr>
<td><code>s-NonIntraSearch</code></td>
<td>Parameter ‘S_{NonIntraSearchP}’ in TS 36.304 [4]. If the field <code>s-NonIntraSearchP</code> is present, the UE applies the value of <code>s-NonIntraSearchP</code> instead. Otherwise if neither <code>s-NonIntraSearch nor s-NonIntraSearchP</code> is present, the UE applies the (default) value of infinity for <code>S_{NonIntraSearchP}</code>.</td>
</tr>
<tr>
<td><code>speedStateReselectionPars</code></td>
<td>Speed dependent reselection parameters, see TS 36.304 [4]. If this field is absent, i.e, <code>mobilityStateParameters</code> is also not present, UE behaviour is specified in TS 36.304 [4].</td>
</tr>
<tr>
<td><code>threshServingLow</code></td>
<td>Parameter ‘ThreshServing,LowP’ in TS 36.304 [4].</td>
</tr>
<tr>
<td><code>threshServingLowQ</code></td>
<td>Parameter ‘ThreshServing,LowQ’ in TS 36.304 [4].</td>
</tr>
<tr>
<td><code>t-ReselectionEUTRA</code></td>
<td>Parameter ‘TreselectionEUTRA’ in TS 36.304 [4].</td>
</tr>
<tr>
<td><code>t-ReselectionEUTRA-SF</code></td>
<td>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].</td>
</tr>
</tbody>
</table>
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**

```
SystemInformationBlockType4 ::= SEQUENCE {
  intraFreqNeighCellList    IntraFreqNeighCellList  OPTIONAL, -- Need OR
  intraFreqBlackCellList    IntraFreqBlackCellList    OPTIONAL, -- Need OR
  csg-PhysCellIdRange     PhysCellIdRange    OPTIONAL, -- Cond CSG
  ...,
  lateNonCriticalExtension    OCTET STRING    OPTIONAL  -- Need OP
}
```

```
IntraFreqNeighCellList ::= SEQUENCE (SIZE (1..maxCellIntra)) OF IntraFreqNeighCellInfo
```

```
IntraFreqNeighCellInfo ::= SEQUENCE {
  physCellId         PhysCellId,
  q-OffsetCell       Q-OffsetRange,
  ...
}
```

```
IntraFreqBlackCellList ::= SEQUENCE (SIZE (1..maxCellBlack)) OF PhysCellIdRange
```

---

<table>
<thead>
<tr>
<th><strong>SystemInformationBlockType4 field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>csg-PhysCellIdRange</strong></td>
</tr>
<tr>
<td>Set of physical cell identities reserved for CSG cells on the frequency on which this field was received. The received <code>csg-PhysCellIdRange</code> 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 <code>csg-PhysCellIdRange</code> when it is in any cell selection state defined in TS 36.304 [4].</td>
</tr>
<tr>
<td><strong>intraFreqBlackCellList</strong></td>
</tr>
<tr>
<td>List of blacklisted intra-frequency neighbouring cells.</td>
</tr>
<tr>
<td><strong>intraFreqNeighCellList</strong></td>
</tr>
<tr>
<td>List of intra-frequency neighbouring cells with specific cell re-selection parameters.</td>
</tr>
<tr>
<td><strong>q-OffsetCell</strong></td>
</tr>
<tr>
<td>Parameter ‘Qoffsetₙ,’ in TS 36.304 [4].</td>
</tr>
</tbody>
</table>
Conditional presence | Explanation
---|---
CSG | This field is optional, need OP, for non-CSG cells, and mandatory for CSG cells.

-- 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**

```
-- ASN1START

SystemInformationBlockType5 ::= SEQUENCE {
  interFreqCarrierFreqList   InterFreqCarrierFreqList,
  ...,
  lateNonCriticalExtension   OCTET STRING(CONTAINING SystemInformationBlockType5-v8h0-IEs)
    OPTIONAL  -- Need OP
}

SystemInformationBlockType5-v8h0-IEs ::= SEQUENCE {
  interFreqCarrierFreqList-v8h0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v8h0
    OPTIONAL,  -- Need OP
  nonCriticalExtension SystemInformationBlockType5-v9e0-IEs OPTIONAL  -- Need OP
}

SystemInformationBlockType5-v9e0-IEs ::= SEQUENCE {
  interFreqCarrierFreqList-v9e0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v9e0
    OPTIONAL,  -- Need OR
  nonCriticalExtension SystemInformationBlockType5-v10j0-IEs OPTIONAL  -- Need OP
}

SystemInformationBlockType5-v10j0-IEs ::= SEQUENCE {
  interFreqCarrierFreqList-v10j0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v10j0
    OPTIONAL,  -- Need OR
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

InterFreqCarrierFreqList ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo
```

-- ASN1END
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-Q-r9 ReselectionThresholdQ-r9
        threshX-HighQ-r9 ReselectionThresholdQ-r9,
        threshX-LowQ-r9 ReselectionThresholdQ-r9
        ]]
}

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

InterFreqNeighCellList ::=  SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo

InterFreqNeighCellInfo ::=  SEQUENCE {
  physCellId       PhysCellId,
  q - OffsetCell       Q - OffsetRange
}

InterFreqBlackCellList ::=  SEQUENCE (SIZE (1..maxCellBlack)) OF PhysCellIdRange

-- ASN1STOP
SystemInformationBlockType5 field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>freqBandInfo</td>
<td>A list of (\text{additionalPmax}) and (\text{additionalSpectrumEmission}) values as defined in TS 36.101 [42, table 6.2.4-1] for the frequency band represented by (\text{dl-CarrierFreq}) for which cell reselection parameters are common.</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-AFRCN used to indicate this. If E-UTRAN includes (\text{interFreqCarrierFreqList-v8h0}) and/ or (\text{interFreqCarrierFreqList-v9e0}) it includes the same number of entries, and listed in the same order, as in (\text{interFreqCarrierFreqList}) (i.e. without suffix). See Annex D for more descriptions.</td>
</tr>
<tr>
<td>interFreqNeighCellList</td>
<td>List of inter-frequency neighbouring cells with specific cell re-selection parameters.</td>
</tr>
<tr>
<td>multiBandInfoList</td>
<td>Indicates the list of frequency bands in addition to the band represented by (\text{dl-CarrierFreq}) for which cell reselection parameters are common. E-UTRAN indicates at most (\text{maxMultiBands}) frequency bands (i.e. the total number of entries across both (\text{multiBandInfoList}) and (\text{multiBandInfoList-v9e0}) is below this limit).</td>
</tr>
<tr>
<td>multiBandInfoList-v10j0</td>
<td>A list of (\text{additionalPmax}) and (\text{additionalSpectrumEmission}) values as defined in TS 36.101 [42, table 6.2.4-1] for the frequency bands in (\text{multiBandInfoList}) (i.e. without suffix) and (\text{multiBandInfoList-v9e0}). If E-UTRAN includes (\text{multiBandInfoList-v10j0}), it includes the same number of entries, and listed in the same order, as in (\text{multiBandInfoList}) (i.e. without suffix).</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 the UE capability.</td>
</tr>
<tr>
<td>q-OffsetCell</td>
<td>Parameter (\text{Qoffset}_{s,n}) in TS 36.304 [4].</td>
</tr>
<tr>
<td>q-OffsetFreq</td>
<td>Parameter (\text{Qoffset}_{frequency}) in TS 36.304 [4].</td>
</tr>
<tr>
<td>q-QualMin</td>
<td>Parameter (\text{Qqualmin}) in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of negative infinity for (\text{Qqualmin}).</td>
</tr>
<tr>
<td>threshX-High</td>
<td>Parameter (\text{Thresh}_{X, HighP}) in TS 36.304 [4].</td>
</tr>
<tr>
<td>threshX-HighQ</td>
<td>Parameter (\text{Thresh}_{X, HighQ}) in TS 36.304 [4].</td>
</tr>
<tr>
<td>threshX-Low</td>
<td>Parameter (\text{Thresh}_{X, LowP}) in TS 36.304 [4].</td>
</tr>
<tr>
<td>threshX-LowQ</td>
<td>Parameter (\text{Thresh}_{X, LowQ}) in TS 36.304 [4].</td>
</tr>
<tr>
<td>t-ReselectionEUTRA</td>
<td>Parameter (\text{Treselection}_{EUTRA}) in TS 36.304 [4].</td>
</tr>
<tr>
<td>t-ReselectionEUTRA-SF</td>
<td>Parameter (\text{Speed dependent ScalingFactor for Treselection}_{EUTRA}) 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>

Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dl-FreqMax</td>
<td>The field is mandatory present if, for the corresponding entry in (\text{InterFreqCarrierFreqList}) (i.e. without suffix), (\text{dl-CarrierFreq}) (i.e. without suffix) is set to (\text{maxEARFCN}). Otherwise the field is not present.</td>
</tr>
<tr>
<td>RSRQ</td>
<td>The field is mandatory present if (\text{threshServingLowQ}) is present in (\text{systemInformationBlockType3}); otherwise it is not present.</td>
</tr>
</tbody>
</table>

SystemInformationBlockType6

The IE \(\text{SystemInformationBlockType6}\) 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

-- ASN1START
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. -- Need OP
}

SystemInformationBlockType6-v8h0-IEs ::= SEQUENCE {
carrierFreqListUTRA-FDD-v8h0 SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqInfoUTRA-FDD-v8h0 OPTIONAL, -- Need OR
nonCriticalExtension SEQUENCE {} 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-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),
    ...
  }

FreqBandIndicator-UTRA-FDD ::=  INTEGER (1..86)

-- ASN1STOP
**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` 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-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.

**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 ‘Qqualmin’ in TS 25.304 [40]. Actual value = IE value [dB].

**q-RxLevMin**
Parameter ‘Qrxlevmin’ in TS 25.304 [40]. Actual value = IE value * 2+1 [dBm].

**t-ReselectionUTRA**
Parameter ‘TreselectionUTRAN’ in TS 36.304 [4].

**t-ReselectionUTRA-SF**
Parameter ‘Speed dependent ScalingFactor for TreselectionUTRAN’ in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].

**threshX-High**

**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].

---

### 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**

```
-- ASN1START

SystemInformationBlockType7 ::= SEQUENCE {
    t-ReselectionGERAN              T-Reselection,
    t-ReselectionGERAN-SF          SpeedStateScaleFactors OPTIONAL, -- Need OR
    carrierFreqsInfoListGERAN      CarrierFreqsInfoListGERAN OPTIONAL, -- Need OR
    ...
    lateNonCriticalExtension       OCTET STRING OPTIONAL  -- Need OP
}

CarrierFreqsInfoListGERAN ::= SEQUENCE (SIZE (1..maxGNFG)) OF CarrierFreqInfoGERAN

-- ASN1END
```

**Conditional presence**

<table>
<thead>
<tr>
<th>RSRQ</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td></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>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>SystemInformationBlockType7 field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>carrierFreqs</strong></td>
</tr>
<tr>
<td><strong>carrierFreqsInfoList</strong></td>
</tr>
<tr>
<td><strong>commonInfo</strong></td>
</tr>
<tr>
<td><strong>ncc-Permitted</strong></td>
</tr>
<tr>
<td><strong>p-MaxGERAN</strong></td>
</tr>
<tr>
<td><strong>q-RxLevMin</strong></td>
</tr>
<tr>
<td><strong>threshX-High</strong></td>
</tr>
<tr>
<td><strong>threshX-Low</strong></td>
</tr>
<tr>
<td><strong>t-ReselectionGERAN</strong></td>
</tr>
<tr>
<td><strong>t-ReselectionGERAN-SF</strong></td>
</tr>
</tbody>
</table>
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 information element

SystemInformationBlockType8 ::= SEQUENCE {
  systemTimeInfo SYSTEMINFOCDMA2000 OPTIONAL, -- Need OR
  searchWindowSize INTEGER (0..15) OPTIONAL, -- Need OR
  parametersHRPD SEQUENCE {
    preRegistrationInfoHRPD PreRegistrationInfoHRPD, -- Need OR
    cellReselectionParametersHRPD CellReselectionParametersCDMA2000 OPTIONAL -- Need OR
  } OPTIONAL, -- Need OR
  parameters1XRTT SEQUENCE {
    csfb-RegistrationParam1XRTT CSFB-RegistrationParam1XRTT OPTIONAL, -- Need OR
    longCodeState1XRTT BIT STRING (SIZE (42)) OPTIONAL, -- Need OR
    cellReselectionParameters1XRTT CellReselectionParametersCDMA2000 OPTIONAL -- Need OR
  } OPTIONAL, -- Need OR
  ...,
  lateNonCriticalExtension OCTET STRING OPTIONAL, -- Need OR
  [ csfb-SupportForDualRxUEs-r9 BOOLEAN OPTIONAL, -- Need OR
    cellReselectionParametersHRPD-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL, -- Cond NCL-HRPD
    cellReselectionParameters1XRTT-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL, -- Cond NCL-1XRTT
    csfb-RegistrationParam1XRTT-v920 CSFB-RegistrationParam1XRTT-v920 OPTIONAL, -- Cond REG-1XRTT
    ac-BarringConfig1XRTT-r9 AC-BarringConfig1XRTT-r9 OPTIONAL -- Cond REG-1XRTT
  ]
  [ csfb-DualRxTxSupport-r10 ENUMERATED {true} OPTIONAL -- Cond REG-1XRTT
  ]
}

CellReselectionParametersCDMA2000 ::= SEQUENCE {
  bandClassList BandClassListCDMA2000,
  neighCellList NeighCellListCDMA2000,
}
CellReselectionParametersCDMA2000-v920 ::= SEQUENCE {
    neighCellList-v920 NeighCellListCDMA2000-v920
}

NeighCellListCDMA2000 ::= SEQUENCE (SIZE (1..16)) OF NeighCellCDMA2000

NeighCellCDMA2000 ::= SEQUENCE {
    bandClass          BandclassCDMA2000,
    neighCellsPerFreqList NeighCellsPerBandclassListCDMA2000
}

NeighCellsPerBandclassListCDMA2000 ::= SEQUENCE (SIZE (1..16)) OF NeighCellsPerBandclassCDMA2000

NeighCellsPerBandclassCDMA2000 ::= SEQUENCE {
    arfcn          ARFCN-ValueCDMA2000,
    physCellIdList PhysCellIdListCDMA2000
}

NeighCellListCDMA2000-v920 ::= SEQUENCE (SIZE (1..16)) OF NeighCellCDMA2000-v920

NeighCellCDMA2000-v920 ::= SEQUENCE {
    neighCellsPerFreqList-v920 NeighCellsPerBandclassListCDMA2000-v920
}

NeighCellsPerBandclassListCDMA2000-v920 ::= SEQUENCE (SIZE (1..16)) OF NeighCellsPerBandclassCDMA2000-v920

NeighCellsPerBandclassCDMA2000-v920 ::= SEQUENCE {
    physCellIdList-v920 PhysCellIdListCDMA2000-v920
}
PhysCellIdListCDMA2000 ::= SEQUENCE (SIZE (1..16)) OF PhysCellIdCDMA2000

PhysCellIdListCDMA2000-v920 ::= SEQUENCE (SIZE (0..24)) OF PhysCellIdCDMA2000

BandClassListCDMA2000 ::= 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)
}

-- ASN1STOP
**SystemInformationBlockType8 field descriptions**

- **ac-BarringConfig1XRTT**
  Contains the access class barring parameters the UE uses to calculate the access class barring factor, see C.S0097 [53].

- **ac-Barring0to9**
  Parameter used for calculating the access class barring factor for access overload classes 0 through 9. It is the parameter 'PSIST' in C.S0004-A [34] for access overload classes 0 through 9.

- **ac-BarringEmg**
  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 'PSIST_EMG' in C.S0004-A [34].

- **ac-BarringMsg**
  Parameter used for modifying the access class barring factor for message transmissions. It is the parameter 'MSG_PSIST' in C.S0004-A [34].

- **ac-BarringN**
  Parameter used for calculating the access class barring factor for access overload class N (N = 10 to 15). It is the parameter 'PSIST' in C.S0004-A [34] for access overload class N.

- **ac-BarringReg**
  Parameter used for modifying the access class barring factor for autonomous registrations. It is the parameter 'REG_PSIST' in C.S0004-A [34].

- **bandClass**
  Identifies the Frequency Band in which the Carrier can be found. Details can be found in C.S0057-E [24, Table 1.5].

- **bandClassList**
  List of CDMA2000 frequency bands.

- **cellReselectionParameters1XRTT**
  Cell reselection parameters applicable only to CDMA2000 1xRTT system.

- **cellReselectionParameters1XRTT-v920**
  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.

- **cellReselectionParametersHRPD**
  Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system.

- **cellReselectionParametersHRPD-v920**
  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.

- **csfb-DualRxTxSupport**
  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].

- **csfb-RegistrationParam1XRTT**
  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.

- **csfb-SupportForDualRxUEs**
  Value TRUE indicates that the network supports dual Rx CSFB [51].

- **longCodeState1XRTT**
  The state of long code generation registers in CDMA2000 1XRTT system as defined in C.S0002-A [12, Section 1.3] at \[ t / 10 \times 10 + 320 \text{ ms}, \] where \( t \) equals to the cdma-SystemTime. This field is required for 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.

- **neighCellsPerFreqList**

- **neighCellsPerFreqList-v920**
  Extended list of neighbour cell ids, in the same CDMA2000 Frequency Band as the corresponding instance in 'NeighCellListCDMA2000'.
SystemInformationBlockType8 field descriptions

parameters1XRTT
Parameters applicable for interworking with CDMA2000 1XRTT system.

parametersHRPD
Parameters applicable only for interworking with CDMA2000 HRPD systems.

physCellIdList

physCellIdList-v920
Extended list of CDMA2000 cell ids, in the same CDMA2000 ARFCN as the corresponding instance in 'NeighCellsPerBandclassCDMA2000'.

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-A [25, Table 2.6.6.2.1-1] and C.S0024-A [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].

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.

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 Ec/Io) in units of 0.5 dB, as defined in C.S0005-A [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 Ec/Io) in units of 0.5 dB, as defined in C.S0005-A [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].

---

SystemInformationBlockType9
The IE SystemInformationBlockType9 contains a home eNB name (HNB Name).

SystemInformationBlockType9 information element

-- ASN1START

SystemInformationBlockType9 ::=  SEQUENCE {
  hnb-Name OCTET STRING (SIZE(1..48)) OPTIONAL, -- Need OR

-- ASN1END
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

-- ASN1START

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  -- Need OP
}

-- ASN1STOP
### 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, 9.4.1.2.2], 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, 9.4.1.2.1], 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 should 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

```
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. -- Need OP
}
```

---

### 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, 9.4.2.2.4] and encoded according to TS 23.038 [38].
**SystemInformationBlockType11 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, 9.4.1.2.2], 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, 9.4.1.2.1], 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.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment1</td>
<td>The field is mandatory present in the first segment of SIB11, otherwise it is not present.</td>
</tr>
</tbody>
</table>

---

**SystemInformationBlockType12**

The IE SystemInformationBlockType12 contains a CMAS notification.

**SystemInformationBlockType12 information element**

```asn1
SystemInformationBlockType12-r9 ::= SEQUENCE {
  messageIdentifier-r9    BIT STRING (SIZE (16)),
  serialNumber-r9      BIT STRING (SIZE (16)),
  warningMessageSegmentType-r9  ENUMERATED {notLastSegment, lastSegment},
  warningMessageSegmentNumber-r9  INTEGER (0..63),
  warningMessageSegment-r9   OCTET STRING,
  dataCodingScheme-r9     OCTET STRING (SIZE (1))   OPTIONAL,  -- Cond Segment1
  lateNonCriticalExtension OCTET STRING     OPTIONAL, -- Need OP
...
}
```

---

ETSI
### SystemInformationBlockType12 field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>dataCodingScheme</strong></td>
<td>Identifies the alphabet/coding and the language applied variations of a CMAS notification. The octet (which is equivalent to the octet of the equivalent IE defined in TS 23.041 [37, 9.4.2.2.4]) contains the octet of the equivalent IE defined in TS 23.041 [39, 9.2.1.52] and encoded according to TS 23.038 [38].</td>
</tr>
<tr>
<td><strong>messageIdentifier</strong></td>
<td>Identifies the source and type of CMAS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 23.041 [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, 9.4.1.2.2], while the trailing bit contains bit 0 of second octet of the same equivalent IE.</td>
</tr>
<tr>
<td><strong>serialNumber</strong></td>
<td>Identifies variations of a CMAS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 23.041 [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, 9.4.1.2.1], while the trailing bit contains bit 0 of second octet of the same equivalent IE.</td>
</tr>
<tr>
<td><strong>warningMessageSegment</strong></td>
<td>Carries a segment of the Warning Message Contents IE defined in TS 36.413 [39]. 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.</td>
</tr>
<tr>
<td><strong>warningMessageSegmentNumber</strong></td>
<td>Segment number of the CMAS warning message segment contained in the SIB. A segment number of zero corresponds to the first segment, one corresponds to the second segment, and so on.</td>
</tr>
<tr>
<td><strong>warningMessageSegmentType</strong></td>
<td>Indicates whether the included CMAS warning message segment is the last segment or not.</td>
</tr>
</tbody>
</table>

#### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment1</td>
<td>The field is mandatory present in the first segment of SIB12, otherwise it is not present.</td>
</tr>
</tbody>
</table>

### SystemInformationBlockType13

The IE `SystemInformationBlockType13` contains the information required to acquire the MBMS control information associated with one or more MBSFN areas.

#### SystemInformationBlockType13 information element

```asn1
SystemInformationBlockType13-r9 ::= SEQUENCE {
    mbsfn-AreaInfoList-r9      MBSFN-AreaInfoList-r9,
    notificationConfig-r9      MBMS-NotificationConfig-r9,
    lateNonCriticalExtension   OCTET STRING     OPTIONAL, -- Need OP
    ...
}
```

### 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.
AntennaInfo information elements

-- ASN1START

AntennaInfoCommon ::= SEQUENCE {
  antennaPortsCount ENUMERATED {an1, an2, an4, spare1}
}

AntennaInfoDedicated ::= SEQUENCE {
  transmissionMode ENUMERATED {
    tm1, tm2, tm3, tm4, tm5, tm6,
    tm7, tm8-v920},
  codebookSubsetRestriction CHOICE {
    n2TxAntenna-tm3 BIT STRING (SIZE (2)),
    n4TxAntenna-tm3 BIT STRING (SIZE (4)),
    n2TxAntenna-tm4 BIT STRING (SIZE (6)),
    n4TxAntenna-tm4 BIT STRING (SIZE (64)),
    n2TxAntenna-tm5 BIT STRING (SIZE (4)),
    n4TxAntenna-tm5 BIT STRING (SIZE (16)),
    n2TxAntenna-tm6 BIT STRING (SIZE (4)),
    n4TxAntenna-tm6 BIT STRING (SIZE (16))
  } OPTIONAL, -- Cond TM
  ue-TransmitAntennaSelection CHOICE {
    release NULL,
    setup ENUMERATED {closedLoop, openLoop}
  }
}

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 {

-- ASN1END
transmissionMode-r10 ENUMERATED {
    tm1, tm2, tm3, tm4, tm5, tm6, tm7, tm8-v920,
    tm9-v1020, spare7, 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
}

--- ASN1STOP

<table>
<thead>
<tr>
<th><strong>AntennaInfo field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>antennaPortsCount</strong> 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].</td>
</tr>
<tr>
<td><strong>codebookSubsetRestriction</strong> Parameter: codebookSubsetRestriction, see TS 36.213 [23, 7.2] and TS 36.211 [21, 6.3.4.2.3]. The number of bits in the codebookSubsetRestriction for applicable transmission modes is defined in TS 36.213 [23, Table 7.2-1b]. If the UE is configured with transmissionMode tm8, E-UTRAN configures the field codebookSubsetRestriction if PMI/RI reporting is configured. If the UE is configured with transmissionMode tm9, E-UTRAN configures the field 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 codebookSubsetRestriction in other cases where the UE is configured with transmissionMode tm8 or tm9.</td>
</tr>
<tr>
<td><strong>maxLayersMIMO</strong> Indicates the maximum number of layers for spatial multiplexing. In this release of the specification EUTRAN only configures value fourLayers for this field, and only configures the field when transmissionMode is set to tm3 or tm4 for the corresponding serving cell.</td>
</tr>
<tr>
<td><strong>transmissionMode</strong> Points to one of Transmission modes defined in TS 36.213 [23, 7.1] where tm1 refers to transmission mode 1, tm2 to transmission mode 2 etc.</td>
</tr>
<tr>
<td><strong>ue-TransmitAntennaSelection</strong> For value 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]. EUTRAN configures the same value for all serving cells.</td>
</tr>
</tbody>
</table>
### 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 <code>transmissionMode</code> is set to tm3, tm4, tm5 or 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 <code>AntennaInfoDedicated</code> is included and <code>transmissionMode</code> is set to tm8. If <code>AntennaInfoDedicated</code> is included and <code>transmissionMode</code> is set to a value other than tm8, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present and the UE takes no action i.e. continues to use the existing value, if previously configured.</td>
</tr>
<tr>
<td><strong>TMX</strong></td>
<td>The field is mandatory present if the <code>transmissionMode-r10</code> is set to tm3, tm4, tm5 or tm6. The field is optionally present, need OR, if the <code>transmissionMode-r10</code> is set to tm8 or 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 `AntennaInfoUL` is used to specify the UL antenna configuration.

**AntennaInfoUL information elements**

```
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**

```
CQI-ReportConfig ::= SEQUENCE {  
  cqi-ReportModeAperiodic CQI-ReportModeAperiodic OPTIONAL, -- Need OR  
  nomPDSCH-RS-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-RI-Report-r9 ENUMERATED {setup} OPTIONAL -- Cond PMIRI
}

CQI-ReportConfig-r10 ::= SEQUENCE {
  cqi-ReportAperiodic-r10 CQI-ReportAperiodic-r10 OPTIONAL, -- Need ON
  nomPDSCH-RS-EPRE-Offset INTEGER (-1..6),
  cqi-ReportPeriodic-r10 CQI-ReportPeriodic-r10 OPTIONAL, -- Need ON
  pmi-RI-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-ReportConfigSCell-r10 ::= SEQUENCE {
  cqi-ReportModeAperiodic-r10 CQI-ReportModeAperiodic-r10 OPTIONAL, -- Need OR
  nomPDSCH-RS-EPRE-Offset-r10 INTEGER (-1..6),
  cqi-ReportPeriodicSCell-r10 CQI-ReportPeriodic-r10 OPTIONAL, -- Need ON
  pmi-RI-Report-r10 ENUMERATED {setup} OPTIONAL -- Cond PMIRISCell
}

CQI-ReportPeriodic ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    cqi-PUCCH-ResourceIndex INTEGER (0..1185),
    cqi-pmi-ConfigIndex INTEGER (0..1023),
    cqi-FormatIndicatorPeriodic CHOICE {
      ...
CQI-ReportPeriodic-r10 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    cqi-PUCCH-ResourceIndex-r10 INTEGER (0..1184),
    cqi-PUCCH-ResourceIndexP1-r10 INTEGER (0..1184) OPTIONAL, -- Need OR
    cqi-pmi-ConfigIndex INTEGER (0..1023),
    cqi-FormatIndicatorPeriodic-r10 CHOICE {
      widebandCQI-r10 SEQUENCE {
        csi-ReportMode-r10 ENUMERATED {submode1, submode2} OPTIONAL -- Need OR
      },
      subbandCQI-r10 SEQUENCE {
        k INTEGER (1..4),
        periodicityFactor-r10 ENUMERATED {n2, n4}
      }
    },
    ri-ConfigIndex INTEGER (0..1023) OPTIONAL, -- Need OR
    simultaneousAckNackAndCQI BOOLEAN,
    cqi-Mask-r9 ENUMERATED {setup} OPTIONAL, -- Need OR
  }
  csi-ConfigIndex-r10 CHOICE {
    release NULL,
    setup SEQUENCE {
      cqi-pmi-ConfigIndex2-r10 INTEGER (0..1023),
      ri-ConfigIndex2-r10 INTEGER (0..1023) OPTIONAL -- Need OR
    }
  }
} OPTIONAL -- Need ON
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-ReportModeAperiodic ::= ENUMERATED {
  rm12, rm20, rm22, rm30, rm31,
  spare3, spare2, spare1
}

-- ASN1STOP
CQI-ReportConfig field descriptions

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 and trigger2 corresponds to the CSI request field 11, see TS 36.213 [23, table 7.2.1-1A]. 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. One value applies for all serving cells (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 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 ICQI/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.

cqi-pmi-ConfigIndex2
Parameter: CQI/PMI Periodicity and Offset Configuration Index ICQI/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.

cqi-PUSCH-ResourceIndex, cqi-PUSCH-ResourceIndexP1
Parameter, see TS 36.213 [23, 7.2]. E-UTRAN does not apply value 1185.

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 configured for the PCell when the transmission bandwidth of the PCell in downlink is 6 resource blocks.

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-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].

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: Δ offset, see TS 36.213 [23, 7.2.3]. Actual value = IE value * 2 [dB].

periodicityFactor
Parameter: H', see TS 36.213 [23, 7.2.2].

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 or tm9.

ri-ConfigIndex
Parameter: RI Config Index IRI, see TS 36.213 [23, 7.2.2-1B]. 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.

ri-ConfigIndex2
Parameter: RI Config Index IRI, see TS 36.213 [23, 7.2.2-1B]. The parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet2. E-UTRAN configures ri-ConfigIndex2 only if ri-ConfigIndex is configured.

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. For SCells this field is not applicable and the UE shall ignore the value.
### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>cqi-Setup</td>
<td>The field is optional present, need OR, if the cqi-ReportPeriodic in 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 and the UE takes no action i.e. continues to use the existing value, if previously configured.</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 and the UE takes no action i.e. continues to use the existing value, if previously configured.</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-ReportModeAperiodic is included in the CQI-ReportConfig-r10, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present and the UE takes no action i.e. continues to use the existing value, if previously configured.</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 and the UE takes no action i.e. continues to use the existing value, if previously configured.</td>
</tr>
</tbody>
</table>

### CrossCarrierSchedulingConfig

The IE CrossCarrierSchedulingConfig is used to specify the configuration when the cross carrier scheduling is used in a cell.

**CrossCarrierSchedulingConfig information elements**

```plaintext
-- ASN1START

CrossCarrierSchedulingConfig-r10 ::= SEQUENCE {
  schedulingCellInfo-r10 CHOICE {
    own-r10 SEQUENCE {
      cif-Presence-r10 BOOLEAN -- No cross carrier scheduling
    },
    other-r10 SEQUENCE {
      schedulingCellId-r10 ServCellIndex-r10,
      pdsch-Start-r10 INTEGER (1..4)
    }
  }
}

-- ASN1STOP
```
CrossCarrierSchedulingConfig field descriptions

cif-Presence
The field is used to indicate whether carrier indicator field is present (value TRUE) or not (value FALSE) in PDCCH DCI formats, see TS 36.212 [22, 5.3.3.1].

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.

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

CSI-RS-Config-r10 ::= SEQUENCE {
  csi-RS-r10                   CHOICE {
    release      NULL,
    setup        SEQUENCE {
      antennaPortsCount-r10     ENUMERATED {an1, an2, an4, an8},
      resourceConfig-r10        INTEGER (0..31),
      subframeConfig-r10        INTEGER (0..154),
      p-C-r10                   INTEGER (-8..15),
    }
  } OPTIONAL, -- Need ON
  zeroTxPowerCSI-RS-r10       CHOICE {
    release      NULL,
    setup        SEQUENCE {
      zeroTxPowerResourceConfigList-r10 BIT STRING (SIZE (16)),
      zeroTxPowerSubframeConfig-r10 INTEGER (0..154)
    }
  } OPTIONAL -- Need ON
}

-- ASN1STOP
CSI-RS-Config field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>antennaPortsCount</td>
<td>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].</td>
</tr>
<tr>
<td>p-C</td>
<td>Parameter: $P_c$, see TS 36.213 [23, 7.2.5].</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].</td>
</tr>
<tr>
<td>subframeConfig</td>
<td>Parameter: $I_{CSI-RS}$, see TS 36.211 [21, table 6.10.5.3-1].</td>
</tr>
<tr>
<td>zeroTxPowerResourceConfigList</td>
<td>Parameter: ZeroPowerCSI-RS, see TS 36.211 [21, 6.10.5.2].</td>
</tr>
</tbody>
</table>

– DRB-Identity

The IE DRB-Identity is used to identify a DRB used by a UE.

**DRB-Identity information elements**

-- ASN1START

DRB-Identity ::= INTEGER (1..32)

-- ASN1STOP

– LogicalChannelConfig

The IE LogicalChannelConfig is used to configure the logical channel parameters.

**LogicalChannelConfig information element**

-- ASN1START

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 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].

**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.

<table>
<thead>
<tr>
<th>Conditional presence</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>

---

**MAC-MainConfig**

The IE *MAC-MainConfig* is used to specify the MAC main configuration for signalling and data radio bearers.

**MAC-MainConfig** information element

-- ASN1START

```
MAC-MainConfig ::= SEQUENCE {
  ul-SCH-Config SEQUENCE {
    maxHARQ-Tx ENUMERATED {
      n1, n2, n3, n4, n5, n6, n7, n8,
      n10, n12, n16, n20, n24, n28,
      spare2, spare1 } OPTIONAL, -- Need ON
    periodicBSR-Timer ENUMERATED {
      sf5, sf10, sf16, sf20, sf32, sf40, sf64, sf80,
      sf128, sf160, sf320, sf640, sf1280, sf2560,
    }
  }
}
```
infinity, spare1} OPTIONAL, -- Need ON

  retxBSR-Timer ENUMERATED {
sf320, sf640, sf1280, sf2560, sf5120,
sf10240, spare2, spare1},

  ttiBundling BOOLEAN
}

} OPTIONAL, -- Need ON
drx-Config DRX-Config OPTIONAL, -- Need ON
timeAlignmentTimerDedicated TimeAlignmentTimer,

phr-Config CHOICE {
  release NULL,
  setup SEQUENCE {
    periodicPHR-Timer ENUMERATED {sf10, sf20, sf50, sf100, sf200,
                               sf500, sf1000, infinity},

    prohibitPHR-Timer ENUMERATED {sf0, sf10, sf20, sf50, sf100,
                                sf200, sf500, sf1000},

    dl-PathlossChange ENUMERATED {dB1, dB3, dB6, infinity}
  }
}

} OPTIONAL, -- Need ON

...,
[[ sr-ProhibitTimer-r9 INTEGER (0..7) OPTIONAL -- Need ON ]],
[[ mac-MainConfig-v1020 SEQUENCE {
    sCellDeactivationTimer-r10 ENUMERATED {rf2, rf4, rf8, rf16, rf32, rf64, rf128,
                                           spare} OPTIONAL, -- Need OP

    extendedBSR-Sizes-r10 ENUMERATED {setup} OPTIONAL, -- Need OR

    extendedPHR-r10 ENUMERATED {setup} OPTIONAL -- Need OR

  ]]
]

}]

DRX-Config ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    onDurationTimer ENUMERATED {

  }}
psf1, psf2, psf3, psf4, psf5, psf6,
psf8, psf10, psf20, psf30, psf40,
psf50, psf60, psf80, psf100,
psf200},

drx-InactivityTimer    ENUMERATED {
    psf1, psf2, psf3, psf4, psf5, psf6,
    psf8, psf10, psf20, psf30, psf40,
    psf50, psf60, psf80, psf100,
    psf200, psf300, psf500, psf750,
    psf1280, psf1920, psf2560, psf0-v1020,
    spare9, spare8, spare7, spare6,
    spare5, spare4, spare3, spare2,
    spare1},

drx-RetransmissionTimer    ENUMERATED {
    psf1, psf2, psf4, psf6, psf8, psf16,
    psf24, psf33},

longDRX-CycleStartOffset  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),
    sf640   INTEGER(0..639),
    sf1024  INTEGER(0..1023),
    sf1280  INTEGER(0..1279),
    sf2048  INTEGER(0..2047),
    sf2560  INTEGER(0..2559)
},

shortDRX        SEQUENCE {

shortDRX-Cycle ENUMERATED {
    sf2, sf5, sf8, sf10, sf16, sf20,
    sf32, sf40, sf64, sf80, sf128, sf160,
    sf256, sf320, sf512, sf640},

    drxShortCycleTimer INTEGER (1..16)
} OPTIONAL -- Need OR

-- ASN1STOP
### MAC-MainConfig field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>dl-PathlossChange</strong></td>
<td>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).</td>
</tr>
<tr>
<td><strong>drx-InactivityTimer</strong></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.</td>
</tr>
<tr>
<td><strong>drx-RetransmissionTimer</strong></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.</td>
</tr>
<tr>
<td><strong>drxShortCycleTimer</strong></td>
<td>Timer for DRX in TS 36.321 [6]. Value in multiples of shortDRX-Cycle. A value of 1 corresponds to shortDRX-Cycle, a value of 2 corresponds to 2 * shortDRX-Cycle and so on.</td>
</tr>
<tr>
<td><strong>extendedBSR-Sizes</strong></td>
<td>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].</td>
</tr>
<tr>
<td><strong>extendedPHR</strong></td>
<td>Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value setup). Otherwise the power headroom shall be reported using the Power Headroom Report MAC control element defined in TS 36.321 [6]. E-UTRAN always configures the value setup if more than one Serving Cell with uplink is configured. E-UTRAN configures extendedPHR only if phr-Config is configured. The UE shall release extendedPHR if phr-Config is released.</td>
</tr>
<tr>
<td><strong>longDRX-CycleStartOffset</strong></td>
<td>longDRX-Cycle and drxStartOffset in TS 36.321 [6]. 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.</td>
</tr>
<tr>
<td><strong>maxHARQ-Tx</strong></td>
<td>Maximum number of transmissions for UL HARQ in TS 36.321 [6].</td>
</tr>
<tr>
<td><strong>onDurationTimer</strong></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.</td>
</tr>
<tr>
<td><strong>periodicBSR-Timer</strong></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><strong>periodicPHR-Timer</strong></td>
<td>Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.</td>
</tr>
<tr>
<td><strong>prohibitPHR-Timer</strong></td>
<td>Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes, sf100 corresponds to 100 subframes and so on.</td>
</tr>
<tr>
<td><strong>retxBSR-Timer</strong></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><strong>sCellDeactivationTimer</strong></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. 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 (although the associated functionality is performed independently for each SCell).</td>
</tr>
<tr>
<td><strong>shortDRX-Cycle</strong></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.</td>
</tr>
<tr>
<td><strong>sr-ProhibitTimer</strong></td>
<td>Timer for SR transmission on PUCCH in TS 36.321 [6]. Value in number of SR period(s). Value 0 means no timer for SR transmission on PUCCH is configured. Value 1 corresponds to one SR period, Value 2 corresponds to 2 * SR periods and so on.</td>
</tr>
<tr>
<td><strong>ttiBundling</strong></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. For TDD, E-UTRAN does not simultaneously enable TTI bundling and semi-persistent scheduling in this release of specification. Furthermore, E-UTRAN does not simultaneously configure TTI bundling and SCells with configured uplink.</td>
</tr>
</tbody>
</table>
-- PDCP-Config

The IE PDCP-Config is used to set the configurable PDCP parameters for data radio bearers.

**PDCP-Config information element**

```plaintext
-- ASN1START

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 SEQUENCE {
        profile0x0001 BOOLEAN,
        profile0x0002 BOOLEAN,
        profile0x0003 BOOLEAN,
        profile0x0004 BOOLEAN,
        profile0x0006 BOOLEAN,
        profile0x0101 BOOLEAN,
        profile0x0102 BOOLEAN,
        profile0x0103 BOOLEAN,
        profile0x0104 BOOLEAN,
      }
    }
  }
}
```

```plaintext
-- ASN1END
```
**PDCP-Config field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>discartTimger</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>maxCID</td>
<td>Indicates the value of the MAX_CID parameter as specified in TS 36.323 [8].</td>
</tr>
<tr>
<td>pdcp-SN-Size</td>
<td>Indicates the PDCP Sequence Number length in bits. Value len7bits means that the 7-bit PDCP SN format is used and len12bits means that the 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.</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 as specified in TS 36.323 [8].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditional presence</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 for a radio bearer configured with RLC AM. 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. 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>
</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**

```
PDSCH-ConfigCommon ::= SEQUENCE {
  referenceSignalPower    INTEGER (-60..50),
  p-b                     INTEGER (0..3)
}
```
PDSCH-ConfigDedicated ::= SEQUENCE {
  p-a ENUMERATED {
    dB-6, dB-4.77, dB-3, dB-1.77,
    dB0, dB1, dB2, dB3
  }
}

-- ASN1STOP

--- PDSCH-Config field descriptions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>p-a</td>
<td>Parameter: $P_A$, see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4.77 corresponds to -4.77 dB etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>p-b</td>
<td>Parameter: $P_B$, see TS 36.213 [23, Table 5.2-1].</td>
</tr>
</tbody>
</table>

--- PHICH-Config

The IE PHICH-Config is used to specify the PHICH configuration.

--- PHICH-Config information element

-- ASN1START

PHICH-Config ::= SEQUENCE {
  phich-Duration ENUMERATED {normal, extended},
  phich-Resource ENUMERATED {oneSixth, half, one, two}
}

-- ASN1STOP

--- PHICH-Config field descriptions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>phich-Duration</td>
<td>Parameter: PHICH-Duration, see TS 36.211 [21, Table 6.9.3-1].</td>
</tr>
<tr>
<td>phich-Resource</td>
<td>Parameter: $Ng$, see TS 36.211 [21, 6.9]. Value oneSixth corresponds to 1/6, half corresponds to 1/2 and so on.</td>
</tr>
</tbody>
</table>

--- PhysicalConfigDedicated

The IE PhysicalConfigDedicated is used to specify the UE specific physical channel configuration.
## PhysicalConfigDedicated information element

```
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-r8
soundingRS-UL-ConfigDedicated SoundingRS-UL-ConfigDedicated OPTIONAL,  -- Need ON
antennaInfo               CHOICE {
    explicitValue   AntennaInfoDedicated,
    defaultValue   NULL
} OPTIONAL,  -- Cond AI-r8
schedulingRequestConfig   SchedulingRequestConfig OPTIONAL,  -- Need ON

} OPTIONAL,  -- Cond AI-r8

[[ cqi-ReportConfig-v920 CQI-ReportConfig-v920 OPTIONAL,  -- Cond CQI-r8
    antennaInfo-v920 AntennaInfoDedicated-v920 OPTIONAL  -- Cond AI-r8
]]

[[ antennaInfo-r10 CHOICE {
    explicitValue-r10 AntennaInfoDedicated-r10,
    defaultValue   NULL
} OPTIONAL,  -- Cond AI-r10

antennaInfoUL-r10 AntennaInfoUL-r10 OPTIONAL,  -- Need ON
cif-Presence-r10 BOOLEAN OPTIONAL,  -- Need ON
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
}
```
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
}]]
}

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
    pdsch-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, -- Need ON
    uplinkPowerControlDedicatedSCell-r10 UplinkPowerControlDedicatedSCell-r10 OPTIONAL, -- Need ON
    cqi-ReportConfigSCell-r10   CQI-ReportConfigSCell-r10 OPTIONAL, -- Need ON
    soundingRS-UL-ConfigDedicated-r10 SoundingRS-UL-ConfigDedicated OPTIONAL, -- Need ON
    soundingRS-UL-ConfigDedicated-v1020 SoundingRS-UL-ConfigDedicated-v1020 OPTIONAL, -- Need ON
    soundingRS-UL-ConfigDedicatedAperiodic-r10 SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL -- Need ON
  } OPTIONAL, -- Cond CommonUL
...
**PhysicalConfigDedicated field descriptions**

<table>
<thead>
<tr>
<th>field descriptions</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>additionalSpectrumEmissionPCell</td>
<td>E-UTRAN does not configure this field in this release of the specification.</td>
</tr>
<tr>
<td>antennaInfo</td>
<td>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.</td>
</tr>
<tr>
<td>tpc-PDCCH-ConfigPUCCH</td>
<td>PDCCH configuration for power control of PUCCH using format 3/3A, see TS 36.212 [22].</td>
</tr>
<tr>
<td>tpc-PDCCH-ConfigPUSCH</td>
<td>PDCCH configuration for power control of PUSCH using format 3/3A, see TS 36.212 [22].</td>
</tr>
</tbody>
</table>

<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 antennaInfoDedicated-r10 is absent. Otherwise the field is not present</td>
</tr>
<tr>
<td>AI-r10</td>
<td>The field is optionally present, need ON, if antennaInfoDedicated is absent. Otherwise the field is not present</td>
</tr>
<tr>
<td>CommonUL</td>
<td>The field is mandatory present if ul-Configuration of RadioResourceConfigCommonSCell-r10 is present; otherwise it is optional, need ON.</td>
</tr>
<tr>
<td>CQI-r8</td>
<td>The field is optionally present, need ON, if cqi-ReportConfig-r10 is absent. Otherwise the field is not present</td>
</tr>
<tr>
<td>CQI-r10</td>
<td>The field is optionally present, need ON, if cqi-ReportConfig is absent. Otherwise the field is not present</td>
</tr>
<tr>
<td>SCellAdd</td>
<td>The field is mandatory present if cellIdentification 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 $P_{\text{EMAX}}$ or $P_{\text{MAX}}$ 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].

**P-Max information element**

---

**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

-- ASN1START

PRACH-ConfigSIB ::= SEQUENCE {
  rootSequenceIndex     INTEGER (0..837),
  prach-ConfigInfo     PRACH-ConfigInfo
}

PRACH-Config ::= SEQUENCE {
  rootSequenceIndex     INTEGER (0..837),
  prach-ConfigInfo     PRACH-ConfigInfo     OPTIONAL  -- Need ON
}

PRACH-ConfigSCell-r10 ::= SEQUENCE {
  prach-ConfigIndex-r10     INTEGER (0..63)
}

PRACH-ConfigInfo ::= SEQUENCE {
  prach-ConfigIndex     INTEGER (0..63),
  highSpeedFlag       BOOLEAN,
  zeroCorrelationZoneConfig   INTEGER (0..15),
  prach-FreqOffset     INTEGER (0..94)
}

-- ASN1STOP

PRACH-Config field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>highSpeedFlag</td>
<td>Parameter: High-speed-flag, see TS 36.211, [21, 5.7.2]. TRUE corresponds to Restricted set and FALSE to Unrestricted set.</td>
</tr>
<tr>
<td>prach-ConfigIndex</td>
<td>Parameter: prach-ConfigurationIndex, see TS 36.211 [21, 5.7.1].</td>
</tr>
<tr>
<td>prach-FreqOffset</td>
<td>Parameter: prach-FrequencyOffset, see TS 36.211, [21, 5.7.1]. For TDD the value range is dependent on the value of prach-ConfigIndex.</td>
</tr>
<tr>
<td>rootSequenceIndex</td>
<td>Parameter: RACH_ROOT_SEQUENCE, see TS 36.211 [21, 5.7.1].</td>
</tr>
<tr>
<td>zeroCorrelationZoneConfig</td>
<td>Parameter: NCS 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.</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**

```
-- ASN1START

PresenceAntennaPort1 ::= BOOLEAN

-- ASN1STOP
```

– **PUCCH-Config**

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**

```
-- 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-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  
  
  format3-r10  SEQUENCE {
    n3PUCCH-AN-List-r10  SEQUENCE (SIZE (1..4)) OF INTEGER (0..549)  OPTIONAL, -- Need ON
    twoAntennaPortActivatedPUCCH-Format3-r10  
      \n      CHOICE {
        release  NULL,
        setup  SEQUENCE {
          n3PUCCH-AN-ListP1-r10  SEQUENCE (SIZE (1..4)) OF INTEGER (0..549)
        }
      }
  }

  channelSelection-r10  SEQUENCE {
    n1PUCCH-AN-CS-r10  
      \n      CHOICE {
        release  NULL,
        setup  SEQUENCE {
          n1PUCCH-AN-CS-List-r10  SEQUENCE (SIZE (1..2)) OF N1PUCCH-AN-CS-r10
        }
      }
  }

  twoAntennaPortActivatedPUCCH-Format1a1b-r10  ENUMERATED {true}  OPTIONAL, -- Need OR
  simultaneousPUCCH-PUSCH-r10  ENUMERATED {true}  OPTIONAL, -- Need OR
  n1PUCCH-AN-RepP1-r10  INTEGER (0..2047)  OPTIONAL -- Need OR
}

N1PUCCH-AN-CS-r10 ::= SEQUENCE (SIZE (1..4)) OF INTEGER (0..2047)

-- ASN1STOP
### PUCCH-Config field descriptions

#### ackNackRepetition
Parameter indicates whether ACK/NACK repetition is configured, see TS 36.213 [23, 10.1].

#### deltaPUCCH-Shift
Parameter: $\Delta_{\text{PUCCH}}$, see 36.211 [21, 5.4.1], where ds1 corresponds to value 1 ds2 to 2 etc.

#### n1PUCCH-AN
Parameter: $N_{\text{PUCCH}}^{(1)}$, see TS 36.213 [23, 10.1].

#### n1PUCCH-AN-CS-List
Parameter: $n_{\text{PUCCH}}^{(1)}$, for PUCCH format 1b with channel selection, see TS 36.213 [23, 10.1.2.1, 10.1.3.2.1].

#### n1PUCCH-AN-Rep, n1PUCCH-AN-RepP1
Parameter: $n_{\text{PUCCH, ANRep}}^{(1, P)}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1].

#### n3PUCCH-AN-List, n3PUCCH-AN-ListP1
Parameter: $n_{\text{PUCCH}}^{(3, P)}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1].

#### nCS-An
Parameter: $N_{\text{cs}}^{(1)}$, see TS 36.211 [21, 5.4].

#### nRB-CQI
Parameter: $N_{\text{RB}}^{(2)}$, see TS 36.211 [21, 5.4].

#### 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 $\text{channelSelection}$ 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.

#### repetitionFactor
Parameter $N_{\text{ANRep}}$, 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, only when the nonContiguousUL-RA-WithinCC-Info is set to supported in the band on which PCell is configured.

#### tddAckNackFeedbackMode
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].

### Conditional presence

<table>
<thead>
<tr>
<th>Condition</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDD</td>
<td>The field is mandatory present for TDD if the pucch-Format is not present. If the pucch-Format is present, the field is not present. It is not present for FDD and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

---

### 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

---

-- ASN1START

PUSCH-ConfigCommon ::= SEQUENCE {

-- ASN1END
pusch-ConfigBasic ::= SEQUENCE {
    n-SB               INTEGER (1..4),
    hoppingMode       ENUMERATED {interSubFrame, intraAndInterSubFrame},
    pusch-HoppingOffset INTEGER (0..98),
    enable64QAM       BOOLEAN
},
ul-ReferenceSignalsPUSCH  UL-ReferenceSignalsPUSCH
}

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-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)
### PUSCH-Config field descriptions

#### betaOffset-ACK-Index, betaOffset-ACK-Index-MC

Parameter: $I_{\text{offset}}^{\text{ACK}}$, for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-1]. One value applies for all serving cells with an uplink (the associated functionality is common i.e. not performed independently for each cell).

#### betaOffset-CQI-Index, betaOffset-CQI-Index-MC

Parameter: $I_{\text{offset}}^{\text{CQI}}$, for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-3]. One value applies for all serving cells with an uplink (the associated functionality is common i.e. not performed independently for each cell).

#### betaOffset-RI-Index, betaOffset-RI-Index-MC

Parameter: $I_{\text{offset}}^{\text{RI}}$, 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 (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].

#### enable64QAM

See TS 36.213 [23, 8.6.1]. TRUE indicates that 64QAM is allowed while FALSE indicates that 64QAM is not allowed.

#### 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].

#### n-SB

Parameter: N_{sb}, see TS 36.211 [21, 5.3.4].

#### pusch-hoppingOffset

Parameter: $N_{\text{RB}}^{\text{HO}}$, see TS 36.211 [21, 5.3.4].

#### sequenceHoppingEnabled

Parameter: Sequence-hopping-enabled, see TS 36.211 [21, 5.5.1.4].

---

### RACH-ConfigCommon

The IE `RACH-ConfigCommon` is used to specify the generic random access parameters.

#### RACH-ConfigCommon information element

-- ASN1START

```
RACH-ConfigCommon ::= SEQUENCE {
  preambleInfo SEQUENCE {
    numberOfRA-Preambles ENUMERATED {
      n4, n8, n12, n16, n20, n24, n28,
    }
  }
}

-- ASN1STOP
```
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
},
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}
},
ra-SupervisionInfo SEQUENCE {
  preambleTransMax ENUMERATED {
    n3, n4, n5, n6, n7, n8, n10, n20, n50,
n100, n200},
  ra-ResponseWindowSize ENUMERATED {
    sf2, sf3, sf4, sf5, sf6, sf7,
    sf8, sf10},
  mac-ContentionResolutionTimer ENUMERATED {
    sf8, sf16, sf24, sf32, sf40, sf48,
    sf56, sf64}
},
maxHARQ-Msg3Tx INTEGER (1..8),
...
### RACH-ConfigCommon field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>mac-ContentionResolutionTimer</strong>&lt;br&gt;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><strong>maxHARQ-Msg3Tx</strong>&lt;br&gt;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><strong>messagePowerOffsetGroupB</strong>&lt;br&gt;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><strong>messageSizeGroupA</strong>&lt;br&gt;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><strong>numberOfRA-Preambles</strong>&lt;br&gt;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><strong>powerRampingStep</strong>&lt;br&gt;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><strong>preambleInitialReceivedTargetPower</strong>&lt;br&gt;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><strong>preamblesGroupAConfig</strong>&lt;br&gt;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><strong>preambleTransMax</strong>&lt;br&gt;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><strong>ra-ResponseWindowSize</strong>&lt;br&gt;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.</td>
</tr>
<tr>
<td><strong>sizeOfRA-PreamblesGroupA</strong>&lt;br&gt;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
RACH-ConfigDedicated ::= SEQUENCE {
  ra-PreambleIndex     INTEGER (0..63),
  ra-PRACH-MaskIndex   INTEGER (0..15)
}
```
RACH-ConfigDedicated field descriptions

<table>
<thead>
<tr>
<th>ra-PRACH-MaskIndex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explicitly signalled PRACH Mask Index for RA Resource selection in TS 36.321 [6].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ra-PreambleIndex</th>
</tr>
</thead>
</table>

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,"
  pcch-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
    ]
}

RadioResourceConfigCommon ::=  SEQUENCE {
  rach-ConfigCommon     RACH-ConfigCommon     OPTIONAL, -- Need ON
  prach-Config          PRACH-Config,"
  pdsch-ConfigCommon    PDSCH-ConfigCommon    OPTIONAL, -- Need ON
  pusch-ConfigCommon    PUSCH-ConfigCommon    OPTIONAL, -- Need ON
  phich-Config          PHICH-Config          OPTIONAL, -- Need ON
  pucch-ConfigCommon    PUCCH-ConfigCommon    OPTIONAL, -- Need ON
  soundingRS-UL-ConfigCommon   SoundingRS-UL-ConfigCommon   OPTIONAL, -- Need ON
```
RadioResourceConfigCommonSCell-r10 ::= SEQUENCE {
    -- DL configuration as well as configuration applicable for DL and UL
    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 TDDSCell
    },
    -- 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
    }
}

-- 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
pusch-ConfigCommon-r10    PUSCH-ConfigCommon

}    OPTIONAL, -- Need OR

....
[[
ul-CarrierFreq-v1090    ARFCN-ValueEUTRA-v9e0    OPTIONAL    -- Need OP
]]


BCCH-Config ::=    SEQUENCE {
    modificationPeriodCoeff    ENUMERATED {n2, n4, n8, n16}
}

PCCH-Config ::=    SEQUENCE {
    defaultPagingCycle    ENUMERATED {
        rf32, rf64, rf128, rf256},
    nB    ENUMERATED {
        fourT, twoT, oneT, halfT, quarterT, oneEighthT,
        oneSixteenthT, oneThirtySecondT}
}

UL-CyclicPrefixLength ::=    ENUMERATED {len1, len2}

-- ASN1STOP
RadioResourceConfigCommon field descriptions

**additionalSpectrumEmissionSCell**
The UE requirements related to IE 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.

**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 and n16 corresponds to value 16.

**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.

**p-Max**
Pmax to be used in the target cell. If absent the UE applies the maximum power according to the UE capability.

**ul-Bandwidth**
Parameter: transmission bandwidth configuration, N_{RB}, 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 36.211 [21, 5.2.1] where len1 corresponds to normal cyclic prefix and len2 corresponds to extended cyclic prefix.

---

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

---

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
}
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {
   -- UE specific configuration extensions applicable for an SCell
   physicalConfigDedicatedSCell-r10  PhysicalConfigDedicatedSCell-r10 OPTIONAL, -- Need ON
   ...
}

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
   drb-Identity           DRB-Identity,
   ...
}
RadioResourceConfigDedicated field descriptions

**logicalChannelConfig**
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.

**logicalChannelIdentity**
The logical channel identity for both UL and DL.

**mac-MainConfig**
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 "defaultValue".

**measSubframePatternPCell**
Time domain measurement resource restriction pattern for the PCell measurements (RSRP, RSRQ and the radio link
monitoring).

**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 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 UM RLC SN field size only upon handover within E-UTRA or upon the first
reconfiguration after RRC connection re-establishment.

**sps-Config**
The default SPS configuration is specified in 9.2.3. Except for handover or releasing SPS, E-UTRAN does not
reconfigure sps-Config when there is a configured downlink assignment or a configured uplink grant (see 36.321 [6]).

**srb-Identity**
Value 1 is applicable for SRB1 only.
Value 2 is applicable for SRB2 only.
## Conditional Presence

<table>
<thead>
<tr>
<th>Conditional Presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<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>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; otherwise the field is optionally present, need ON. Upon connection establishment/ re-establishment only SRB1 is applicable.</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 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; In case of RRC connection establishment and RRC connection re-establishment the field is not present; 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 handover within E-UTRA and upon the first reconfiguration after re-establishment but in both these cases only when fullConfig is not included in the RRCConnectionReconfiguration message; 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>
</tbody>
</table>

---

### 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
    },
    ...
  }
```
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,
  ms230, ms235, ms240, ms245, ms250, ms300,
  ms350, ms400, ms450, ms500, spare9, spare8,
  spare7, spare6, spare5, spare4, spare3,
PollPDU ::= ENUMERATED {
  p4, p8, p16, p32, p64, p128, p256, pInfinity}

PollByte ::= ENUMERATED {
  kB25, kB50, kB75, kB100, kB125, kB250, kB375,
  kB500, kB750, kB1000, kB1250, kB1500, kB2000,
  kB3000, kBInfinity, spare1}

T-Reordering ::= ENUMERATED {
  ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35,
  ms40, ms45, ms50, ms55, ms60, ms65, ms70,
  ms75, ms80, ms85, ms90, ms95, ms100, ms110,
  ms120, ms130, ms140, ms150, ms160, ms170,
  ms180, ms190, ms200, spare1}

T-StatusProhibit ::= ENUMERATED {
  ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35,
  ms40, ms45, ms50, ms55, ms60, ms65, ms70,
  ms75, ms80, ms85, ms90, ms95, ms100, ms105,
  ms110, ms115, ms120, ms125, ms130, ms135,
  ms140, ms145, ms150, ms155, ms160, ms165,
  ms170, ms175, ms180, ms185, ms190, ms195,
  ms200, ms205, ms210, ms215, ms220, ms225,
  ms230, ms235, ms240, ms245, ms250, ms300,
  ms350, ms400, ms450, ms500, spare8, spare7,
  spare6, spare5, spare4, spare3, spare2,
  spare1}

-- ASN1STOP
### RLC-Config field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxRetxThreshold</td>
<td>Parameter for RLC AM in TS 36.322 [7]. Value t1 corresponds to 1 retransmission, t2 to 2 retransmissions and so on.</td>
</tr>
<tr>
<td>pollByte</td>
<td>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.</td>
</tr>
<tr>
<td>pollPDU</td>
<td>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.</td>
</tr>
<tr>
<td>sn-FieldLength</td>
<td>Indicates the UM RLC SN field size, see TS 36.322 [7], in bits. Value size5 means 5 bits, size10 means 10 bits.</td>
</tr>
<tr>
<td>t-PollRetransmit</td>
<td>Timer for RLC AM in TS 36.322 [7], in milliseconds. Value ms5 means 5ms, ms10 means 10ms and so on.</td>
</tr>
<tr>
<td>t-Reordering</td>
<td>Timer for reordering in TS 36.322 [7], in milliseconds. Value ms0 means 0ms, ms5 means 5ms and so on.</td>
</tr>
<tr>
<td>t-StatusProhibit</td>
<td>Timer for status reporting in TS 36.322 [7], in milliseconds. Value ms0 means 0ms, ms5 means 5ms and so on.</td>
</tr>
</tbody>
</table>

---

### RLF-TimersAndConstants

The IE `RLF-TimersAndConstants` contains UE specific timers and constants applicable for UEs in RRC_CONNECTED.

#### RLF-TimersAndConstants information element

```asn1
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 field descriptions

<table>
<thead>
<tr>
<th>n3xy</th>
<th>Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on.</th>
</tr>
</thead>
<tbody>
<tr>
<td>t3xy</td>
<td>Timers are described in section 7.3. Value ms0 corresponds with 0 ms, ms50 corresponds with 50 ms and so on.</td>
</tr>
</tbody>
</table>

---

**– RN-SubframeConfig**

The IE *RN-SubframeConfig* is used to specify the subframe configuration for an RN.

**RN-SubframeConfig information element**

```asn1
RN-SubframeConfig-r10 ::= SEQUENCE {
    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 {
        channelSelectionMultiplexingBundling  SEQUENCE {
            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
    }
}  }
**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 interleaving corresponds to cross-interleaving and value noInterleaving corresponds to no cross-interleaving according to TS 36.216 [55, 7.4.2 and 7.4.3].

*n1PUCCH-AN-List*
Parameter: \( n_{\text{PUCCH}}^{(i)} \), 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: \( n_{\text{PUCCH}}^{(i,p)} \) 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**

```asn1
SchedulingRequestConfig ::= CHOICE {
  release         NULL,
  setup           SEQUENCE {
    sr-PUCCH-ResourceIndex    INTEGER (0..2047),
    sr-ConfigIndex      INTEGER (0..157),
    dsr-TransMax      ENUMERATED {
      n4, n8, n16, n32, n64, spare3, spare2, spare1}
  }
}

SchedulingRequestConfig-v1020 ::= SEQUENCE {
  ...
}
```
sr-PUCCH-ResourceIndexP1-r10 INTEGER (0..2047) OPTIONAL -- Need OR

SchedulingRequestConfig field descriptions

dsr-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.

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: $n^{(1,p)}_{PUCCH,SRI}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1]. E-UTRAN 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

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-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,--Need ON
srs-ActivateAp-r10 CHOICE {
release NULL,
setup SEQUENCE {
srs-ConfigApDCI-Format0-r10 SRS-ConfigAp-r10,
srs-ConfigApDCI-Format1a2b2c-r10 SRS-ConfigAp-r10,
...
}
} 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}
SoundingRS-UL-Config field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ackNackSRS-SimultaneousTransmission</td>
<td></td>
<td>Parameter: Simultaneous-AN-and-SRS, see TS 36.213 [23, 8.2]. For SCells this field is not applicable and the UE shall ignore the value.</td>
</tr>
<tr>
<td>cyclicShift, cyclicShiftAp</td>
<td>n_SRS</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>
</tr>
<tr>
<td>duration</td>
<td></td>
<td>Parameter: Duration for periodic sounding reference signal transmission. See TS 36.213 [21, 8.2]. FALSE corresponds to ‘single’ and value TRUE to ‘indefinite’.</td>
</tr>
<tr>
<td>freqDomainPosition, freqDomainPositionAp</td>
<td>nRRC</td>
<td>Parameter: nRRC for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3.2].</td>
</tr>
<tr>
<td>srs-AntennaPort, srs-AntennaPortAp</td>
<td></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>
</tr>
<tr>
<td>srs-Bandwidth, srs-BandwidthAp</td>
<td>B_{SRS}</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>
</tr>
<tr>
<td>srs-BandwidthConfig</td>
<td></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>
</tr>
<tr>
<td>srs-HoppingBandwidth</td>
<td></td>
<td>Parameter: SRS hopping bandwidth ( b_{hop} \in {0,1,2,3} ) for periodic sounding reference signal transmission, see TS 36.211 [21, 5.5.3.2] where hbw0 corresponds to value 0, hbw1 to value 1 and so on.</td>
</tr>
<tr>
<td>srs-MaxUpPts</td>
<td></td>
<td>Parameter: srsMaxUpPts, see TS 36.211 [21, 5.5.3.2]. If this field is present, reconfiguration of ( n^{\text{max}}_{SRS,0} ) applies for UpPts, otherwise reconfiguration does not apply.</td>
</tr>
<tr>
<td>srs-SubframeConfig</td>
<td></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 to value 1 and so on.</td>
</tr>
<tr>
<td>transmissionComb, transmissionCombAp</td>
<td></td>
<td>Parameter: ( k_{TC} \in {0,1} ) for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3.2].</td>
</tr>
</tbody>
</table>

### Conditional presence

<table>
<thead>
<tr>
<th>Condition</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDD</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**

**ASN1START**

```
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
      }
    } OPTIONAL  -- Need ON
    ]]]
  }
}

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
...

N1PUCCH-AN-PersistentList := SEQUENCE (SIZE (1..4)) OF INTEGER (0..2047)

-- ASN1STOP
### SPS-Config field descriptions

**implicitReleaseAfter**  
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.

**n1PUCCH-AN-PersistentList , n1PUCCH-AN-PersistentListP1**  
List of parameter: $n_{PUCCH}^{(1,p)}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1]. Field n1PUCCH-AN-PersistentListP1 is applicable only if the twoAntennaPortActivatedPUCCH-Format1a1b in PUCCH-ConfigDedicated-v1020 is set to true. Otherwise the field is not configured.

**numberOfConfSPS-Processes**  
The number of configured HARQ processes for Semi-Persistent Scheduling, see TS 36.321 [6].

**p0-NominalPUSCH-Persistent**  
Parameter: $P_{O,NOMINAL,PUSCH}(0)$. 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 for p0-NominalPUSCH-Persistent.

**p0-UE-PUSCH-Persistent**  
Parameter: $P_{O,UE,PUSCH}(0)$. 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 for p0-UE-PUSCH-Persistent.

**semiPersistSchedC-RNTI**  
Semi-persistent Scheduling C-RNTI, see TS 36.321 [6].

**semiPersistSchedIntervalDL**  
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.

**semiPersistSchedIntervalUL**  
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.

**twoIntervalsConfig**  
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.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</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

```plaintext
-- ASN1START

TDD-Config ::= SEQUENCE {  
    subframeAssignment ENUMERATED {  
        sa0, sa1, sa2, sa3, sa4, sa5, sa6},  
    specialSubframePatterns ENUMERATED {  
        ssp0, ssp1, ssp2, ssp3, ssp4, ssp5, ssp6, ssp7,  
        ssp8}  
}

-- ASN1END
```
--- ASN1STOP

<table>
<thead>
<tr>
<th><strong>TDD-Config field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>specialSubframePatterns</strong></td>
</tr>
<tr>
<td>Indicates Configuration as in TS 36.211 [21, table 4.2-1] where ssp0 point to Configuration 0, ssp1 to Configuration 1 etc.</td>
</tr>
<tr>
<td><strong>subframeAssignment</strong></td>
</tr>
<tr>
<td>Indicates DL/UL subframe configuration where sa0 point to Configuration 0, sa1 to Configuration 1 etc. as specified in TS 36.211 [21, table 4.2-2]. One value applies for all serving cells (the associated functionality is common i.e. not performed independently for each cell)</td>
</tr>
</tbody>
</table>

---

**TimeAlignmentTimer**

The IE `TimeAlignmentTimer` is used to control how long the UE is considered 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. In this release of the specification, uplink time alignment is common for all serving cells.

**TimeAlignmentTimer information element**

--- ASN1START

```asn1
TimeAlignmentTimer ::=     ENUMERATED {
    sf500, sf750, sf1280, sf1920, sf2560, sf5120,
    sf10240, infinity}
```

--- ASN1STOP

---

**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-PDCCH-Config information element**

--- ASN1START

```asn1
TPC-PDCCH-Config ::=     CHOICE {
    release         NULL,
    setup           SEQUENCE {
        tpc-RNTI       BIT STRING (SIZE (16)),
        tpc-Index      TPC-Index
    }
}
```

--- ASN1STOP

```asn1
TPC-Index ::=       CHOICE {
```

---
indexOfFormat3       INTEGER (1..15),
indexOfFormat3A       INTEGER (1..31)
}

-- ASN1STOP

### TPC-PDCCH-Config field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>indexOfFormat3</td>
<td>Index of N when DCI format 3 is used. See TS 36.212 [22, 5.3.3.1.6].</td>
</tr>
<tr>
<td>indexOfFormat3A</td>
<td>Index of M when DCI format 3A is used. See TS 36.212 [22, 5.3.3.1.7].</td>
</tr>
<tr>
<td>tpcIndex</td>
<td>Index of N or M, see TS 36.212 [22, 5.3.3.1.6 and 5.3.3.1.7], where N or M is dependent on the used DCI format (i.e. format 3 or 3a).</td>
</tr>
<tr>
<td>tpc-RNTI</td>
<td>RNTI for power control using DCI format 3/3A, see TS 36.212 [22].</td>
</tr>
</tbody>
</table>

---

**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

```asn1
UplinkPowerControlCommon ::= SEQUENCE {
  p0-NominalPUSCH      INTEGER (-126..24),
  alpha                ENUMERATED {al0, al04, al05, al06, al07, al08, al09, al1},
  p0-NominalPUCCH      INTEGER (-127..-96),
  deltaFList-PUCCH     DeltaFList-PUCCH,
  deltaPreambleMsg3     INTEGER (-1..6)
}

UplinkPowerControlCommon-v1020 ::= SEQUENCE {
  deltaF-PUCCH-Format3-r10    ENUMERATED {deltaF-1, deltaF0, deltaF1, deltaF2, deltaF3, deltaF4, deltaF5, deltaF6},
  deltaF-PUCCH-Format1bCS-r10    ENUMERATED {deltaF1, deltaF2, spare2, spare1}
}

UplinkPowerControlCommonSCell-r10 ::= SEQUENCE {
  p0-NominalPUSCH-r10      INTEGER (-126..24),
```

---
alpha-r10 ENUMERATED {al0, al04, al05, al06, al07, al08, al09, al1}

UplinkPowerControlDedicated ::= SEQUENCE {
p0-UE-PUSCH INTEGER (-8..7),
deltaMCS-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
pSRS-OffsetAp-r10 INTEGER (0..15) OPTIONAL -- Need OR
}

UplinkPowerControlDedicatedSCell-r10 ::= SEQUENCE {
p0-UE-PUSCH-r10 INTEGER (-8..7),
deltaMCS-Enabled-r10 ENUMERATED {en0, en1},
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}
}

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, deltaF1, deltaF2},
deltaF-PUCCH-Format2a ENUMERATED {deltaF-2, deltaF0, deltaF2},
deltaF-PUCCH-Format2b ENUMERATED {deltaF-2, deltaF0, deltaF2}
```asn1
DeltaTxD-OffsetListPUCCH-r10 ::= SEQUENCE {
  deltaTxD-OffsetPUCCH-Format1-r10  ENUMERATED {dB0, dB-2},
  deltaTxD-OffsetPUCCH-Format1a1b-r10  ENUMERATED {dB0, dB-2},
  deltaTxD-OffsetPUCCH-Format22a2b-r10 ENUMERATED {dB0, dB-2},
  deltaTxD-OffsetPUCCH-Format3-r10  ENUMERATED {dB0, dB-2},
  ...
}
```

---

### UplinkPowerControl field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>accumulationEnabled</td>
<td>Parameter: Accumulation-enabled, see TS 36.213 [23, 5.1.1.1]. TRUE corresponds to 'enabled' whereas FALSE corresponds to 'disabled'.</td>
</tr>
<tr>
<td>alpha</td>
<td>Parameter: $\alpha$ See TS 36.213 [23, 5.1.1.1] where $a0$ corresponds to 0, $a04$ corresponds to value 0.4, $a05$ to 0.5, $a06$ to 0.6, $a07$ to 0.7, $a08$ to 0.8, $a09$ to 0.9 and $a1$ corresponds to 1.</td>
</tr>
<tr>
<td>deltaF-PUCCH-FormatX</td>
<td>Parameter: $F_PUCCH$ for the PUCCH formats 1, 1b, 2, 2a, 2b, 3 and 1b with channel selection. See TS 36.213 [23, 5.1.2] where $\Delta F_2$ corresponds to -2 dB, $\Delta F_0$ corresponds to 0 dB and so on.</td>
</tr>
<tr>
<td>deltaMCS-Enabled</td>
<td>Parameter: $Ks$ See TS 36.213 [23, 5.1.1.1]. $en0$ corresponds to value 0 corresponding to 'disabled'. $en1$ corresponds to value 1.25 corresponding to 'enabled'.</td>
</tr>
<tr>
<td>deltaPreambleMsg3</td>
<td>Parameter: $\Delta_{PREAMBLE_Msg3}$ see TS 36.213 [23, 5.1.1.1]. Actual value = IE value * 2 [dB].</td>
</tr>
<tr>
<td>deltaTxD-OffsetPUCCH-FormatX</td>
<td>Parameter: $\Delta_{TxD_PUCCH}$ for the PUCCH formats 1, 1a/1b, 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, $dB-2$ corresponds to -2 dB.</td>
</tr>
<tr>
<td>filterCoefficient</td>
<td>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.</td>
</tr>
<tr>
<td>p0-NominalPUCCH</td>
<td>Parameter: $P_{O_NOMINAL_PUCCH}$ See TS 36.213, 5.1.2.1, unit dBm.</td>
</tr>
<tr>
<td>p0-NominalPUSCH</td>
<td>Parameter: $P_{O_NOMINAL_PUSCH}$ See TS 36.213, 5.1.2.1, unit dBm. This field is applicable for non-persistent scheduling, only.</td>
</tr>
<tr>
<td>p0-UE-PUCCH</td>
<td>Parameter: $P_{O_UE_PUCCH}$ See TS 36.213 [23, 5.1.2.1]. Unit dB</td>
</tr>
<tr>
<td>p0-UE-PUSCH</td>
<td>Parameter: $P_{O_UE_PUSCH}$ See TS 36.213 [23, 5.1.2.1]. Unit dB. This field is applicable for non-persistent scheduling, only.</td>
</tr>
<tr>
<td>pathlossReferenceLinking</td>
<td>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).</td>
</tr>
<tr>
<td>pSRS-Offset, pSRS-OffsetAp</td>
<td>Parameter: $PSRS_OFFSET$ for periodic and aperiodic sounding reference signal transmission repectively. See TS 36.213 [23, 5.1.3.1]. For $Ks=1.25$, the actual parameter value is $pSRS_Offset$ value – 3. For $Ks=0$, the actual parameter value is $-10.5 + 1.5*pSRS_Offset$ value.</td>
</tr>
</tbody>
</table>
6.3.3 Security control information elements

-- NextHopChainingCount

The IE NextHopChainingCount is used to update the $K_{SNB}$ key and corresponds to parameter NCC: See TS 33.401 [32, 7.2.8.4].

\textit{NextHopChainingCount} information element

\begin{verbatim}
NextHopChainingCount ::= INTEGER (0..7)
\end{verbatim}

-- SecurityAlgorithmConfig

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.

\textit{SecurityAlgorithmConfig} information element

\begin{verbatim}
SecurityAlgorithmConfig ::= SEQUENCE {
    cipheringAlgorithm ENUMERATED {
        eea0, eea1, eea2, spare5, spare4, spare3,
        spare2, spare1, ...},
    integrityProtAlgorithm ENUMERATED {
        eia0-v920, eia1, eia2, spare5, spare4, spare3,
        spare2, spare1, ...}
}
\end{verbatim}

\textbf{SecurityAlgorithmConfig field descriptions}

\begin{tabular}{|l|}
\hline
\textit{cipheringAlgorithm}  \\
Indicates the ciphering algorithm to be used for SRBs and DRBs, as specified in TS 33.401 [32, 5.1.3.2].  \\
\hline
\textit{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).  \\
\hline
\end{tabular}
— **ShortMAC-I**

The IE *ShortMAC-I* is used to identify and verify the UE at RRC connection re-establishment. The 16 least significant bits of the MAC-I calculated using the 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**

*AdditionalSpectrumEmission information element*

```asn1
AdditionalSpectrumEmission ::= INTEGER (1..32)
```

---

— **ARFCN-ValueCDMA2000**

The IE *ARFCN-ValueCDMA2000* used to indicate the CDMA2000 carrier frequency within a CDMA2000 band, see C.S0002-A [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.
**ARFCN-ValueEUTRA information element**

```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)
```
The IE \textit{BandclassCDMA2000} is used to define the CDMA2000 band in which the CDMA2000 carrier frequency can be found, as defined in C.S0057-E [24, table 1.5-1].

\textbf{BandclassCDMA2000 information element}

\begin{verbatim}
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, ...}
\end{verbatim}

\textbf{BandIndicatorGERAN information element}

The IE \textit{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.

\textbf{BandIndicatorGERAN information element}

\begin{verbatim}
BandIndicatorGERAN ::= ENUMERATED {dcs1800, pcs1900}
\end{verbatim}

\textbf{CarrierFreqCDMA2000 information element}

The IE \textit{CarrierFreqCDMA2000} used to provide the CDMA2000 carrier information.

\begin{verbatim}
CarrierFreqCDMA2000 ::= SEQUENCE {
  bandClass            BandclassCDMA2000,
  arfcn                ARFCN-ValueCDMA2000
}
\end{verbatim}
– **CarrierFreqGERAN**

The IE *CarrierFreqGERAN* is used to provide an unambiguous carrier frequency description of a GERAN cell.

**CarrierFreqGERAN information element**

```asciidoc
CarrierFreqGERAN ::= SEQUENCE {
    arfcn        ARFCN-ValueGERAN,
    bandIndicator     BandIndicatorGERAN
}
```

**CarrierFreqGERAN field descriptions**

- **arfcn**
  GERAN ARFCN of BCCH carrier.

- **bandIndicator**
  Indicates how to interpret the ARFCN of the BCCH carrier.

– **CarrierFreqsGERAN**

The IE *CarrierFreqListGERAN* is used to provide one or more GERAN ARFCN values, as defined in TS 44.005 [43], which represents a list of GERAN BCCH carrier frequencies.

**CarrierFreqsGERAN information element**

```asciidoc
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-Value

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.

*numbervOfFollowingARFCNs*  
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) \ldots ((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".

---

**CDMA2000-Type**

The IE *CDMA2000-Type* is used to describe the type of CDMA2000 network.

**CDMA2000-Type information element**

```asn1
CDMA2000-Type ::= ENUMERATED {type1XRTT, typeHRPD}
```

---

**CellIdentity**

The IE *CellIdentity* is used to unambiguously identify a cell within a PLMN.

**CellIdentity information element**

```asn1
-- 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

– 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.

-- ASN1START

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}
}

-- ASN1STOP
### CSFB-RegistrationParam1XRTT field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>foreignNIDReg</td>
<td>The CDMA2000 1xRTT NID roamer registration indicator.</td>
</tr>
<tr>
<td>foreignSIDReg</td>
<td>The CDMA2000 1xRTT SID roamer registration indicator.</td>
</tr>
<tr>
<td>homeReg</td>
<td>The CDMA2000 1xRTT Home registration indicator.</td>
</tr>
<tr>
<td>multipleNID</td>
<td>The CDMA2000 1xRTT Multiple NID storage indicator.</td>
</tr>
<tr>
<td>multipleSID</td>
<td>The CDMA2000 1xRTT Multiple SID storage indicator.</td>
</tr>
<tr>
<td>nid</td>
<td>Used along with the sid as a pair to control when the UE should Register or Re-Register with the CDMA2000 1xRTT network.</td>
</tr>
<tr>
<td>parameterReg</td>
<td>The CDMA2000 1xRTT Parameter-change registration indicator.</td>
</tr>
<tr>
<td>powerDownReg</td>
<td>The CDMA2000 1xRTT Power-down registration indicator.</td>
</tr>
<tr>
<td>powerUpReg</td>
<td>The CDMA2000 1xRTT Power-up registration indicator.</td>
</tr>
<tr>
<td>registrationPeriod</td>
<td>The CDMA2000 1xRTT Registration period.</td>
</tr>
<tr>
<td>registrationZone</td>
<td>The CDMA2000 1xRTT Registration zone.</td>
</tr>
<tr>
<td>sid</td>
<td>Used along with the nid as a pair to control when the UE should Register or Re-Register with the CDMA2000 1xRTT network.</td>
</tr>
<tr>
<td>totalZone</td>
<td>The CDMA2000 1xRTT Number of registration zones to be retained.</td>
</tr>
<tr>
<td>zoneTimer</td>
<td>The CDMA2000 1xRTT Zone timer length.</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cellIdentity</td>
<td>Identity of the cell within the context of the PLMN.</td>
</tr>
<tr>
<td>plmn-Identity</td>
<td>Identifies the PLMN of the cell as given by the first PLMN entry in the plmn-IdentityList in SystemInformationBlockType1.</td>
</tr>
</tbody>
</table>
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,
  cellIdentity     BIT STRING (SIZE (28))
}
```

**CellGlobalIdUTRA field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cellIdentity</td>
<td>UTRAN Cell Identifier which is unique within the context of the identified PLMN as defined in TS 25.331 [19].</td>
</tr>
<tr>
<td>plmn-Identity</td>
<td>Identifies the PLMN of the cell as given by the common PLMN broadcast in the MIB, as defined in TS 25.331 [19].</td>
</tr>
</tbody>
</table>

CellGlobalIdGERAN

The IE CellGlobalIdGERAN specifies the Cell Global Identification (CGI), the globally unique identity of a cell in GERAN.

**CellGlobalIdGERAN information element**

```asn1
CellGlobalIdGERAN ::= SEQUENCE {
  plmn-Identity    PLMN-Identity,
  locationAreaCode BIT STRING (SIZE (16)),
  cellIdentity     BIT STRING (SIZE (16))
}
```

**CellGlobalIdGERAN field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cellIdentity</td>
<td>Cell Identifier which is unique within the context of the GERAN location area as defined in TS 23.003 [27].</td>
</tr>
<tr>
<td>locationAreaCode</td>
<td>A fixed length code identifying the location area within a PLMN as defined in TS 23.003 [27].</td>
</tr>
<tr>
<td>plmn-Identity</td>
<td>Identifies the PLMN of the cell, as defined in TS 23.003 [27].</td>
</tr>
</tbody>
</table>
-- CellGlobalIdCDMA2000

The IE *CellGlobalIdCDMA2000* specifies the Cell Global Identification (CGI), the globally unique identity of a cell in CDMA2000.

### CellGlobalIdCDMA2000 information element

```asn
CellGlobalIdCDMA2000 ::= CHOICE {
  cellGlobalId1XRTT       BIT STRING (SIZE (47)),
  cellGlobalIdHRPD      BIT STRING (SIZE (128))
}
```

---

**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-A [25].

*cellGlobalIdHRPD*  
Unique identifier for a CDMA2000 HRPD cell, corresponds to SECTOR ID parameter defined in C.S0024-A [26, 14.9].

-- CSG-Identity

The IE *CSG-Identity* is used to identify a Closed Subscriber Group.

### CSG-Identity information element

```asn
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

```asn
FreqBandIndicator ::=     INTEGER (1..maxFBI)
```

FreqBandIndicator-v9e0 ::= INTEGER (maxFBI-Plus1..maxFBI2)

-- ASN1STOP

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
    carrierBandwidth CarrierBandwidthEUTRA OPTIONAL, -- Cond HO-toEUTRA
    additionalSpectrumEmission AdditionalSpectrumEmission OPTIONAL, -- Cond HO-toEUTRA
    t304 ENUMERATED {
        ms50, ms100, ms150, ms200, ms500, ms1000,
        ms2000, spare1 },
    newUE-Identity C-RNTI,
    radioResourceConfigCommon RadioResourceConfigCommon,
    rach-ConfigDedicated RACH-ConfigDedicated OPTIONAL, -- Need OP
    ..., 
    [ [ carrierFreq-v9e0 CarrierFreqEUTRA-v9e0 OPTIONAL -- Need ON
    ] ]
}

CarrierBandwidthEUTRA ::= SEQUENCE {
    dl-Bandwidth ENUMERATED {
        n6, n15, n25, n50, n75, n100, spare10,
        spare9, spare8, spare7, spare6, spare5,
        spare4, spare3, spare2, spare1 },

    -- ASN1STOP
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-r9,
    ul-CarrierFreq-v9e0     ARFCN-ValueEUTRA-r9   OPTIONAL -- Cond FDD
}

--- ASN1STOP

--- MobilityControlInfo 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].

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.
dl-Bandwidth
Parameter: Downlink bandwidth, see TS 36.101 [42].
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.
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.
![Table: Conditional presence and Explanation](image)

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FDD</strong></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 'FDD'; otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>HO-toEUTRA</strong></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><strong>HO-toEUTRA2</strong></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>
</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**

```asciidoc
-- ASN1START

MobilityParametersCDMA2000 ::= OCTET STRING

-- ASN1STOP
```

– **MobilityStateParameters**

The IE *MobilityStateParameters* contains parameters to determine UE mobility state.

**MobilityStateParameters information element**

```asciidoc
-- ASN1START

MobilityStateParameters ::= SEQUENCE {
    t-Evaluation ENUMERATED {
        s30, s60, s120, s180, s240, spare3, spare2, spare1},
    t-HystNormal ENUMERATED {
        s30, s60, s120, s180, s240, spare3, spare2, spare1},
    n-CellChangeMedium INTEGER (1..16),
    n-CellChangeHigh INTEGER (1..16)
}

-- ASN1STOP
```
### MobilityStateParameters field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-CellChangeHigh</td>
<td>The number of cell changes to enter high mobility state. Corresponds to ( N_{CR, 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 ( N_{CR, M} ) in TS 36.304 [4].</td>
</tr>
<tr>
<td>t-Evaluation</td>
<td>The duration for evaluating criteria to enter mobility states. Corresponds to ( T_{CR_{max}} ) in TS 36.304 [4]. Value in seconds, s&lt;sub&gt;30&lt;/sub&gt; 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. Corresponds to ( T_{CR_{max, Hyst}} ) in TS 36.304 [4]. Value in seconds, s&lt;sub&gt;30&lt;/sub&gt; corresponds to 30 s and so on.</td>
</tr>
</tbody>
</table>

---

### MultiBandInfoList

**MultiBandInfoList information element**

```asn1
-- ASN1START

MultiBandInfoList ::= SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator

MultiBandInfoList-v9e0 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF MultiBandInfo-v9e0

MultiBandInfoList-v10j0 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF NS-PmaxList-r10

MultiBandInfo-v9e0 ::=  SEQUENCE {
    freqBandIndicator-v9e0    FreqBandIndicator-v9e0  OPTIONAL -- Need OP
}

-- ASN1STOP

---

### NS-PmaxList

The IE NS-PmaxList concerns a list of additionalPmax and additionalSpectrumEmission as defined in TS 36.101 [42, table 6.2.4-1] for a given frequency band. E-UTRAN does not include the same value of additionalSpectrumEmission in SystemInformationType2 within this list.

**NS-PmaxList information element**

```asn1
-- ASN1START

NS-PmaxList-r10 ::=    SEQUENCE (SIZE (1..maxNS-Pmax-r10)) OF NS-PmaxValue-r10

NS-PmaxValue-r10 ::=   SEQUENCE {
    additionalPmax-r10     P-Max       OPTIONAL, -- Need OP
    additionalSpectrumEmission   AdditionalSpectrumEmission
}

-- ASN1STOP
```
-- 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**

```asn1
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.

**PhysCellIdRange information element**

```asn1
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**

<table>
<thead>
<tr>
<th><strong>range</strong></th>
<th>Indicates the number of physical cell identities in the range (including <em>start</em>). 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 <em>start</em> applies.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>start</strong></td>
<td>Indicates the lowest physical cell identity in the range.</td>
</tr>
</tbody>
</table>
-- 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

```asn1
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
}
```

**PhysCellIdRangeUTRA-FDDList** field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>range</strong></td>
<td>Indicates the number of primary scrambling codes in the range (including <em>start</em>). The UE shall apply value 1 in case the field is absent, in which case only the primary scrambling code value indicated by <em>start</em> applies.</td>
</tr>
<tr>
<td><strong>start</strong></td>
<td>Indicates the lowest primary scrambling code in the range.</td>
</tr>
</tbody>
</table>

-- 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
-- ASN1START
```
PhysCellIdGERAN ::= SEQUENCE {
  networkColourCode BIT STRING (SIZE (3)),
  baseStationColourCode BIT STRING (SIZE (3))
}

-- ASN1STOP

<table>
<thead>
<tr>
<th>PhysCellIdGERAN field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>baseStationColourCode</strong></td>
</tr>
<tr>
<td><strong>networkColourCode</strong></td>
</tr>
</tbody>
</table>

— 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*

-- ASN1START

PhysCellIdUTRA-FDD ::= INTEGER (0..511)

-- ASN1STOP

— 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*

-- ASN1START

PhysCellIdUTRA-TDD ::= INTEGER (0..127)

-- ASN1STOP

— 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 PLMN-Identity is included in CellGlobalIdEUTRA, in CellGlobalIdUTRA, in CellGlobalIdGERAN or in RegisteredMME. This IE is also mandatory in the first occurrence of the IE PLMN-Identity within the IE PLMN-IdentityList. Otherwise it is optional, need OP.</td>
</tr>
</tbody>
</table>

-- PreRegistrationInfoHRPD

-- ASN1START

PreRegistrationInfoHRPD ::= SEQUENCE {
  preRegistrationAllowed    BOOLEAN,
  preRegistrationZoneId    PreRegistrationZoneIdHRPD OPTIONAL, -- cond PreRegAllowed
  secondaryPreRegistrationZoneIdList SecondaryPreRegistrationZoneIdListHRPD OPTIONAL -- Need OR
}
SecondaryPreRegistrationZoneIdListHRPD ::= SEQUENCE (SIZE (1..2)) OF PreRegistrationZoneIdHRPD

PreRegistrationZoneIdHRPD ::= INTEGER (0..255)

--- ASN1STOP

### PreRegistrationInfoHRPD field descriptions

**preRegistrationAllowed**

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.

**preRegistrationZoneID**

ColorCode (see C.S0024-A [26], C.S0087-A [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.

**secondaryPreRegistrationZoneIdList**

List of SecondaryColorCodes (see C.S0024-A [26], C.S0087-A [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.

---

### Conditional presence

<table>
<thead>
<tr>
<th>Condition</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 $Q_{qualmin}$ in 36.304 [4]. Actual value $Q_{qualmin} = IE$ 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 $Q_{rxlevmin}$ in 36.304 [4]. Actual value $Q_{rxlevmin} = IE$ value * 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 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

- **Q-OffsetRangeInterRAT**

The IE *Q-OffsetRangeInterRAT* is used to indicate a frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value in dB.

**Q-OffsetRangeInterRAT information element**

-- ASN1START

Q-OffsetRangeInterRAT ::= INTEGER (-15..15)

-- ASN1STOP

- **ReselectionThreshold**

The IE *ReselectionThreshold* is used to indicate an Rx level threshold for cell reselection. Actual value of threshold = IE value * 2 [dB].

**ReselectionThreshold information element**

-- ASN1START
ReselectionThreshold ::= INTEGER (0..31)

-- ASN1STOP

– ReselectionThresholdQ

The IE ReselectionThresholdQ is used to indicate a quality level threshold for cell reselection. Actual value of threshold = IE value [dB].

ReselectionThresholdQ information element

-- ASN1START

ReselectionThresholdQ-r9 ::= INTEGER (0..31)

-- ASN1STOP

– SCellIndex

The IE SCellIndex concerns a short identity, used to identify an SCell.

SCellIndex information element

-- ASN1START

SCellIndex-r10 ::= INTEGER (1..7)

-- ASN1STOP

– ServCellIndex

The IE 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 SCellIndex that has previously been assigned applies for SCells.

ServCellIndex information element

-- ASN1START

ServCellIndex-r10 ::= INTEGER (0..7)

-- ASN1STOP
-- SpeedStateScaleFactors
The IE SpeedStateScaleFactors concerns factors, to be applied when the UE is in medium or high speed state, used for scaling a mobility control related parameter.

**SpeedStateScaleFactors** information element

```
-- ASN1START

SpeedStateScaleFactors ::= SEQUENCE {
    sf-Medium ENUMERATED {oDot25, oDot5, oDot75, lDot0},
    sf-High ENUMERATED {oDot25, oDot5, oDot75, lDot0}
}
-- ASN1STOP
```

**SpeedStateScaleFactors** field descriptions

**sf-High**
The concerned mobility control related parameter is multiplied with this factor if the UE is in High Mobility state as defined in TS 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.

-- SystemInfoListGERAN
The IE SystemInfoListGERAN contains system information of a GERAN cell.

**SystemInfoListGERAN** information element

```
-- ASN1START

SystemInfoListGERAN ::= SEQUENCE (SIZE (1..maxGERAN-SI)) OF OCTET STRING (SIZE (1..23))
-- ASN1STOP
```

**SystemInfoListGERAN** field descriptions

**SystemInfoListGERAN**
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].

-- SystemTimeInfoCDMA2000
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.
NOTE: The UE needs the CDMA2000 system time with a certain level of accuracy for performing measurements as well as for communicating with the CDMA2000 network (HRPD or 1xRTT).

**SystemTimeInfoCDMA2000 information element**

```plaintext
-- ASN1START

SystemTimeInfoCDMA2000 ::= SEQUENCE {
  cdma-EUTRA-Synchronisation  BOOLEAN,
  cdma-SystemTime      CHOICE {
    synchronousSystemTime    BIT STRING (SIZE (39)),
    asynchronousSystemTime    BIT STRING (SIZE (49))
  }
}

-- ASN1STOP
```

**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>Not 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
– **T-Reselection**

The IE *T-Reselection* concerns the cell reselection timer $T_{\text{Reselection}}$ for E-UTRA, UTRA, GERAN or CDMA2000. Value in seconds.

**T-Reselection** information element

---

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

---

– **Hysteresis**

The IE *Hysteresis* is a parameter used within the entry and leave condition of an event triggered reporting condition. The actual value is IE value * 0.5 dB.

**Hysteresis** information element

---
-- ASN1STOP

– 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**

```
LocationInfo-r10 ::= SEQUENCE {
  locationCoordinates-r10     CHOICE {
    ellipsoid-Point-r10      OCTET STRING,
    ellipsoidPointWithAltitude-r10   OCTET STRING,
    ...                        },
  horizontalVelocity-r10     OCTET STRING    OPTIONAL,
  gnss-TOD-msec-r10      OCTET STRING    OPTIONAL,
  ...                      }
```

-- ASN1STOP

**LocationInfo field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ellipsoid-Point</td>
<td>Parameter Ellipsoid-Point defined in TS36.355 [54].</td>
</tr>
<tr>
<td>ellipsoidPointWithAltitude</td>
<td>Parameter EllipsoidPointWithAltitude defined in TS36.355 [54].</td>
</tr>
<tr>
<td>gnss-TOD-msec</td>
<td>Parameter Gnss-TOD-msec defined in TS36.355 [54]</td>
</tr>
<tr>
<td>horizontalVelocity</td>
<td>Parameter HorizontalVelocity defined in TS36.355 [54].</td>
</tr>
</tbody>
</table>

– 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**

```
MeasConfig ::=      SEQUENCE {
  -- Measurement objects
```

-- ASN1START
<table>
<thead>
<tr>
<th>Identifier</th>
<th>Description</th>
<th>Default</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>measObjectToRemoveList</td>
<td>MeasObjectToRemoveList</td>
<td>OPTIONAL</td>
<td>-- Need ON</td>
</tr>
<tr>
<td>measObjectToAddModList</td>
<td>MeasObjectToAddModList</td>
<td>OPTIONAL</td>
<td>-- Need ON</td>
</tr>
<tr>
<td>reportConfigToRemoveList</td>
<td>ReportConfigToRemoveList</td>
<td>OPTIONAL</td>
<td>-- Need ON</td>
</tr>
<tr>
<td>reportConfigToAddModList</td>
<td>ReportConfigToAddModList</td>
<td>OPTIONAL</td>
<td>-- Need ON</td>
</tr>
<tr>
<td>measIdToRemoveList</td>
<td>MeasIdToRemoveList</td>
<td>OPTIONAL</td>
<td>-- Need ON</td>
</tr>
<tr>
<td>measIdToAddModList</td>
<td>MeasIdToAddModList</td>
<td>OPTIONAL</td>
<td>-- Need ON</td>
</tr>
<tr>
<td>quantityConfig</td>
<td>QuantityConfig</td>
<td>OPTIONAL</td>
<td>-- Need ON</td>
</tr>
<tr>
<td>measGapConfig</td>
<td>MeasGapConfig</td>
<td>OPTIONAL</td>
<td>-- Need ON</td>
</tr>
<tr>
<td>s-Measure</td>
<td>RSRP-Range</td>
<td>OPTIONAL</td>
<td>-- Need ON</td>
</tr>
<tr>
<td>preRegistrationInfoHRPD</td>
<td>PreRegistrationInfoHRPD</td>
<td>OPTIONAL</td>
<td>-- Need OP</td>
</tr>
<tr>
<td>speedStatePars</td>
<td>CHOICE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>release</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>setup</td>
<td>SEQUENCE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mobilityStateParameters</td>
<td>MobilityStateParameters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>timeToTrigger-SF</td>
<td>SpeedStateScaleFactors</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>OPTIONAL</td>
<td>-- Need ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[[ measObjectToAddModList-v9e0]</td>
<td>MeasObjectToAddModList-v9e0</td>
<td>OPTIONAL</td>
<td>-- Need ON</td>
</tr>
</tbody>
</table>

MeasIdToRemoveList ::= SEQUENCE (SIZE (1..maxMeasId)) OF MeasId

MeasObjectToRemoveList ::= SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectId

ReportConfigToRemoveList ::= SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigId

-- ASN1STOP
**MeasConfig field descriptions**

**measGapConfig**
Used to setup and release measurement gaps.

**measIdToRemoveList**
List of measurement identities to remove.

**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).

**measObjectToRmoveList**
List of measurement objects to remove.

**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.

---

**MeasGapConfig**
The IE **MeasGapConfig** specifies the measurement gap configuration and controls setup/ release of measurement gaps.

**MeasGapConfig** information element

---

```
MeasGapConfig ::=     CHOICE {
                  release      NULL,
                  setup        SEQUENCE {
                        gapOffset    CHOICE {
                              gp0          INTEGER (0..39),
                              gp1          INTEGER (0..79),
                              ...
                        }
                  }
}
```

---

**MeasGapConfig field descriptions**

**gapOffset**
Value **gapOffset** of **gp0** corresponds to gap offset of Gap Pattern Id '0' with MGRP = 40ms, **gapOffset** of **gp1** corresponds to gap offset of Gap Pattern Id ‘1’ with MGRP = 80ms. Also used to specify the measurement gap pattern to be applied, as defined in TS 36.133 [16].
– **MeasId**

The IE *MeasId* is used to identify a measurement configuration, i.e., linking of a measurement object and a reporting configuration.

**MeasId information element**

```
-- ASN1START

MeasId ::= INTEGER (1..maxMeasId)

-- ASN1STOP
```

– **MeasIdToAddModList**

The IE *MeasIdToAddModList* concerns a list of measurement identities to add or modify, with for each entry the *measId*, the associated *measObjectId* and the associated *reportConfigId*.

**MeasIdToAddModList information element**

```
-- ASN1START

MeasIdToAddModList ::= SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddMod

MeasIdToAddMod ::= SEQUENCE {
  measId        MeasId,
  measObjectId   MeasObjectId,
  reportConfigId ReportConfigId
}

-- ASN1STOP
```

– **MeasObjectCDMA2000**

The IE *MeasObjectCDMA2000* specifies information applicable for inter-RAT CDMA2000 neighbouring cells.

**MeasObjectCDMA2000 information element**

```
-- ASN1START

MeasObjectCDMA2000 ::= SEQUENCE {
  cdma2000-Type   CDMA2000-Type,
  carrierFreq     CarrierFreqCDMA2000,
}

-- ASN1STOP
```
searchWindowSize INTEGER (0..15) OPTIONAL, -- Need ON
offsetFreq Q-OffsetRangeInterRAT DEFAULT 0,
cellsToRemoveList CellIndexList OPTIONAL, -- Need ON
cellsToAddModList CellsToAddModListCDMA2000 OPTIONAL, -- Need ON
cellForWhichToReportCGI PhysCellIdCDMA2000 OPTIONAL, -- Need ON

... }

CellsToAddModListCDMA2000 ::= SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModCDMA2000

CellsToAddModCDMA2000 ::= SEQUENCE {
cellIndex INTEGER (1..maxCellMeas),
physCellId PhysCellIdCDMA2000
}

-- ASN1STOP

**MeasObjectCDMA2000 field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>carrierInfo</td>
<td>Identifies CDMA2000 carrier frequency for which this configuration is valid.</td>
</tr>
<tr>
<td>cdma2000-Type</td>
<td>The type of CDMA2000 network: CDMA2000 1xRTT or CDMA2000 HRPD.</td>
</tr>
<tr>
<td>cellIndex</td>
<td>Entry index in the neighbouring cell list.</td>
</tr>
<tr>
<td>cellsToAddModList</td>
<td>List of cells to add/modify in the neighbouring cell list.</td>
</tr>
<tr>
<td>cellsToRemoveList</td>
<td>List of cells to remove from the neighbouring cell list.</td>
</tr>
<tr>
<td>physCellId</td>
<td>CDMA2000 Physical cell identity of a cell in neighbouring cell list expressed as PNOffset.</td>
</tr>
<tr>
<td>searchWindowSize</td>
<td>Provides the search window size to be used by the UE for the neighbouring pilot, see C.S0005-A [25].</td>
</tr>
</tbody>
</table>

---

**MeasObjectEUTRA**

The IE *MeasObjectEUTRA* specifies information applicable for intra-frequency or inter-frequency E-UTRA cells.

**MeasObjectEUTRA information element**

-- ASN1START

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

]]

}

MeasObjectEUTRA-v9e0 ::= SEQUENCE {
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 measSubframe  
  }  
}

MeasSubframeCellList-r10 ::= SEQUENCE (SIZE (1..maxCellMeas)) OF PhysCellIdRange

-- ASN1STOP
MeasObjectEUTRA field descriptions

**blackCellsToAddMoList**
List of cells to add/modify in the blacklist of cells.

**blackCellsToRemoveList**
List of cells to remove from the blacklist of cells.

**carrierFreq**
Identifies E-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 E-ARFCN used to indicate this.

**cellIndex**
Entry index in the cell list. An entry may concern a range of cells, in which case this value applies to the entire range.

**cellIndividualOffset**
Cell individual offset applicable to a specific cell. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.

**cellsToAddModList**
List of cells to add/modify in the cell list.

**cellsToRemoveList**
List of cells to remove from the cell list.

**measCycleSCell**
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-UTRAN 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.

**measSubframeCellList**
List of cells for which measSubframePatternNeigh is applied.

**measSubframePatternNeigh**
Time domain measurement resource restriction pattern applicable to neighbour cell RSRP and RSRQ 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.

**offsetFreq**
Offset value applicable to the carrier frequency. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.

**physCellId**
Physical cell identity of a cell in the cell list.

**physCellIdRange**
Physical cell identity or a range of physical cell identities of cells in the blacklist.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>measSubframe</td>
<td>The field is mandatory present if measSubframePatternNeigh is configured.</td>
</tr>
</tbody>
</table>

-- MeasObjectGERAN

The IE MeasObjectGERAN specifies information applicable for inter-RAT GERAN neighbouring frequencies.

**MeasObjectGERAN** information element

--- ASN1START

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ncc-Permitted</td>
<td>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.</td>
</tr>
</tbody>
</table>

– MeasObjectId

The IE MeasObjectId used to identify a measurement object configuration.

**MeasObjectId information element**

---

MeasObjectId ::= INTEGER (1..maxObjectId)

---

– MeasObjectToAddModList

The IE MeasObjectToAddModList concerns a list of measurement objects to add or modify

**MeasObjectToAddModList information element**

---

MeasObjectToAddModList ::= SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectToAddMod

MeasObjectToAddModList-v9e0 ::= SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectToAddMod-v9e0

MeasObjectToAddMod ::= SEQUENCE {
  measObjectId MeasObjectId,
  measObject CHOICE {
    measObjectEUTRA MeasObjectEUTRA,
    measObjectUTRA MeasObjectUTRA,
    measObjectGERAN MeasObjectGERAN,
    measObjectCDMA2000 MeasObjectCDMA2000,
    ...
  }
}
MeasObjectToAddMod-v9e0 ::= SEQUENCE {
    measObjectEUTRA-v9e0    MeasObjectEUTRA-v9e0  OPTIONAL  -- Cond eutra
}

-- ASN1STOP

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>eutra</td>
<td>The field is optional present, need OR, if for the corresponding entry in MeasObjectToAddModList field measObject is set to measObjectEUTRA and its sub-field carrierFreq is set to maxEARFCN. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

– MeasObjectUTRA

The IE *MeasObjectUTRA* specifies information applicable for inter-RAT UTRA neighbouring cells.

**MeasObjectUTRA information element**

-- ASN1START

MeasObjectUTRA ::= SEQUENCE {
    carrierFreq       ARFCN-ValueUTRA,
    offsetFreq       Q-OffsetRangeInterRAT  DEFAULT 0,
    cellsToRemoveList CellIndexList OPTIONAL,   -- Need ON
    cellsToAddModList CHOICE {
        cellsToAddModListUTRA-FDD   CellsToAddModListUTRA-FDD,
        cellsToAddModListUTRA-TDD   CellsToAddModListUTRA-TDD
    }                OPTIONAL,   -- Need ON
    cellForWhichToReportCGI    CHOICE {
        utra-FDD       PhysCellIdUTRA-FDD,
        utra-TDD       PhysCellIdUTRA-TDD
    }                OPTIONAL,  -- Need ON
    ....
    [ csg-allowedReportingCells-v930   CSG-AllowedReportingCells-r9 OPTIONAL  -- Need ON
    ]
}

CellsToAddModListUTRA-FDD ::= SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModUTRA-FDD
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.

---

**MeasResults**

The IE *MeasResults* covers measured results for intra-frequency, inter-frequency and inter-RAT mobility.

**MeasResults information element**

---

MeasResults ::= SEQUENCE {
  measId            MeasId,
  measResultPCell   SEQUENCE {
    rsrpResult       RSRP-Range,
  }
MeasResultListEUTRA ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultEUTRA

MeasResultEUTRA ::= SEQUENCE {
  physCellId       PhysCellId,
  cgi-Info         SEQUENCE {
    cellGlobalId      CellGlobalIdEUTRA,
    trackingAreaCode  TrackingAreaCode,
    plmn-IdentityList PLMN-IdentityList2  OPTIONAL
  }                OPTIONAL,
  measResult        SEQUENCE {
    rsrpResult       RSRP-Range  OPTIONAL,
    rsrqResult       RSRQ-Range  OPTIONAL,
    ....
  }                OPTIONAL,
  [[ additionalSI-Info-r9 AdditionalSI-Info-r9  OPTIONAL
  ]]
}
MeasResultServFreqList-r10 ::= SEQUENCE (SIZE (1..maxServCell-r10)) OF MeasResultServFreq-r10

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,
}

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
  ]]
}
MeasResultListGERAN ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultGERAN

MeasResultGERAN ::= SEQUENCE {
carrierFreq CarrierFreqGERAN,
physCellId PhysCellIdGERAN,
cgi-Info SEQUENCE {
cellGlobalId CellGlobalIdGERAN,
routingAreaCode BIT STRING (SIZE (8)) OPTIONAL
} OPTIONAL,
measResult SEQUENCE {
  rssi INTEGER (0..63),
  ...
} }

MeasResultsCDMA2000 ::= SEQUENCE {
  preRegistrationStatusHRPD BOOLEAN,
  measResultListCDMA2000 MeasResultListCDMA2000
}

MeasResultListCDMA2000 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultCDMA2000

MeasResultCDMA2000 ::= SEQUENCE {
  physCellId PhysCellIdCDMA2000,
cgi-Info CellGlobalIdCDMA2000 OPTIONAL,
measResult SEQUENCE {
pilotPnPhase INTEGER (0..32767) OPTIONAL,
pilotStrength INTEGER (0..63),
... }
} }
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
}

--- ASN1STOP

<table>
<thead>
<tr>
<th><strong>MeasResults field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>csg-MemberStatus</strong></td>
</tr>
<tr>
<td>Indicates whether or not the UE is a member of the CSG of the neighbour cell.</td>
</tr>
<tr>
<td><strong>currentSFN</strong></td>
</tr>
<tr>
<td>Indicates the current system frame number when receiving the UE Rx-Tx time difference measurement results from lower layer.</td>
</tr>
<tr>
<td><strong>locationAreaCode</strong></td>
</tr>
<tr>
<td>A fixed length code identifying the location area within a PLMN, as defined in TS 23.003 [27].</td>
</tr>
<tr>
<td><strong>measId</strong></td>
</tr>
<tr>
<td>Identifies the measurement identity for which the reporting is being performed.</td>
</tr>
<tr>
<td><strong>measResult</strong></td>
</tr>
<tr>
<td>Measured result of an E-UTRA cell; Measured result of a UTRA cell; Measured result of a GERAN cell or frequency; or Measured result of a CDMA2000 cell. Measured result of UE Rx–Tx time difference.</td>
</tr>
<tr>
<td><strong>measResultListCDMA2000</strong></td>
</tr>
<tr>
<td>List of measured results for the maximum number of reported best cells for a CDMA2000 measurement identity.</td>
</tr>
<tr>
<td><strong>measResultListEUTRA</strong></td>
</tr>
<tr>
<td>List of measured results for the maximum number of reported best cells for an E-UTRA measurement identity.</td>
</tr>
<tr>
<td><strong>measResultListGERAN</strong></td>
</tr>
<tr>
<td>List of measured results for the maximum number of reported best cells or frequencies for a GERAN measurement identity.</td>
</tr>
<tr>
<td><strong>measResultListUTRA</strong></td>
</tr>
<tr>
<td>List of measured results for the maximum number of reported best cells for a UTRA measurement identity.</td>
</tr>
<tr>
<td><strong>measResultPCell</strong></td>
</tr>
<tr>
<td>Measured result of the PCell.</td>
</tr>
<tr>
<td><strong>measResultsCDMA2000</strong></td>
</tr>
<tr>
<td>Contains the CDMA2000 HRPD pre-registration status and the list of CDMA2000 measurements.</td>
</tr>
</tbody>
</table>
### MeasResults field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MeasResultServFreqList</strong></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.</td>
</tr>
<tr>
<td><strong>pilotPnPhase</strong></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-A [25]. This information is used in either SRVCC handover or enhanced 1xRTT CS fallback procedure to CDMA2000 1xRTT.</td>
</tr>
<tr>
<td><strong>plmnIdentityList</strong></td>
<td>The list of PLMN Identity read from broadcast information when the multiple PLMN Identities are broadcast. This field contains the list of identities starting from the second entry of PLMN Identities in the broadcast information.</td>
</tr>
<tr>
<td><strong>preRegistrationStatusHRPD</strong></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><strong>routingAreaCode</strong></td>
<td>The RAC identity read from broadcast information, as defined in TS 23.003 [27].</td>
</tr>
<tr>
<td><strong>rscpResult</strong></td>
<td>Measured RSRP result of an E-UTRA cell. The rscpResult is only reported if configured by the eNB.</td>
</tr>
<tr>
<td><strong>rsrqResult</strong></td>
<td>Measured RSRQ result of an E-UTRA cell. The rsrqResult is only reported if configured by the eNB.</td>
</tr>
<tr>
<td><strong>rsi</strong></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 RSI bit string, the first/leastmost bit of the bit string contains the most significant bit.</td>
</tr>
<tr>
<td><strong>ue-RxTxTimeDiffResult</strong></td>
<td>UE Rx-Tx time difference measurement result of the PCell, provided by lower layers. According to UE Rx-Tx time difference report mapping in TS 36.133 [16].</td>
</tr>
<tr>
<td><strong>utra-EcN0</strong></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>
</tbody>
</table>

---

### QuantityConfig

The IE QuantityConfig specifies the measurement quantities and layer 3 filtering coefficients for E-UTRA and inter-RAT measurements.

**QuantityConfig information element**

```plaintext
-- ASN1START

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 ]]
}
```

---

ETSI
QuantityConfigEUTRA ::= SEQUENCE {
  filterCoefficientRSRP FilterCoefficient DEFAULT fc4,
  filterCoefficientRSRQ FilterCoefficient DEFAULT fc4
}

QuantityConfigUTRA ::= SEQUENCE {
  measQuantityUTRA-FDD ENUMERATED {cpich-RSCP, cpich-EcN0},
  measQuantityUTRA-TDD ENUMERATED {pccpch-RSCP},
  filterCoefficient FilterCoefficient DEFAULT fc4
}

QuantityConfigUTRA-v1020 ::= SEQUENCE {
  filterCoefficient2-FDD-r10 FilterCoefficient DEFAULT fc4
}

QuantityConfigGERAN ::= SEQUENCE {
  measQuantityGERAN ENUMERATED {rssi},
  filterCoefficient FilterCoefficient DEFAULT fc2
}

QuantityConfigCDMA2000 ::= SEQUENCE {
  measQuantityCDMA2000 ENUMERATED {pilotStrength, pilotPnPhaseAndPilotStrength}
}

-- ASN1STOP
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`.

**filterCoefficientRSRP**
Specifies the filtering coefficient used for RSRP.

**filterCoefficientRSRQ**
Specifies the filtering coefficient used for RSRQ.

**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.

**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.

---

**ReportConfigEUTRA**

The IE `ReportConfigEUTRA` specifies criteria for triggering of an E-UTRA measurement reporting event. The E-UTRA measurement reporting events are labelled A\(N\) 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;
- **Event A4**: Neighbour becomes better than absolute threshold;
- **Event A5**: PCell becomes worse than absolute threshold1 AND Neighbour becomes better than another absolute threshold2.
- **Event A6**: Neighbour becomes amount of offset better than SCell.

**ReportConfigEUTRA information element**

```asn1
ReportConfigEUTRA ::= SEQUENCE {
  triggerType CHOICE {
    event SEQUENCE {
      eventId CHOICE {
        eventA1 SEQUENCE {
          a1-Threshold ThresholdEUTRA,
        },
        eventA2 SEQUENCE {
          a2-Threshold ThresholdEUTRA,
        }
      }\n    }\n  }\n}
```

---
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
}
},
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 OR
]]}
ThresholdEUTRA ::= CHOICE{
  threshold-RSRP        RSRP-Range,
  threshold-RSRQ        RSRQ-Range
}

--- ASN1STOP

**ReportConfigEUTRA field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a3-Offset/ a6-Offset</strong></td>
<td>Offset value to be used in EUTRA measurement report triggering condition for event a3/ a6. The actual value is IE value * 0.5 dB.</td>
</tr>
<tr>
<td><strong>aN-ThresholdM</strong></td>
<td>Threshold to be used in EUTRA measurement report triggering condition for event number aN. If multiple thresholds are defined for event number aN, the thresholds are differentiated by M.</td>
</tr>
<tr>
<td><strong>eventId</strong></td>
<td>Choice of E-UTRA event triggered reporting criteria.</td>
</tr>
<tr>
<td><strong>maxReportCells</strong></td>
<td>Max number of cells, excluding the serving cell, to include in the measurement report.</td>
</tr>
<tr>
<td><strong>reportAmount</strong></td>
<td>Number of measurement reports applicable for triggerType event as well as for triggerType periodical. In case purpose is set to reportCGI only value 1 applies.</td>
</tr>
<tr>
<td><strong>reportOnLeave/ a6-ReportOnLeave</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>reportQuantity</strong></td>
<td>The quantities to be included in the measurement report. The value both means that both the rsvp and rsrq quantities are to be included in the measurement report.</td>
</tr>
<tr>
<td><strong>si-RequestForHO</strong></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><strong>ThresholdEUTRA</strong></td>
<td>For RSRP: RSRP based threshold for event evaluation. The actual value is IE value – 140 dBm. For RSRQ: RSRQ based threshold for event evaluation. The actual value is (IE value – 40)/2 dB.</td>
</tr>
<tr>
<td><strong>timeToTrigger</strong></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><strong>triggerQuantity</strong></td>
<td>The quantities used to evaluate the triggering condition for the event. The values rsvp and rsrq correspond to Reference Signal Received Power (RSRP) and Reference Signal Received Quality (RSRQ), see TS 36.214 [48].</td>
</tr>
</tbody>
</table>

**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.</td>
</tr>
<tr>
<td>reportMDT</td>
<td>The field is optional, need OR, in case triggerType is set to eventA2 or periodical; otherwise the field is not present.</td>
</tr>
</tbody>
</table>
- ReportConfigId

The IE `ReportConfigId` is used to identify a measurement reporting configuration.

`ReportConfigId` information element

```asn1
ReportConfigId ::= INTEGER (1..maxReportConfigId)
```

- ReportConfigInterRAT

The IE `ReportConfigInterRAT` specifies criteria for triggering of an inter-RAT measurement reporting event. The inter-RAT measurement reporting events are labelled B\(N\) 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.

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-A [25] for details.

`ReportConfigInterRAT` information element

```asn1
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,
          }
        }
      }
    }
  }
}
```
ThresholdGERAN ::= INTEGER (0..63)

ThresholdCDMA2000 ::= INTEGER (0..63)
**ReportConfigInterRAT field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>bN-ThresholdM</strong></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><strong>eventId</strong></td>
<td>Choice of inter-RAT event triggered reporting criteria.</td>
</tr>
<tr>
<td><strong>maxReportCells</strong></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.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>reportStrongestCellsForSON applies only in case reportConfig is linked to a measObject set to measObjectUTRA or measObjectCDMA2000.</td>
</tr>
<tr>
<td><strong>reportAmount</strong></td>
<td>Number of measurement reports applicable for triggerType event as well as for triggerType periodical. In case purpose is set to reportCGI or reportStrongestCellsForSON only value 1 applies.</td>
</tr>
<tr>
<td><strong>reportQuantityUTRA-FDD</strong></td>
<td>The quantities to be included in the UTRA measurement report. The value both means that both the cpich RSCP and cpich EcNo0 quantities are to be included in the measurement report.</td>
</tr>
<tr>
<td><strong>si-RequestForHO</strong></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><strong>ThresholdGERAN</strong></td>
<td>The actual value is IE value – 110 dBm.</td>
</tr>
<tr>
<td><strong>ThresholdUTRA</strong></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-EcNo0 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 IE value – 115 dBm. For utra-EcNo0: The actual value is (IE value – 49)/2 dB.</td>
</tr>
<tr>
<td><strong>timeToTrigger</strong></td>
<td>Time during which specific criteria for the event needs to be met in order to trigger a measurement report.</td>
</tr>
</tbody>
</table>

**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.</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

ReportConfigToAddMod ::= SEQUENCE {
    reportConfigId      ReportConfigId,
    reportConfig      CHOICE {
        reportConfigEUTRA     ReportConfigEUTRA,
        reportConfigInterRAT    ReportConfigInterRAT
    }
}
```

---
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
```

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].

**RSRP-Range** information element

```
-- ASN1START

RSRP-Range ::= INTEGER(0..97)

-- ASN1STOP
```

The IE `RSRQ-Range` specifies the value range used in RSRQ measurements and thresholds. Integer value for RSRQ measurements according to mapping table in TS 36.133 [16].

**RSRQ-Range** information element

```
-- ASN1START

-- ASN1STOP
```
RSRQ-Range ::= INTEGER(0..34)

-- ASN1STOP

– TimeToTrigger

The IE TimeToTrigger specifies the value range used for time to trigger parameter, which concerns the time during which specific criteria for the event needs to be met in order to trigger a measurement report. Value ms0 corresponds to 0 ms, ms40 corresponds to 40 ms, and so on.

**TimeToTrigger information element**

-- ASN1START

TimeToTrigger ::= ENUMERATED {
    ms0, ms40, ms64, ms80, ms100, ms160, ms256,
    ms320, ms480, ms512, ms640, ms1024, ms1280, ms2560,
    ms5120}

-- 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 applies in the entire RPLMN of the UE at the point of receiving the configuration

**AreaConfiguration information element**

-- ASN1START
AreaConfiguration-r10 ::= CHOICE {
    cellGlobalIdList-r10 CellGlobalIdList-r10,
    trackingAreaCodeList-r10 TrackingAreaCodeList-r10
}

CellGlobalIdList-r10 ::= SEQUENCE (SIZE (1..32)) OF CellGlobalIdEUTRA

TrackingAreaCodeList-r10 ::= SEQUENCE (SIZE (1..8)) OF TrackingAreaCode

-- ASN1STOP

– 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.
DedicatedInfoNAS information element

DedicatedInfoNAS ::= OCTET STRING

FilterCoefficient information element

FilterCoefficient ::= ENUMERATED {
  fc0, fc1, fc2, fc3, fc4, fc5,
  fc6, fc7, fc8, fc9, fc11, fc13,
  fc15, fc17, fc19, spare1, ...
}

LoggingDuration information element

LoggingDuration-r10 ::= ENUMERATED {
  min10, min20, min40, min60, min90, min120, spare2, spare1
}
– **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.

**LoggingInterval information element**

-- ASN1START

```
LoggingInterval-r10 ::= ENUMERATED {
    ms1280, ms2560, ms5120, ms10240, ms20480,
    ms30720, ms40960, ms61440
}
```

-- ASN1STOP

– **MeasSubframePattern**

The IE *MeasSubframePattern* is used to specify time domain measurement resource restriction. 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 for measurement.

**MeasSubframePattern information element**

-- ASN1START

```
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)),
        ...
    },
    ...
}
```

-- ASN1STOP

– **MMEC**

The IE *MMEC* identifies an MME within the scope of an MME Group within a PLMN, see TS 23.003 [27].
**MMEC information element**

```
MMEC ::= BIT STRING (SIZE (8))
```

**NeighCellConfig information element**

```
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.

**OtherConfig information element**

```
OtherConfig-r9 ::= SEQUENCE {
    reportProximityConfig-r9 ReportProximityConfig-r9 OPTIONAL, -- Need ON
    ...
}
```

The IE **OtherConfig** contains configuration related to other configuration.
ReportProximityConfig-r9 ::= SEQUENCE {
   proximityIndicationEUTRA-r9 ENUMERATED {enabled} OPTIONAL, -- Need OR
   proximityIndicationUTRA-r9 ENUMERATED {enabled} OPTIONAL -- Need OR
}

--- ASN1STOP

<table>
<thead>
<tr>
<th>OtherConfig field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>reportProximityConfig</td>
</tr>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

NOTE: Enabling/ disabling of proximity indication includes enabling/ disabling of the related functionality e.g. autonomous search in connected mode.

– 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
-- RRC-TransactionIdentifier

The IE RRC-TransactionIdentifier is used, together with the message type, for the identification of an RRC procedure (transaction).

\[ \text{RRC-TransactionIdentifier information element} \]

\[
\text{RRC-TransactionIdentifier ::= INTEGER (0..3)}
\]

-- ASN1STOP

-- 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].

\[ \text{S-TMSI information element} \]

\[
\text{S-TMSI ::= SEQUENCE { mmeId MMEC, m-TMSI BIT STRING (SIZE (32)) }}
\]

-- ASN1STOP

\[ \text{S-TMSI field descriptions} \]

\[ m-TMSI \]
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].

\[ \text{TraceReference information element} \]

\[
\text{TraceReference-r10 ::= SEQUENCE { plmnId-r10 PLMN-Identity, traceId-r10 OCTET STRING (SIZE (3)) }}
\]
The IE **UE-CapabilityRAT-ContainerList** contains a list of containers, one for each RAT for which UE capabilities are transferred, if any.

**UE-CapabilityRAT-ContainerList**

The field description of **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. Note.
- 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-C [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/ most significant 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.

**UE-EUTRA-Capability information element**

```asn1
-- 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,
  utraTDD128       IRAT-ParametersUTRA-TDD128    OPTIONAL,
  utraTDD384       IRAT-ParametersUTRA-TDD384    OPTIONAL,
  utraTDD768       IRAT-ParametersUTRA-TDD768    OPTIONAL,
  geran        IRAT-ParametersGERAN     OPTIONAL,
  cdma2000-HRPD      IRAT-ParametersCDMA2000-HRPD   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,
    -- Following field is only to be used for late REL-9 extensions
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    nonCriticalExtension UE-EUTRA-Capability-v10c0-IEs OPTIONAL
}

UE-EUTRA-Capability-v10c0-IEs ::= SEQUENCE {
    otdoa-PositioningCapabilities-r10 OTDOA-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-v10j0-IEs) OPTIONAL,

nonCriticalExtension SEQUENCE {} OPTIONAL

UE-EUTRA-Capability-v10j0-IEs ::= SEQUENCE {
rf-Parameters-v10j0 RF-Parameters-v10j0 OPTIONAL,
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,
interRAT-ParametersCDMA2000-v920 IRAT-ParametersCDMA2000-1XRTT-v920 OPTIONAL,
deviceType-r9 ENUMERATED {noBenFromBatConsumeOpt} OPTIONAL,
csg-ProximityIndicationParameters-r9 CSG-ProximityIndicationParameters-r9,
neighCellSI-AcquisitionParameters-r9 NeighCellSI-AcquisitionParameters-r9,
on-Prameters-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 OPTIONAL,
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,
ue-BasedNetwPerfMesParameters-r10   UE-BasedNetwPerfMesParameters-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   OPTIONAL,
  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   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,
  ...,}
AccessStratumRelease ::= ENUMERATED {
    rel8, rel9, rel10, spare5, spare4, spare3,
    spare2, spare1, ...
}

PDCP-Parameters ::= SEQUENCE {
    supportedROHC-Profiles    SEQUENCE {
        profile0x0001      BOOLEAN,
        profile0x0002      BOOLEAN,
        profile0x0003      BOOLEAN,
        profile0x0004      BOOLEAN,
        profile0x0006      BOOLEAN,
        profile0x0101      BOOLEAN,
        profile0x0102      BOOLEAN,
        profile0x0103      BOOLEAN,
        profile0x0104      BOOLEAN
    },
    maxNumberROHC-ContextSessions  ENUMERATED {
        cs2, cs4, cs8, cs12, cs16, cs24, cs32,
        cs48, cs64, cs128, cs256, cs512, cs1024,
        cs16384, spare2, spare1} DEFAULT cs16,
    ...
}

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
}

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
}

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-r10)) OF BandCombinationParameters-v1090

SupportedBandCombination-v10i0 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v10i0

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
}

SupportedBandwidthCombinationSet-r10 ::= BIT STRING (SIZE (1..maxBandwidthCombSet-r10))

BandParameters-r10 ::= SEQUENCE {
  bandEUTRA-r10     INTEGER (1..64),
  bandParametersUL-r10   BandParametersUL-r10     OPTIONAL,
  bandParametersDL-r10   BandParametersDL-r10     OPTIONAL
}

BandParameters-v1090 ::= SEQUENCE {
  bandEUTRA-v1090     FreqBandIndicator-v9e0     OPTIONAL,
  ...
}

BandParameters-v10i0 ::= SEQUENCE {
  bandParametersDL-v10i0   SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersDL-v10i0
}

BandParametersUL-r10 ::= SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF 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
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-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

SupportedBandEUTRA ::= SEQUENCE {
  bandEUTRA  INTEGER (1..64),
  halfDuplex  BOOLEAN
}

SupportedBandEUTRA-v9e0 ::= SEQUENCE {
  bandEUTRA-v9e0  FreqBandIndicator-v9e0  OPTIONAL
}

MeasParameters ::= SEQUENCE {
  bandListEUTRA  BandListEUTRA
}

MeasParameters-v1020 ::= SEQUENCE {
  bandCombinationListEUTRA-r10  BandCombinationListEUTRA-r10
}
BandListEUTRA ::= SEQUENCE (SIZE (1..maxBands)) OF BandInfoEUTRA

BandCombinationListEUTRA-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandInfoEUTRA

BandInfoEUTRA ::= SEQUENCE {
    interFreqBandList InterFreqBandList,
    interRAT-BandList InterRAT-BandList OPTIONAL
}

InterFreqBandList ::= SEQUENCE (SIZE (1..maxBands)) OF InterFreqBandInfo

InterFreqBandInfo ::= SEQUENCE {
    interFreqNeedForGaps BOOLEAN
}

InterRAT-BandList ::= SEQUENCE (SIZE (1..maxBands)) OF InterRAT-BandInfo

InterRAT-BandInfo ::= SEQUENCE {
    interRAT-NeedForGaps BOOLEAN
}

IRAT-ParametersUTRA-FDD ::= SEQUENCE {
    supportedBandListUTRA-FDD SupportedBandListUTRA-FDD
}

IRAT-ParametersUTRA-v920 ::= SEQUENCE {
    e-RedirectionUTRA-r9 ENUMERATED {supported}
}

IRAT-ParametersUTRA-v9c0 ::= SEQUENCE {
    voiceOverPS-HS-UTRA-FDD-r9 ENUMERATED {supported} OPTIONAL,
    voiceOverPS-HS-UTRA-TDD128-r9 ENUMERATED {supported} OPTIONAL,
    srvcc-FromUTRA-FDD-ToUTRA-FDD-r9 ENUMERATED {supported} OPTIONAL,
}
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smerc-FromUTRA-FDD-ToGERAN-r9 ENUMERATED { supported } OPTIONAL,
smerc-FromUTRA-TDD128-ToUTRA-TDD128-r9 ENUMERATED { supported } OPTIONAL,
smerc-FromUTRA-TDD128-ToGERAN-r9 ENUMERATED { supported } OPTIONAL

IRAT-ParametersUTRA-v9h0 ::= SEQUENCE {
  mfbi-UTRA-r9 ENUMERATED { supported }
}

SupportedBandListUTRA-FDD ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-FDD

SupportedBandUTRA-FDD ::= ENUMERATED {
  bandII, 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}

IRAT-ParametersUTRA-TDD128 ::= SEQUENCE {
  supportedBandListUTRA-TDD128 SupportedBandListUTRA-TDD128
}

SupportedBandListUTRA-TDD128 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD128

SupportedBandUTRA-TDD128 ::= ENUMERATED {
  a, b, c, d, e, f, g, h, i, j, k, l, m, n,
  o, p, ...}

IRAT-ParametersUTRA-TDD384 ::= SEQUENCE {
  supportedBandListUTRA-TDD384 SupportedBandListUTRA-TDD384
}

SupportedBandListUTRA-TDD384 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD384
SupportedBandUTRA-TDD384 ::= ENUMERATED {
    a, b, c, d, e, f, g, h, i, j, k, l, m, n,
    o, p, ...
}

IRAT-ParametersUTRA-TDD768 ::= SEQUENCE {
    supportedBandListUTRA-TDD768 SupportedBandListUTRA-TDD768
}

SupportedBandListUTRA-TDD768 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD768

SupportedBandUTRA-TDD768 ::= ENUMERATED {
    a, b, c, d, e, f, g, h, i, j, k, l, m, n,
    o, p, ...
}

IRAT-ParametersUTRA-TDD-v1020 ::= SEQUENCE {
    e-RedirectionUTRA-TDD-r10 ENUMERATED {supported}
}

IRAT-ParametersGERAN ::= SEQUENCE {
    supportedBandListGERAN SupportedBandListGERAN,
    interRAT-PS-HO-ToGERAN BOOLEAN
}

IRAT-ParametersGERAN-v920 ::= SEQUENCE {
    dtm-r9 ENUMERATED {supported} OPTIONAL,
    e-RedirectionGERAN-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-Mob1XRTT-r9 ENUMERATED {supported} OPTIONAL
}

IRAT-ParametersCDMA2000-1XRTT-v1020 ::= SEQUENCE {
    e-CSFB-dual-1XRTT-r10 ENUMERATED {supported}
}

SupportedBandList1XRTT ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandclassCDMA2000

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,
utan-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
}

OTDOA-PositioningCapabilities-r10 ::= SEQUENCE {
  otdoa-UE-Assisted-r10 ENUMERATED {supported},
  interFreqRSTD-Measurement-r10 ENUMERATED {supported} OPTIONAL
}

-- ASN1STOP
<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>accessStratumRelease</strong></td>
<td>Set to rel10 in this version of the specification.</td>
</tr>
<tr>
<td><strong>bandCombinationListEUTRA</strong></td>
<td>One entry corresponding to each supported band combination listed in the same order as in supportedBandCombination.</td>
</tr>
<tr>
<td><strong>BandCombinationParameters-v1090</strong></td>
<td>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><strong>bandEUTRA</strong></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><strong>bandListEUTRA</strong></td>
<td>One entry corresponding to each supported E-UTRA band listed in the same order as in supportedBandListEUTRA.</td>
</tr>
<tr>
<td><strong>bandParametersUL, bandParametersDL</strong></td>
<td>Indicates the supported parameters for the band. UE shall indicate parameters for only one CA uplink or downlink bandwidth class in a single band entry for one band combination entry.</td>
</tr>
<tr>
<td><strong>CA-BandwidthClass</strong></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><strong>crossCarrierScheduling</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>deviceType</strong></td>
<td>UE may set the value to ‘noBenFromBatConsumpOpt’ 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>dtm</strong></td>
<td>Indicates whether the UE supports DTM in GERAN.</td>
</tr>
<tr>
<td><strong>e-CSFB-1XRTT</strong></td>
<td>Indicates whether the UE supports enhanced CS fallback to CDMA2000 1xRTT or not. Yes</td>
</tr>
<tr>
<td><strong>e-CSFB-ConcPS-Mob1XRTT</strong></td>
<td>Indicates whether the UE supports concurrent enhanced CS fallback to CDMA2000 1xRTT and PS handover/ redirection to CDMA2000 HRPD. Yes</td>
</tr>
<tr>
<td><strong>e-CSFB-dual-1XRTT</strong></td>
<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. Yes</td>
</tr>
<tr>
<td><strong>enhancedDualLayerTDD</strong></td>
<td>Indicates whether the UE supports enhanced dual layer (PDSCH transmission mode 8) for TDD or not.</td>
</tr>
<tr>
<td><strong>e-RedirectionUTRA</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>e-RedirectionUTRA-TDD</strong></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. Yes</td>
</tr>
<tr>
<td><strong>featureGroupIndicators, featureGroupIndRel9Add, featureGroupIndRel10</strong></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>
</tr>
<tr>
<td><strong>fourLayerTM3-TM4</strong></td>
<td>Indicates whether the UE supports 4-layer spatial multiplexing for TM3 and TM4.</td>
</tr>
<tr>
<td><strong>halfDuplex</strong></td>
<td>If halfDuplex is set to true, only half duplex operation is supported for the band, otherwise full duplex operation is supported.</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>
</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>
</tr>
<tr>
<td><strong>interFreqProximityIndication</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>UE-EUTRA-Capability field descriptions</strong></td>
<td><strong>FDD/TDD diff</strong></td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<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>
</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>
</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>
</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>
</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>
</tr>
<tr>
<td><strong>intraFreqProximityIndication</strong></td>
<td>Indicates whether the UE supports proximity indication for intra-frequency E-UTRAN CSG member cells.</td>
</tr>
<tr>
<td><strong>intraFreqSI-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 intra-frequency cell.</td>
</tr>
<tr>
<td><strong>loggedMeasurementsIdle</strong></td>
<td>Indicates whether the UE supports logged measurements in Idle mode.</td>
</tr>
<tr>
<td><strong>maxNumberROHC-ContextSessions</strong></td>
<td>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.</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 [63].</td>
</tr>
<tr>
<td><strong>MIMO-CapabilityDL</strong></td>
<td>The number of supported layers for spatial multiplexing in DL.</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>
</tr>
<tr>
<td><strong>modifiedMPR-Behavior</strong></td>
<td>Field encoded as a bit map, where at least one bit N is set to &quot;1&quot; 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>
</tr>
<tr>
<td><strong>multiClusterPUSCH-WithinCC</strong></td>
<td>Indicates whether the UE supports the mechanisms defined for cells broadcasting NS-PmaxList.</td>
</tr>
<tr>
<td><strong>multiNS-Pmax</strong></td>
<td>One entry corresponding to each supported E-UTRA band listed in the same order as in supportedBandListEUTRA.</td>
</tr>
<tr>
<td><strong>NonContiguousUL-RA-WithinCC-List</strong></td>
<td>Indicates whether the UE supports UE-assisted OTDOA positioning [54].</td>
</tr>
<tr>
<td><strong>pmi-Disabling</strong></td>
<td>Indicates whether the UE supports delivery of rachReport.</td>
</tr>
<tr>
<td><strong>rach-Report</strong></td>
<td>Indicates whether the UE supports SRVCC handover from UTRA FDD PS HS to GERAN CS.</td>
</tr>
<tr>
<td><strong>simultaneousPUCCH-PUSCH</strong></td>
<td>Indicates whether the UE supports SRVCC handover from UTRA FDD PS HS to GERAN CS.</td>
</tr>
<tr>
<td><strong>srvcc-FromUTRA-FDD-ToGERAN</strong></td>
<td>Indicates whether the UE supports SRVCC handover from UTRA FDD PS HS to UTRA FDD CS.</td>
</tr>
<tr>
<td><strong>srvcc-FromUTRA-FDD-ToUTRA-FDD</strong></td>
<td>Indicates whether the UE supports SRVCC handover from UTRA FDD PS HS to UTRA FDD CS.</td>
</tr>
<tr>
<td><strong>srvcc-FromUTRA-TDD128-ToGERAN</strong></td>
<td>Indicates whether the UE supports SRVCC handover from UTRA FDD PS HS to UTRA FDD CS.</td>
</tr>
<tr>
<td><strong>UE-EUTRA-Capability field descriptions</strong></td>
<td><strong>FDD/TDD diff</strong></td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Indicates whether UE supports SRVCC handover from UTRA TDD 1.28Mcps PS HS to GERAN CS.</td>
<td>-</td>
</tr>
<tr>
<td><strong>srvcc-FromUTRA-TDD128-ToUTRA-TDD128</strong></td>
<td>Indicates whether UE supports SRVCC handover from UTRA TDD 1.28Mcps PS HS to UTRA TDD 1.28Mcps CS.</td>
</tr>
<tr>
<td><strong>standaloneGNSS-Location</strong></td>
<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>
</tr>
<tr>
<td><strong>supportedBandCombination</strong></td>
<td>Indicates the supported CA band combinations, if any, and may include all the supported non-CA bands. The UE shall include all the supported non-CA bands, regardless of whether it supports carrier aggregation, if:</td>
</tr>
<tr>
<td>- it includes <strong>ue-Category-v1020</strong> (i.e. category 6 to 8); or</td>
<td></td>
</tr>
<tr>
<td>- for at least one of the non-CA bands, it supports more MIMO layers with TM9 than implied by the UE category</td>
<td></td>
</tr>
<tr>
<td><strong>SupportedBandCombinationExt, SupportedBandCombination-v1090, SupportedBandCombination-v1010</strong></td>
<td>If included, the UE shall include the same number of entries, and listed in the same order, as in supportedBandCombination-r10.</td>
</tr>
<tr>
<td><strong>SupportedBandGERAN</strong></td>
<td>GERAN band as defined in TS 45.005 [20].</td>
</tr>
<tr>
<td><strong>SupportedBandList1XRTT</strong></td>
<td>One entry corresponding to each supported CDMA2000 1xRTT band class.</td>
</tr>
<tr>
<td><strong>SupportedBandListEUTRA</strong></td>
<td>Includes the supported E-UTRA bands. This field shall include all bands which are indicated in BandCombinationParameters.</td>
</tr>
<tr>
<td><strong>SupportedBandListEUTRA-v9e0</strong></td>
<td>If included, the UE shall include the same number of entries, and listed in the same order, as in supportedListEUTRA (i.e. without suffix).</td>
</tr>
<tr>
<td><strong>SupportedBandListGERAN</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>SupportedBandListHRPD</strong></td>
<td>One entry corresponding to each supported CDMA2000 HRPD band class.</td>
</tr>
<tr>
<td><strong>SupportedBandUTRA-FDD</strong></td>
<td>UTRA band as defined in TS 25.101 [17].</td>
</tr>
<tr>
<td><strong>SupportedBandUTRA-TDD128</strong></td>
<td>UTRA band as defined in TS 25.102 [18].</td>
</tr>
<tr>
<td><strong>SupportedBandUTRA-TDD384</strong></td>
<td>UTRA band as defined in TS 25.102 [18].</td>
</tr>
<tr>
<td><strong>SupportedBandUTRA-TDD768</strong></td>
<td>UTRA band as defined in TS 25.102 [18].</td>
</tr>
<tr>
<td><strong>supportedBandwidthCombinationSet</strong></td>
<td>The <strong>supportedBandwidthCombinationSet</strong> indicated for a band combination is applicable to all bandwidth classes indicated by the UE in this band combination.</td>
</tr>
<tr>
<td>Field encoded as a bit map, where bit N is set to &quot;1&quot; 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.</td>
<td></td>
</tr>
<tr>
<td><strong>tm9-With-8Tx-FDD</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>tm5-FDD</strong></td>
<td>Indicates whether the UE supports the PDSCH transmission mode 5 in FDD.</td>
</tr>
<tr>
<td><strong>tm5-TDD</strong></td>
<td>Indicates whether the UE supports the PDSCH transmission mode 5 in TDD.</td>
</tr>
<tr>
<td><strong>twoAntennaPortsForPUCCH</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>ue-Category</strong></td>
<td>UE category as defined in TS 36.306 [5]. Set to values 1 to 8 in this version of the specification.</td>
</tr>
<tr>
<td><strong>ue-SpecificRefSigsSupported</strong></td>
<td>TRUE indicates that the UE is capable of supporting UE transmit antenna selection as described in TS 36.213 [23, 8.7].</td>
</tr>
<tr>
<td><strong>utran-ProximityIndication</strong></td>
<td>Indicates whether the UE supports proximity indication for UTRAN CSG member cells.</td>
</tr>
<tr>
<td><strong>utran-Si-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...</td>
</tr>
</tbody>
</table>
NOTE 1: The IE *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 *UE-EUTRA-CapabilityAddXDD-Mode-xNM*, a different value compared to the value signalled elsewhere within *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).

NOTE 3: All the combinations of *CA-MIMO-ParametersUL* and *CA-MIMO-ParametersDL* for one band and across all the bands in each *BandCombinationParameters* are supported by the UE and have the same measurement gap requirement (i.e. the same *BandInfoEUTRA* applies). The *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.

---

**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**

```asn1
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},
...
}

-- ASN1STOP

<table>
<thead>
<tr>
<th>UE-TimersAndConstants field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n3xy</strong></td>
</tr>
<tr>
<td><strong>t3xy</strong></td>
</tr>
</tbody>
</table>

6.3.7 MBMS information elements

– MBMS-NotificationConfig

The IE MBMS-NotificationConfig specifies the MBMS notification related configuration parameters, that are applicable for all MBSFN areas.

**MBMS-NotificationConfig information element**

-- ASN1START

MBMS-NotificationConfig-r9 ::= SEQUENCE {
    notificationRepetitionCoeff-r9 ENUMERATED {n2, n4},
    notificationOffset-r9 INTEGER (0..10),
    notificationSF-Index-r9 INTEGER (1..6)
}

-- ASN1STOP

<table>
<thead>
<tr>
<th>MBMS-NotificationConfig field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>notificationOffset</strong></td>
</tr>
<tr>
<td><strong>notificationRepetitionCoeff</strong></td>
</tr>
<tr>
<td><strong>notificationSF-Index</strong></td>
</tr>
</tbody>
</table>
MBSFN-AreaInfoList

The IE **MBSFN-AreaInfoList** contains the information required to acquire the MBMS control information associated with one or more MBSFN areas.

**MBSFN-AreaInfoList information element**

```asn1
-- ASN1START

MBSFN-AreaInfoList-r9 ::= SEQUENCE (SIZE(1..maxMBSFN-Area)) OF MBSFN-AreaInfo-r9

MBSFN-AreaInfo-r9 ::= SEQUENCE {
  mbsfn-AreaId-r9 INTEGER (0..255),
  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**

**mbsfn-AreaId**
Indicates the MBSFN area ID, parameter \( \text{N}_{\text{MBSFN}} \) in TS 36.211 [21, 6.10.2.1].

**mcch-ModificationPeriod**
Defines periodically appearing boundaries, i.e. radio frames for which \( \text{SFN} \mod \text{mcch-ModificationPeriod} = 0 \). 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 \( \text{mcch-RepetitionPeriod} \), the radio frames in which MCCH is scheduled i.e. MCCH is scheduled in radio frames for which: \( \text{SFN} \mod \text{mcch-RepetitionPeriod} = \text{mcch-Offset} \).

**mcch-RepetitionPeriod**
Defines the interval between transmissions of MCCH information, in radio frames, Value \( \text{rf}32 \) corresponds to 32 radio frames, \( \text{rf}64 \) 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, Section 5.3.3.1] and so on.

**sf-AllocInfo**
Indicates the subframes of the radio frames indicated by the \( \text{mcch-RepetitionPeriod} \) and the \( \text{mcch-Offset} \), 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 \( \text{mcch-RepetitionPeriod} \) and \( \text{mcch-Offset} \), 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 \( \text{mcch-RepetitionPeriod} \) and \( \text{mcch-Offset} \), 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 Modulation and Coding Scheme (MCS) applicable for the subframes indicated by the field \( \text{sf-AllocInfo} \) 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 \( \text{MCS}_I \) 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.

#### MBSFN-SubframeConfig information element

```plaintext
-- 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/leftmost 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/leftmost 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. Uplink subframes are not allocated.

oneFrame
'1' denotes that the corresponding subframe is allocated for MBSFN. The following mapping applies:

FDD: The first/leftmost 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/leftmost bit defines the allocation for subframe #3, 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.

radioFrameAllocationPeriod, radioFrameAllocationOffset
Radio-frames that contain MBSFN subframes occur when equation \( SFN \mod radioFrameAllocationPeriod = radioFrameAllocationOffset \) is satisfied. Value \( n1 \) for radioframeAllocationPeriod 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 radioFrameAllocationPeriod and the radioFrameAllocationOffset.

-- PMCH-InfoList
The IE PMCH-InfoList specifies configuration of all PMCHs of an MBSFN area. The information provided for an individual PMCH includes the configuration parameters of the sessions that are carried by the concerned PMCH.

PMCH-InfoList information element

-- ASN1START

PMCH-InfoList-r9 ::= SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF PMCH-Info-r9

PMCH-Info-r9 ::= SEQUENCE {  
  pmch-Config-r9    PMCH-Config-r9,  
  mbms-SessionInfoList-r9   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},
  ...
}

TMGI-r9 ::= SEQUENCE {
  plmn-Id-r9                   CHOICE {
    plmn-Index-r9                INTEGER (1..6),
    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, Table 7.1.7.1-1], which defines the Modulation and Coding Scheme (MCS) applicable for the subframes of this (P)MCH as indicated by the field commonSF-Alloc. The MCS does however neither apply to the subframes that may carry MCCH i.e. the subframes indicated by the field sf-AllocoInfo 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 rf8 corresponds to 8 radio frames, 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 mcch-RepetitionPeriod.

**plmn-Index**
Index of the entry in field plmn-IdentityList within SystemInformationBlockType1.

**sessionId**
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.

**serviceld**
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 indicated by field commonSF-AllocPeriod. The subframes allocated to (P)MCH corresponding with the $i^{th}$ 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.
### 6.4 RRC multiplicity and type constraint values

- Multiplicity and type constraint definitions

```plaintext
maxBandComb-r10 INTEGER ::= 128 -- Maximum number of band combinations.
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
maxCellBlack INTEGER ::= 16 -- Maximum number of blacklisted physical cell identity ranges listed in SIB type 4 and 5
maxCellInfoGERAN-r9 INTEGER ::= 32 -- Maximum number of GERAN cells for which system information can be provided as redirection assistance
maxCellInfoUTRA-r9 INTEGER ::= 16 -- Maximum number of UTRA cells for which system information can be provided as redirection assistance
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
maxDRB INTEGER ::= 11 -- Maximum number of Data Radio Bearers
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
```
<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxFBI</td>
<td>INTEGER ::= 64 -- Maximum value of frequency band indicator</td>
</tr>
<tr>
<td>maxFBI-Plus1</td>
<td>INTEGER ::= 65 -- Lowest value extended FBI range</td>
</tr>
<tr>
<td>maxFBI2</td>
<td>INTEGER ::= 256 -- Highest value extended FBI range</td>
</tr>
<tr>
<td>maxFreq</td>
<td>INTEGER ::= 8 -- Maximum number of carrier frequencies</td>
</tr>
<tr>
<td>maxGERAN-SI</td>
<td>INTEGER ::= 10 -- Maximum number of GERAN SI blocks that can be provided as part of NACC information</td>
</tr>
<tr>
<td>maxGNFG</td>
<td>INTEGER ::= 16 -- Maximum number of GERAN neighbour freq groups</td>
</tr>
<tr>
<td>maxLogMeasReport-r10</td>
<td>INTEGER ::= 520 -- Maximum number of logged measurement entries that can be reported by the UE in one message</td>
</tr>
<tr>
<td>maxMBSFN-Allocations</td>
<td>INTEGER ::= 8 -- Maximum number of MBSFN frame allocations with different offset</td>
</tr>
<tr>
<td>maxMBSFN-Area</td>
<td>INTEGER ::= 8</td>
</tr>
<tr>
<td>maxMBSFN-Area-1</td>
<td>INTEGER ::= 7</td>
</tr>
<tr>
<td>maxMeasId</td>
<td>INTEGER ::= 32</td>
</tr>
<tr>
<td>maxMultiBands</td>
<td>INTEGER ::= 8 -- Maximum number of additional frequency bands that a cell belongs to</td>
</tr>
<tr>
<td>maxNS-Pmax-r10</td>
<td>INTEGER ::= 8 -- Maximum number of NS and P-Max values per band</td>
</tr>
<tr>
<td>maxObjectId</td>
<td>INTEGER ::= 32</td>
</tr>
<tr>
<td>maxPageRec</td>
<td>INTEGER ::= 16</td>
</tr>
<tr>
<td>maxPhysCellIdRange-r9</td>
<td>INTEGER ::= 4 -- Maximum number of physical cell identity ranges</td>
</tr>
<tr>
<td>maxPNOffset</td>
<td>INTEGER ::= 511 -- Maximum number of CDMA2000 PNOffsets</td>
</tr>
<tr>
<td>maxPMCH-PerMBSFN</td>
<td>INTEGER ::= 15</td>
</tr>
<tr>
<td>maxRAT-Capabilities</td>
<td>INTEGER ::= 8 -- Maximum number of interworking RATs (incl EUTRA)</td>
</tr>
<tr>
<td>maxReportConfigId</td>
<td>INTEGER ::= 32</td>
</tr>
<tr>
<td>maxRSTD-Freq-r10</td>
<td>INTEGER ::= 3 -- Maximum number of frequency layers for RSTD measurement</td>
</tr>
<tr>
<td>maxSCell-r10</td>
<td>INTEGER ::= 4 -- Maximum number of SCells</td>
</tr>
<tr>
<td>maxServCell-r10</td>
<td>INTEGER ::= 5 -- Maximum number of Serving cells</td>
</tr>
<tr>
<td>maxServiceCount</td>
<td>INTEGER ::= 16 -- Maximum number of MBMS services that can be included in an MBMS counting request and response</td>
</tr>
<tr>
<td>maxServiceCount-1</td>
<td>INTEGER ::= 15</td>
</tr>
<tr>
<td>maxSessionPerPMCH</td>
<td>INTEGER ::= 29</td>
</tr>
<tr>
<td>maxSessionPerPMCH-1</td>
<td>INTEGER ::= 28</td>
</tr>
<tr>
<td>maxSIB</td>
<td>INTEGER ::= 32 -- Maximum number of SIBs</td>
</tr>
</tbody>
</table>
maxSIB-1 INTEGER ::= 31
maxSI-Message INTEGER ::= 32 -- Maximum number of SI messages
maxSimultaneousBands-r10 INTEGER ::= 64 -- Maximum number of simultaneously aggregated bands
maxUTRA-FDD-Carrier INTEGER ::= 16 -- Maximum number of UTRA FDD carrier frequencies
maxUTRA-TDD-Carrier INTEGER ::= 16 -- Maximum number of UTRA TDD carrier frequencies

NOTE: The value of maxDRB align with SA2.

– End of EUTRA-RRC-Definitions

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.

-- ASN1START

EUTRA-UE-Variables DEFINITIONS AUTOMATIC TAGS ::= 

BEGIN 

IMPORTS

AbsoluteTimeInfo-r10,
AreaConfiguration-r10,
CarrierFreqGERAN,
CellIdentity,
SpeedStateScaleFactors,
C-RNTI,
LoggingDuration-r10,
LoggingInterval-r10,
LogMeasInfo-r10,
MeasId,
MeasIdToAddModList,
MeasObjectToAddModList,
MeasObjectToAddModList-v9e0,
MobilityStateParameters,
NeighCellConfig,
PhysCellId,
PhysCellIdCDMA2000,
PhysCellIdGERAN,
PhysCellIdUTRA-FDD,
PhysCellIdUTRA-TDD,
PLMN-Identity,
QuantityConfig,
ReportConfigToAddModList,
RLF-Report-r9,
RSRP-Range,
TraceReference-r10,
maxCellMeas,
maxMeasId
FROM EUTRA-RRC-Definitions;

-- 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 and inter-RAT mobility related measurements.

VarLogMeasConfig UE variable

-- ASN1START
VarLogMeasConfig-r10 ::= SEQUENCE {
    areaConfiguration-r10   AreaConfiguration-r10  OPTIONAL,
    loggingDuration-r10    LoggingDuration-r10,
    loggingInterval-r10    LoggingInterval-r10
}

-- ASN1STOP

– VarLogMeasReport

The UE variable VarLogMeasReport includes the logged measurements information.

**VarLogMeasReport UE variable**

-- ASN1START

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
}

LogMeasInfoList2-r10 ::= SEQUENCE (SIZE (1..maxLogMeas-r10)) OF LogMeasInfo-r10

-- ASN1STOP

– VarMeasConfig

The UE variable VarMeasConfig includes the accumulated configuration of the measurements to be performed by the UE, covering intra-frequency, inter-frequency and inter-RAT mobility related measurements.

**NOTE:** The amount of measurement configuration information, which a UE is required to store, is specified in subclause 11.1. If the number of frequencies configured for a particular RAT exceeds the minimum performance requirements specified in [16], it is up to UE implementation which frequencies of that RAT are measured. If the total number of frequencies for all RATs provided to the UE in the measurement configuration exceeds the minimum performance requirements specified in [16], it is up to UE implementation which frequencies/RATs are measured.
VarMeasConfig UE variable

-- ASN1START

VarMeasConfig ::= SEQUENCE {
  -- Measurement identities
  measIdList            MeasIdToAddModList    OPTIONAL,
  -- Measurement objects
  measObjectList        MeasObjectToAddModList    OPTIONAL,
  measObjectList-v9i0   MeasObjectToAddModList-v9e0   OPTIONAL,
  -- Reporting configurations
  reportConfigList      ReportConfigToAddModList   OPTIONAL,
  -- Other parameters
  quantityConfig        QuantityConfig      OPTIONAL,
  s-Measure             INTEGER (-140..-44)     OPTIONAL,
  speedStatePars        CHOICE {
    release              NULL,
    setup                SEQUENCE {
      mobilityStateParameters    MobilityStateParameters,
      timeToTrigger-SF     SpeedStateScaleFactors
    }
  }
}

-- 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..maxId)) OF VarMeasReport

VarMeasReport ::= SEQUENCE {
  -- List of measurement that have been triggered

measId          MeasId,
cellsTriggeredList  CellsTriggeredList  OPTIONAL,
numberOfReportsSent  INTEGER
}

CellsTriggeredList ::=  SEQUENCE (SIZE (1..maxCellMeas)) OF CHOICE {
  physCellIdEUTRA  PhysCellId,
  physCellIdUTRA  CHOICE {
    fdd  PhysCellIdUTRA-FDD,
    tdd  PhysCellIdUTRA-TDD
  },
  physCellIdGERAN  SEQUENCE {
    carrierFreq  CarrierFreqGERAN,
    physCellId  PhysCellIdGERAN
  },
  physCellIdCDMA2000  PhysCellIdCDMA2000
}

– VarRLF-Report

The UE variable VarRLF-Report includes the radio link failure information or handover failure information.

VarRLF-Report UE variable

– VarShortMAC-Input

The UE variable VarShortMAC-Input specifies the input used to generate the shortMAC-I.
**VarShortMAC-Input UE variable**

-- ASN1START

VarShortMAC-Input ::= SEQUENCE {
  cellIdentity         CellIdentity,
  physCellId           PhysCellId,
  c-RNTI               C-RNTI
}

-- ASN1STOP

**VarShortMAC-Input field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cellIdentity</td>
<td>Set to CellIdentity of the current cell.</td>
</tr>
<tr>
<td>c-RNTI</td>
<td>Set to C-RNTI that the UE had in the PCell it was connected to prior to the failure.</td>
</tr>
<tr>
<td>physCellId</td>
<td>Set to the physical cell identity of the PCell the UE was connected to prior to the failure.</td>
</tr>
</tbody>
</table>

**Multiplicity and type constraint definitions**

This section includes multiplicity and type constraints applicable (only) for UE variables.

-- ASN1START

maxLogMeas-r10 INTEGER ::= 4060 -- Maximum number of logged measurement entries that can be stored by the UE

-- ASN1STOP

**End of EUTRA-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 (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</td>
<td>Reception of RRCConnectionSetup or RRCConnectionReject 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>T301</td>
<td>Transmission of RRCConnectionReestablishmentRequest</td>
<td>Reception of RRCConnectionReestablishmentReject message as well as when the selected cell becomes unsuitable</td>
<td>Go to RRC_IDLE</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 MobilityControlInfo or reception of MobilityFromEUTRACommand message including CellChangeOrder</td>
<td>Criterion for successful completion of handover to EUTR 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>T310</td>
<td>Upon detecting physical layer problems 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, 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>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>
</tbody>
</table>
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 received from lower layers</td>
</tr>
<tr>
<td>N311</td>
<td>Maximum number of consecutive &quot;in-sync&quot; indications received from lower layers</td>
</tr>
</tbody>
</table>

8 Protocol data unit abstract syntax

8.1 General

The RRC PDU contents in clause 6 and clause 10 are described using abstract syntax notation one (ASN.1) as specified in ITU-T Rec. X.680 [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, 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

- upon reception of an PDCP SDU from the PDCP layer, the first bit of the PDCP SDU shall represent the first bit of the RRC PDU and onwards; and

- upon reception of an RLC SDU from the RLC layer, the first bit of the RLC SDU shall represent the first bit of the RRC PDU and onwards.

8.3 Basic production

The 'basic production' is obtained by applying UNALIGNED PER to the abstract syntax value (the ASN.1 description) as specified in X.691. It always contains a multiple of 8 bits.

8.4 Extension

The following rules apply with respect to the use of protocol extensions:

- A transmitter compliant with this version of the specification shall, unless explicitly indicated otherwise on a PDU type basis, set the extension part empty. Transmitters compliant with a later version may send non-empty extensions;

- A transmitter compliant with this version of the specification shall set spare bits to zero;

8.5 Padding

If the encoded RRC message does not fill a transport block, the RRC layer shall add padding bits. This applies to PCCH and BCCH.

Padding bits shall be set to 0 and the number of padding bits is a multiple of 8.

---

![Figure 8.5-1: RRC level padding](image-url)
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>
<td></td>
</tr>
</tbody>
</table>

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

<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>Normal MAC headers are used</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></td>
</tr>
</tbody>
</table>

9.1.1.3 PCCH 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>
<td></td>
</tr>
</tbody>
</table>

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>
<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>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>
<td></td>
<td></td>
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</table>
9.1.2 SRB configurations

9.1.2.1 SRB1

Parameters

<table>
<thead>
<tr>
<th>Name</th>
<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>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.1.2.2 SRB2

Parameters

<table>
<thead>
<tr>
<th>Name</th>
<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>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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. 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>
<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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;pollPDU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;pollByte</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;maxRetxThreshold</td>
<td></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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;t-StatusProhibit</td>
<td></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>
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<tr>
<td>bucketSizeDuration</td>
<td>N/A</td>
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<tr>
<td>logicalChannelGroup</td>
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</tbody>
</table>
9.2.1.2 SRB2

Parameters

<table>
<thead>
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<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLC configuration</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>ul-RLC-Config</td>
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<td></td>
</tr>
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<td>&gt;t-PollRetransmit</td>
<td>ms45</td>
<td>infinity</td>
<td></td>
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<tr>
<td>&gt;pollPDU</td>
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<td>infinity</td>
<td></td>
</tr>
<tr>
<td>&gt;pollByte</td>
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<td>14</td>
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<tr>
<td>&gt;maxRetxThreshold</td>
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</tr>
<tr>
<td>dl-RLC-Config</td>
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<tr>
<td>&gt;t-Reordering</td>
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</tr>
<tr>
<td>&gt;t-StatusProhibit</td>
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<td></td>
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<tr>
<td>Logical channel configuration</td>
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<td>priority</td>
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<tr>
<td>prioritisedBitRate</td>
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</tr>
<tr>
<td>bucketSizeDuration</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>logicalChannelGroup</td>
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</tr>
</tbody>
</table>

9.2.2 Default MAC main configuration

Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAC main configuration</td>
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<td></td>
</tr>
<tr>
<td>maxHARQ-tx</td>
<td>n5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>periodicBSR-Timer</td>
<td>infinity</td>
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<td></td>
</tr>
<tr>
<td>retxBSR-Timer</td>
<td>sf2560</td>
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</tr>
<tr>
<td>ttiBundling</td>
<td>FALSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>drx-Config</td>
<td>release</td>
<td></td>
<td></td>
</tr>
<tr>
<td>phr-Config</td>
<td>release</td>
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<td></td>
</tr>
</tbody>
</table>

9.2.3 Default semi-persistent scheduling configuration

SPS-Config

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;sps-ConfigDL</td>
<td></td>
<td>release</td>
<td></td>
</tr>
<tr>
<td>&gt;sps-ConfigUL</td>
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</table>

9.2.4 Default physical channel configuration

Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDSCH-ConfigDedicated</td>
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<td></td>
</tr>
<tr>
<td>&gt;p-a</td>
<td>dB0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUCCH-ConfigDedicated</td>
<td></td>
<td>bundling</td>
<td>release</td>
</tr>
<tr>
<td>&gt; tdd-AckNackFeedbackMode</td>
<td></td>
<td>Only valid for TDD mode</td>
<td></td>
</tr>
<tr>
<td>&gt;ackNackRepetition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUSCH-ConfigDedicated</td>
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<td>10</td>
<td></td>
</tr>
<tr>
<td>&gt;betaOffset-ACK-Index</td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>&gt;betaOffset-RI-Index</td>
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<td>15</td>
<td></td>
</tr>
<tr>
<td>UplinkPowerControlDedicated</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>&gt;p0-UE-PUSCH</td>
<td></td>
<td>en0 (disabled)</td>
<td></td>
</tr>
<tr>
<td>&gt;deltaMCS-Enabled</td>
<td></td>
<td>TRUE</td>
<td></td>
</tr>
<tr>
<td>&gt;accumulationEnabled</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>&gt;p0-UE-PUCCH</td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>&gt;pSRS-Offset</td>
<td></td>
<td>fc4</td>
<td></td>
</tr>
<tr>
<td>&gt; filterCoefficient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tpc-pdch-ConfigPUCCH</td>
<td></td>
<td>release</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Value</td>
<td>Semantics description</td>
<td>Ver</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>---------</td>
<td>-----------------------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>tpc-pdch-ConfigPUSCH</td>
<td>release</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CQI-ReportConfig</td>
<td>release</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; CQI-ReportPeriodic</td>
<td>release</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; cqi-ReportModeAperiodic</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; nomPDSCH-RS-EPRE-Offset</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SoundingRS-UL-ConfigDedicated</td>
<td>release</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AntennaInfoDedicated</td>
<td>tm1, tm2</td>
<td>If the number of PBCH antenna ports is one, tm1 is used as default; otherwise tm2 is used as default</td>
<td></td>
</tr>
<tr>
<td>&gt;transmissionMode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;codebookSubsetRestriction</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;ue-TransmitAntennaSelection</td>
<td>release</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SchedulingRequestConfig</td>
<td>release</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.2.5 Default values timers and constants

Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>t310</td>
<td>ms1000</td>
<td></td>
<td></td>
</tr>
<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>

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.

-- ASN1START

EUTRA-InterNodeDefinitions DEFINITIONS AUTOMATIC TAGS ::=


10.2.2 Message definitions

--- HandoverCommand

This message is used to transfer the handover command generated by the target eNB, which is transparently transferred by the source RAN to the UE.
Direction: target eNB to source eNB/ source RAN

**HandoverCommand message**

```asn1
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 {}       OPTIONAL
  }
}

HandoverCommand-r8-IEs ::= SEQUENCE {
  handoverCommandMessage    OCTET STRING (CONTAINING DL-DCCH-Message),
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
```

**HandoverCommand field descriptions**

*handoverCommandMessage*
Contains the entire DL-DCCH-Message including the *RRConnectionReconfiguration* message used to perform handover to E-UTRAN, generated (entirely) by the target eNB.

– **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 {
```

-- ASN1START
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, spare6, spare5, v10j0, spare3,
    spare2, spare1, ...} 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
}

-- Late non-critical extensions:
HandoverPreparationInformation-v9j0-IEs ::= SEQUENCE {
  -- Following field is only for pre REL-10 late non-critical extensions
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension HandoverPreparationInformation-v10j0-IEs OPTIONAL
}

HandoverPreparationInformation-v10j0-IEs ::= SEQUENCE {
  as-Config-v10j0 AS-Config-v10j0 OPTIONAL, -- Need ON
  -- Following field is only for late non-critical extensions from REL-10
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- Regular non-critical extensions:
HandoverPreparationInformation-v9e0-IEs ::= SEQUENCE {
  as-Config-v9e0 AS-Config-v9e0 OPTIONAL, -- Cond HO2
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP

--- 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**
E-UTRA radio access capabilities are always included and in case of inter-RAT handover to E-UTRA, UTRA radio access capabilities may be included. (If UTRA radio access capabilities are received from the source RAN, they are ignored by target eNB.) In case of inter-RAT handover to E-UTRA and the source is GERAN, GERAN capabilities are always included.

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 temporary continues extensions of this part of the configuration in a target PCell not supporting them.
### Conditional presence and Explanation

<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>

---

**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 {}       }
```

---

**UERadioAccessCapabilityInformation field descriptions**

**ue-RadioAccessCapabilityInfo**

Including E-UTRA, GERAN, and CDMA2000-1xRTT Bandclass radio access capabilities (separated). UTRA radio access capabilities are not included.
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.

**As-Config** information element

```asn1
AS-Config ::= SEQUENCE {
    sourceMeasConfig     MeasConfig,
    sourceRadioResourceConfig   RadioResourceConfigDedicated,
    sourceSecurityAlgorithmConfig  SecurityAlgorithmConfig,
    sourceUE-Identity     C-RNTI,
    sourceMasterInformationBlock   MasterInformationBlock,
    sourceSystemInformationBlockType1 SystemInformationBlockType1(WITH COMPONENTS
                                          {..., nonCriticalExtension ABSENT}),
    sourceSystemInformationBlockType2 SystemInformationBlockType2,
    antennaInfoCommon     AntennaInfoCommon,
    sourceDl-CarrierFreq    ARFCN-ValueEUTRA,
    ...
    sourceSystemInformationBlockType1Ext OCTET STRING (CONTAINING
                                    SystemInformationBlockType1-v890-IEs) OPTIONAL,
    sourceOtherConfig-r9    OtherConfig-r9
}]

[[ sourceSCellConfigList-r10   SCellToModList-r10 OPTIONSAL
]]
}

AS-Config-v9e0 ::= SEQUENCE {
    sourceDl-CarrierFreq-v9e0  ARFCN-ValueEUTRA-v9e0
}

AS-Config-v10j0 ::= SEQUENCE {
    antennaInfoDedicatedPCell-v10i0  AntennaInfoDedicated-v10i0 OPTIONSAL
}
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

<table>
<thead>
<tr>
<th>Field Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>antennaInfoCommon</strong></td>
</tr>
<tr>
<td>This field provides information about the number of antenna ports in the source PCell.</td>
</tr>
<tr>
<td><strong>sourceDL-CarrierFreq</strong></td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td><strong>sourceOtherConfig</strong></td>
</tr>
<tr>
<td>Provides other configuration in the source PCell.</td>
</tr>
<tr>
<td><strong>sourceMasterInformationBlock</strong></td>
</tr>
<tr>
<td>MasterInformationBlock transmitted in the source PCell.</td>
</tr>
<tr>
<td><strong>sourceMeasConfig</strong></td>
</tr>
<tr>
<td>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.</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 when handover is triggered shall be included. See 10.5.</td>
</tr>
<tr>
<td><strong>sourceSCellConfigList</strong></td>
</tr>
<tr>
<td>Radio resource configuration (common and dedicated) of the SCells configured in the source eNB.</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>
<tr>
<td><strong>sourceSystemInformationBlockType1</strong></td>
</tr>
<tr>
<td>SystemInformationBlockType1 transmitted in the source PCell.</td>
</tr>
<tr>
<td><strong>sourceSystemInformationBlockType2</strong></td>
</tr>
<tr>
<td>SystemInformationBlockType2 transmitted in the source PCell.</td>
</tr>
</tbody>
</table>

---

### AS-Context

The IE AS-Context is used to transfer local E-UTRAN context required by the target eNB.

### AS-Context information element

```
AS-Context ::= SEQUENCE {
  reestablishmentInfo  ReestablishmentInfo  OPTIONAL  -- Cond HO
}
```
AS-Context 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>
</tbody>
</table>

– ReestablishmentInfo

The ReestablishmentInfo IE contains information needed for the RRC connection re-establishment.

ReestablishmentInfo information element

```plaintext
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))
```

-- ASN1STOP
ReestablishmentInfo field descriptions

**additionalReestablishInfoList**
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.

**sourcePhyCellId**
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,
        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,
}
```

---

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---

**RRM-Config field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>candidateCellInfoList</code></td>
<td>A list of the best cells on each frequency for which measurement information was available, in order of decreasing RSRP.</td>
</tr>
<tr>
<td><code>dl-CarrierFreq</code></td>
<td>The source includes <code>dl-CarrierFreq-v1090</code> if and only if <code>dl-CarrierFreq-r10</code> is set to <code>maxEARFCN</code>.</td>
</tr>
<tr>
<td><code>ue-InactiveTime</code></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**

  ```
  maxReestabInfo INTEGER ::= 32 -- Maximum number of KeNB* and shortMAC-I forwarded
  -- at handover for re-establishment preparation
  ```

---

- **End of EUTRA-InterNodeDefinitions**

---

END
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 information elements 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.

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>
</tr>
</thead>
<tbody>
<tr>
<td>#DRBs</td>
<td>The number of DRBs that a UE shall support</td>
<td>8</td>
</tr>
<tr>
<td>#RLC-AM</td>
<td>The number of RLC AM entities that a UE shall support</td>
<td>10</td>
</tr>
<tr>
<td>#minCellperMeasObjectEUTRA</td>
<td>The minimum number of neighbour cells (excluding blacklist cells) that a UE shall be able to store within a MeasObjectEUTRA. NOTE.</td>
<td>32</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>
</tr>
<tr>
<td>#minCellperMeasObjectGERAN</td>
<td>The minimum number of neighbour cells that a UE shall be able to store within a MeasObjectGERAN. NOTE.</td>
<td>32</td>
</tr>
<tr>
<td>#minCellperMeasObjectCDMA2000</td>
<td>The minimum number of neighbour cells that a UE shall be able to store within a MeasObjectCDMA2000. NOTE.</td>
<td>32</td>
</tr>
<tr>
<td>#minCellTotal</td>
<td>The minimum number of neighbour cells (excluding blacklist cells) that UE shall be able to store in total in all measurement objects configured</td>
<td>256</td>
</tr>
</tbody>
</table>

**NOTE:** In case of CGI reporting, the limit regarding the cells E-UTRAN can configure includes the cell for which the UE is requested to report CGI i.e. the amount of neighbour cells that can be included is at most (# minCellperMeasObjectRAT - 1), where RAT represents EUTRA/UTRA/GERAN/CDMA2000 respectively.

### 11.2 Processing delay requirements for RRC procedures

The UE performance requirements for RRC procedures are specified in the following table, by means of a value N:

\[
N = \text{the number of 1ms subframes from the end of reception of the E-UTRAN -> UE message on the UE physical layer up to when the UE shall be ready for the reception of uplink grant for the UE -> E-UTRAN response message with no access delay other than the TTI-alignment (e.g. excluding delays caused by scheduling, the random access procedure or physical layer synchronisation).}
\]

**NOTE:** No processing delay requirements are specified for RN-specific procedures.

---

**Figure 11.2-1: Illustration of RRC procedure delay**

<table>
<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>Procedure title</td>
<td>E-UTRAN -&gt; UE</td>
<td>UE -&gt; E-UTRAN</td>
<td>N</td>
<td>Notes</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---</td>
<td>-------</td>
</tr>
<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>RRConnectionSetup</td>
<td>RRConnectionSetupComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection release</td>
<td>RRConnectionRelease</td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>RRC connection re-configuration (radio resource configuration)</td>
<td>RRConnectionReconfiguration</td>
<td>RRConnectionReconfigurationComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-configuration (measurement configuration)</td>
<td>RRConnectionReconfiguration</td>
<td>RRConnectionReconfigurationComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-configuration (intra-LTE mobility)</td>
<td>RRConnectionReconfiguration</td>
<td>RRConnectionReconfigurationComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection reconfiguration (SCell addition/release)</td>
<td>RRConnectionReconfiguration</td>
<td>RRConnectionReconfigurationComplete</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-establishment</td>
<td>RRConnectionReestablishment</td>
<td>RRConnectionReestablishmentComplete</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, RRConnectionReconfiguration</td>
<td>RRConnectionReconfigurationComplete</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></td>
<td>NA</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>RRConnectionReconfiguration (sent by other RAT)</td>
<td>RRConnectionReconfigurationComplete</td>
<td>NA</td>
<td>The performance of this procedure is specified in [50] in case of handover from GSM and [29], [30] in case of handover from UTRA.</td>
</tr>
<tr>
<td>Handover from E-UTRA</td>
<td>MobilityFromEUTRACommand</td>
<td></td>
<td></td>
<td>NA</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></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement Reporting</td>
<td>MeasurementReport</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</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></td>
<td>NA</td>
</tr>
<tr>
<td>UE information</td>
<td>UEInformationRequest</td>
<td>UEInformationResponse</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>MBMS counting</td>
<td>MBMSCountingRequest</td>
<td>MBMSCountingResponse</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>
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):

-- 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`), 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 "-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>Conf</td>
<td>Confirmation</td>
</tr>
<tr>
<td>Config</td>
<td>Configuration</td>
</tr>
<tr>
<td>DL</td>
<td>Downlink</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>Reestab</td>
<td>Reestablishment</td>
</tr>
<tr>
<td>Req</td>
<td>Request</td>
</tr>
<tr>
<td>Sched</td>
<td>Scheduling</td>
</tr>
<tr>
<td>Thresh</td>
<td>Threshold</td>
</tr>
<tr>
<td>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.

```plaintext
--/example/ ASN1START

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
-- /example/ ASN1START

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 {}
}

-- ASN1STOP
```
A nested two-level CHOICE structure is used, where the alternative PDU types are alternatives within the inner level c1 CHOICE.

Spare alternatives (i.e., spare1 in this case) may be included within the c1 CHOICE to facilitate future extension. The number of such spare alternatives should not extend the total number of alternatives beyond an integer-power-of-two number of alternatives (i.e., eight in this case).

Further extension of the number of alternative PDU types is facilitated using the messageClassExtension alternative in the outer level CHOICE.

A.3.3 Message definition

Each PDU (message) type is specified in an ASN.1 section similar to the one shown in the example below.

```
-- /example/ ASN1START

RRConnectionReconfiguration ::= SEQUENCE { 
  rrc-TransactionIdentifier RRC-TransactionIdentifier, 
  criticalExtensions CHOICE { 
    c1 CHOICE { 
      rrcConnectionReconfiguration-r8 RRCConnectionReconfiguration-r8-IEs, 
      spare3 NULL, spare2 NULL, spare1 NULL 
    }, 
    criticalExtensionsFuture SEQUENCE { } 
  } 
}

RRConnectionReconfiguration-r8-IEs ::= SEQUENCE { 
  -- Enter the IEs here. 
  ... 
}

-- ASN1STOP
```

Hooks for critical and non-critical extension should normally be included in the PDU type specification. How these hooks are used is further described in 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., spare3 down to spare1 in this case) may be included within the c1 CHOICE. The number of spare alternatives to be included in the original PDU specification should be decided case by case, based on the expected rate of critical extension in the future releases of the protocol.

Further critical extension, when the spare alternatives from the original specifications are used up, is facilitated using the criticalExtensionsFuture in the outer level CHOICE.
In PDU types where critical extension is not expected in the future releases of the protocol, the inner level `c1 CHOICE` and the spare alternatives may be excluded, as shown in the example below.

```asn1
RRCConnectionReconfigurationComplete ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    rrcConnectionReconfigurationComplete-r8
      RRCConnectionReconfigurationComplete-r8-IEs,
    criticalExtensionsFuture   SEQUENCE {}
  }
}

RRCConnectionReconfigurationComplete-r8-IEs ::= SEQUENCE {
  -- Enter the IEs here. --
  ... -- Cond condTag
}
```

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 OPTIONAL e.g. as shown in the following example:

```asn1
RRCMessage-r8-IEs ::=      SEQUENCE {
  field1          InformationElement1,
  field2          InformationElement2,
  nonCriticalExtension     SEQUENCE {}      OPTIONAL -- Need OP
}
```

```
The ASN.1 section specifying the contents of a PDU type may be followed by a field description table where a further description of, e.g., the semantic properties of the fields may be included. The general format of this table is shown in the example below. The field description table is absent in case there are no fields for which further description needs to be provided e.g. because the PDU does not include any fields, or because an IE is defined for each field while there is nothing specific regarding the use of this IE that needs to be specified.

<table>
<thead>
<tr>
<th>Field identifier</th>
<th>Field description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDU-TypeIdentifier</td>
<td>Field description</td>
</tr>
</tbody>
</table>

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.

```asn1
-- /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 a ASN.1 definition in to smaller pieces.

A group of closely related IE type definitions, like the IEs PRACH-ConfigSIB and PRACH-Config in this example, are preferably placed together in a common ASN.1 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 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:

```
-- /example/ ASN1START

PreambleInfo ::=     SEQUENCE {
    numberOfRA-Preambles    INTEGER (1..64)      DEFAULT 1,
    ...
}

-- ASN1STOP
```

Alternatively, a field with optional presence may be declared with the keyword OPTIONAL. It identifies a field for which a value can be omitted. The omission carries semantics, which is different from any normal value of the field:
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.

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):

<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>

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.
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

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
RRCMessage ::=      SEQUENCE {
```
rrc-TransactionIdentifier   RRC-TransactionIdentifier,
criticalExtensions       CHOICE {
c1                       CHOICE{
   rrcMessage-r8      RRCMessage-r8-IEs,
   spare3 NULL, spare2 NULL, spare1 NULL
},
criticalExtensionsFuture  SEQUENCE { }
}

-- 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
},
   later                     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
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, 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 is not provided for the field, which always is a group including at least one extension and a field facilitating further possible extensions.

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.

```asn1
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
```

-- /example/ ASN1START
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-v1170 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,
  field2          InformationElement2,
  field3          InformationElement3     OPTIONAL, -- Need ON
  nonCriticalExtension   RRCMessage-v860-IEs     OPTIONAL
}

RRCMessage-v860-IEs ::= SEQUENCE {
  field4-v860      InformationElement4     OPTIONAL, -- Need OP
  field5-v860      BOOLEAN         OPTIONAL, -- Cond C54
  nonCriticalExtension   RRCMessage-v940-IEs
}

RRCMessage-v940-IEs ::= SEQUENCE {
  field6-v940      InformationElement6-r9     OPTIONAL, -- Need OR
  nonCriticalExtensions   SEQUENCE {}        OPTIONAL -- Need OP
}

-- 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
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
  ]]
}
```

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 {
  -- Root encoding, including:
  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)
}
```

---

**Conditional presence**

<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 chIE1-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>

---

**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
```
ChildIE2-WithoutEM ::= CHOICE {
  release         NULL,
  setup         SEQUENCE {
-- Root encoding
  }
}

ChildIE2-WithoutEM-vNx0 ::= SEQUENCE {
  chIE2-NewField-rN     INTEGER (0..31)     OPTIONAL -- Cond ConfigF
}

-- ASN1STOP

<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>DLIinformationTransfer</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>HandoverFromEUTRAPreparationRequestCDMA2000</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>MBSFNAreaConfiguration</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>MeasurementReport</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>RAN2 agreed that measurement configuration may be sent prior to security activation. But: In order to protect privacy of UEs MeasurementReport 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>RRCCConnectionReconfiguration</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCCConnectionReconfigurationComplete</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>Unprotected, if sent as response to RRCCConnectionReconfiguration which was sent before security activation</td>
</tr>
<tr>
<td>RRCCConnectionReestabilishment</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>This message is not protected by PDCP operation.</td>
</tr>
<tr>
<td>RRCCConnectionReestabishmentComplete</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCCConnectionReestabishmentReject</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>RRCCConnectionReestabishmentRequest</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>RRCCConnectionReject</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>RRCCConnectionRelease</td>
<td>+</td>
<td>-</td>
<td>-</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>RRCCConnectionRequest</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>RRCCConnectionSetup</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>RRCCConnectionSetupComplete</td>
<td>+</td>
<td>NA</td>
<td>NA</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>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>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>
</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].

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, 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.

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 | | 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 PUCCH: Mode 2-0 – UE selected subband CQI without PMI  
- Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-1 – UE selected subband CQI with single PMI | - can only be set to 1 if the UE has set bit number 7 to 1. | Yes, if UE supports VoLTE | 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 | No |
| 4 | - Short DRX cycle | - can only be set to 1 if the UE has set bit number 5 to 1. | 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 not support VoLTE | Yes, if UE supports VoLTE | 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 for FDD, if UE supports UTRA FDD | Yes |
| 9 | - EUTRA RRC_CONNECTED to GERAN GSM_Dedicated handover | - related to SR-VCC | 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) | - related to SR-VCC | Yes | |
| 11 | - EUTRA RRC_CONNECTED to CDMA2000 1xRTT CS Active handover | - related to SR-VCC | Yes | |
| 12 | - EUTRA RRC_CONNECTED to CDMA2000 HRPD Active handover | - can only be set to 1 if the UE has set bit number 24 to 1 | Yes | |

*ETSI.*
<p>| 13 | Inter-frequency handover (within FDD or TDD) | - can only be set to 1 if the UE has set bit number 25 to 1 | Yes, unless UE only supports band 13 | No |
| 14 | Measurement reporting event: Event A4 | - Neighbour &gt; threshold | Yes | No |
| 15 | Measurement reporting event: Event A5 | - Serving &lt; threshold1 &amp; Neighbour &gt; threshold2 | Yes | No |
| 16 | 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 | Yes for FDD, if UE supports only UTRAN FDD and does not support UTRAN TDD or GERAN or 1xRTT or HRPD | Yes | No |
| 16 | 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 | Yes | No |
| 16 | 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 | Yes | No |
| 16 | Intra-frequency periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCells; | Inter-frequency periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCells, if the UE has set bit number 25 to 1 | | |
| 16 | Inter-frequency periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCells, if the UE has set bit number 25 to 1 | Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCells for UTRAN FDD or UTRAN TDD, if the UE supports both only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1 | Yes | No |
| 16 | Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCells for UTRAN FDD or UTRAN TDD, if the UE supports both only UTRAN FDD or only 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 reportStrongestCells for UTRAN FDD or UTRAN TDD, if the UE supports both only UTRAN FDD or only UTRAN TDD and has set bit number 22 or 39 to 1, respectively | Yes | No |
| 16 | Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCells for GERAN, 1xRTT or HRPD, if the UE has set bit number 23, 24 or 26 to 1, respectively | NOTE: Event triggered periodical reporting (i.e., with triggerType set to event and with reportAmount &gt; 1) is a mandatory functionality of event triggered reporting and therefore not the subject of this bit. | Yes | No |</p>
<table>
<thead>
<tr>
<th>Table 14: Inter-RAT ANR features including:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 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</td>
</tr>
<tr>
<td>- 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</td>
</tr>
<tr>
<td>- 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</td>
</tr>
<tr>
<td>- 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</td>
</tr>
<tr>
<td>- 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</td>
</tr>
</tbody>
</table>

- 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, 39, 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

<p>| Yes | No |</p>
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<tr>
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</thead>
<tbody>
<tr>
<td>20</td>
<td>If bit number 7 is set to 0:</td>
<td>If bit number 7 is set to 1:</td>
<td>- SRB1 and SRB2 for DCCH + 8x AM DRB</td>
<td>- SRB1 and SRB2 for DCCH + 8x AM DRB</td>
<td>- SRB1 and SRB2 for DCCH + 5x AM DRB + 3x UM DRB</td>
<td>- 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</td>
<td>Yes</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>21</td>
<td>Predefined intra- and inter-subframe frequency hopping for PUSCH with N_sb &gt; 1</td>
<td>Predefined inter-subframe frequency hopping for PUSCH with N_sb &gt; 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
<td></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>UTRAN FDD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode, if the UE supports both UTRAN FDD and UTRAN TDD</td>
<td>Yes for FDD, if UE supports UTRA FDD</td>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>GERAN measurements, reporting and measurement reporting event B2 in E-UTRA connected mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>24</td>
<td>1xRTT measurements, reporting and measurement reporting event B2 in E-UTRA connected mode</td>
<td></td>
<td>Yes for FDD, if UE supports enhanced 1xRTT CSFB for FDD</td>
<td>Yes for TDD, if UE supports enhanced 1xRTT CSFB for TDD</td>
<td></td>
<td>Yes</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>25</td>
<td>Inter-frequency measurements and reporting in E-UTRA connected mode</td>
<td></td>
<td>Yes, unless UE only supports band 13</td>
<td></td>
<td></td>
<td>No</td>
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</tr>
<tr>
<td>26</td>
<td>HRPD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode</td>
<td></td>
<td>Yes for FDD, if UE supports HRPD</td>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
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<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>EUTRA RRC_CONNECTED to UTRA FDD CELL_DCH CS handover, if the UE supports both UTRAN FDD and UTRAN TDD</td>
<td>related to SR-VCC</td>
<td>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]</td>
<td></td>
<td>Yes for FDD, if UE supports VoLTE and UTRA FDD</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>TTI bundling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes for FDD</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Semi-Persistent Scheduling</td>
<td></td>
<td></td>
<td></td>
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<td>Yes</td>
<td>Yes</td>
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<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>
<td></td>
<td></td>
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<tr>
<td>31</td>
<td>- Indicates whether the UE supports the mechanisms defined for cells broadcasting multi band information i.e. comprehending multiBandInfoList, 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>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>32</td>
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</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>
</tr>
</thead>
<tbody>
<tr>
<td>33 (leftmost bit)</td>
<td>Inter-RAT ANR features for UTRAN FDD including:</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>- Inter-RAT periodical measurement reporting where triggerType is set to</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>periodical and purpose is set to reportStrongestCellsForSON</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Inter-RAT periodical measurement reporting where triggerType is set to</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>periodical and purpose is set to reportCGI</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 22 to 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Inter-RAT ANR features for GERAN including:</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>- Inter-RAT periodical measurement reporting where triggerType is set to</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>periodical and purpose is set to reportStrongestCells</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Inter-RAT periodical measurement reporting where triggerType is set to</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>periodical and purpose is set to reportCGI</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 23 to 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Inter-RAT ANR features for 1xRTT including:</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>- Inter-RAT periodical measurement reporting where triggerType is set to</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>periodical and purpose is set to reportStrongestCellsForSON</td>
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<tr>
<td></td>
<td>- Inter-RAT periodical measurement reporting where triggerType is set to</td>
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<tr>
<td></td>
<td>periodical and purpose is set to reportCGI</td>
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<tr>
<td></td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 24 to 1.</td>
<td></td>
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<tr>
<td>36</td>
<td>Inter-RAT ANR features for HRPD including:</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>- Inter-RAT periodical measurement reporting where triggerType is set to</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>periodical and purpose is set to reportStrongestCellsForSON</td>
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<tr>
<td></td>
<td>- Inter-RAT periodical measurement reporting where triggerType is set to</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>periodical and purpose is set to reportCGI</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 26 to 1.</td>
<td></td>
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<tr>
<td>37</td>
<td>Inter-RAT ANR features for UTRAN TDD including:</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>- Inter-RAT periodical measurement reporting where triggerType is set to</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>periodical and purpose is set to reportStrongestCellsForSON</td>
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<tr>
<td></td>
<td>- Inter-RAT periodical measurement reporting where triggerType is set to</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>periodical and purpose is set to reportCGI</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 at least one of the bit number 22 (for UEs supporting only UTRA TDD) or the bit number 39 to 1.</td>
<td></td>
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</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></td>
<td>Yes</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></td>
<td>Yes</td>
</tr>
</tbody>
</table>
### 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.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>40</td>
<td>- EUTRA RRC CONNECTED to UTRA TDD CELL_DCH CS handover, if the UE supports both UTRAN FDD and UTRAN TDD</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Measurement reporting event: Event B1 – Neighbour &gt; threshold for UTRAN FDD, if the UE supports UTRAN FDD and has set bit number 22 to 1</td>
<td>Yes for FDD, unless UE has set bit number 15 to 1</td>
<td></td>
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<tr>
<td>42</td>
<td>Undefined</td>
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<td>64</td>
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<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.1-2: 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-UTRAN 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-UTRAN 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-UTRAN 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-UTRAN 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-UTRAN connected mode</td>
<td>Group 9 (GSM_connected handover) Separate UE capability bit defined in TS 36.306 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 or 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>
<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 “Yes” 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.</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>102</td>
<td>Trigger type 1 SRS (aperiodic SRS) transmission (Up to X ports) &lt;br&gt;Note: X = number of supported layers on given band</td>
<td>- for Category 8 UEs, this bit shall be set to 1.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>103</td>
<td>PDSCH transmission mode 9 when up to 4 CSI reference signal ports are configured</td>
<td>- for Category 8 UEs, this bit shall be set to 1.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>104</td>
<td>PDSCH transmission mode 9 for TDD when 8 CSI reference signal ports are configured</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>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  &lt;br&gt;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.</td>
<td>Yes</td>
<td></td>
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<tr>
<td>No.</td>
<td>Feature Description</td>
<td>Condition</td>
<td>Yes/No</td>
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<tr>
<td>106</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-( \text{With-8Tx-FDD-r10} ) is set to &quot;supported&quot;) and if index 2 (Table B.1-1) is set to 1.</td>
<td>Yes</td>
<td></td>
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<tr>
<td>107</td>
<td>- 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.</td>
<td>- this bit can be set to 1 only if indices 1 (Table B.1-1) and 103 are set to 1.</td>
<td>Yes</td>
<td></td>
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<tr>
<td>108</td>
<td>- 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.</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 &quot;supported&quot;) and if index 1 (Table B.1-1) is set to 1.</td>
<td>Yes</td>
<td></td>
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<tr>
<td>109</td>
<td>- Periodic CQI/PMI/RI reporting on PUCCH Mode 1-1, submode 1</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 &quot;supported&quot;).</td>
<td>Yes</td>
<td></td>
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<tr>
<td>110</td>
<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 &quot;supported&quot;).</td>
<td>Yes</td>
<td></td>
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<tr>
<td>111</td>
<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>
<td></td>
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<tr>
<td>112</td>
<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 and the Handover to EUTRA procedure.</td>
<td>Yes</td>
<td></td>
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<td>113</td>
<td>- Trigger type 0 SRS (periodic SRS) transmission on X Serving Cells</td>
<td>- this bit can be set to 1 only if the UE supports carrier aggregation in UL.</td>
<td>Yes</td>
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<tr>
<td>114</td>
<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>
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<tr>
<td>115</td>
<td>- time domain ICIC RLM/RRM measurement subframe restriction for the serving cell - time domain ICIC RRM measurement subframe restriction for neighbour cells - time domain ICIC CSI measurement</td>
<td>- this bit can be set to 1 only if index 22 (Table B.1-1) is set to 1.</td>
<td>Yes</td>
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<tr>
<td>subframe restriction</td>
<td>Notes: this bit can be set to 1 only if the UE supports two or more layers for spatial multiplexing in UL.</td>
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<tr>
<td>116</td>
<td>Relative transmit phase continuity for spatial multiplexing in UL.</td>
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</tbody>
</table>

**NOTE:** The column FDD/TDD diff indicates if the UE is allowed to signal different values for FDD and TDD.
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.
- 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. The UE applies the first listed band 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: 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 bands associated with f3 has four overlapping bands B3, B4, B92, and B93; the band associated with f4 does not have overlapping bands.
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-UTRA includes 4 UTRAN FDD frequencies.
- The bands associated with f1 and f4 have no overlapping bands. The band associated f2 has two overlapping bands, B1 and B2. The band associated with f3 has one overlapping band, B3.
- E-UTRA include 4 lists in carrierFreqListUTRA-FDD-v8h0 with the first and fourth entry not including MultiBandInfoList.
Annex E (informative):
Change history
3GPP TS 36.331 version 10.19.0 Release 10

399

ETSI TS 136 331 V10.19.0 (2016-01)

Change history
Date
12/2007
03/2008
03/2008
05/2008
09/2008
12/2008
03/2009

TSG #
RP-38
RP-39
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TSG Doc.
RP-070920
RP-080163
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RP-080361
RP-080693
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Rev Subject/Comment
Approved at TSG-RAN #38 and placed under Change Control
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CR to 36.331 with Miscellaneous corrections
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CR to 36.331 to convert RRC to agreed ASN.1 format
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CR to 36.331 on Miscellaneous clarifications/ corrections
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Miscellaneous corrections and clarifications
Correction to the Counter Check procedure
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Issues in handling optional IE upon absence in GERAN NCL
CR to 36.331 on Removal of useless RLC re-establishment at RB
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Padding of the SRB-ID for security input
Validity of ETWS SIB
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Configuration of the Two-Intervals-SPS
Corrections on Scaling Factor Values of Qhyst
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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
1
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R1 of CR0023 (R2-091029) on combination of SPS and TTI
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L3 filtering for path loss measurements
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S-measure handling for reportCGI
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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
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CR to 36.331 - Clarification on Configured PRACH Freq Offset
Clarification on TTI bundling configuration
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Set of values for the parameter "messagePowerOffsetGroupB"
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Delivery of Message Identifier and Serial Number to upper layers
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Clarification on the maximum size of cell lists
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<td>Unification of T300 and T301 and removal of miscellaneous FFSs</td>
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| RP-52 | RP-110830 0735 | - Radio frame alignment of CSA and MSP | 10.1.0 | 10.2.0 |
| RP-52 | RP-110847 0740 | - Reconfiguration involving critically extended IEs (using fullFieldConfig i.e. option 2) | 10.1.0 | 10.2.0 |
| RP-52 | RP-110839 0744 | - Counter proposal to R2-112753 on CR to remove CSG Identity validity limited to CSG cell | 10.1.0 | 10.2.0 |
| RP-52 | RP-110839 0746 | 1 Increase of prioritisedBitRate | 10.1.0 | 10.2.0 |
| RP-53 | RP-111297 0764 | - 36.331 correction on CSG identity validity to allow introduction of CSG RAN sharing | 10.2.0 | 10.3.0 |
| RP-53 | RP-111283 0770 | 2 Additional Spectrum Emissions in CA | 10.2.0 | 10.3.0 |
| RP-53 | RP-111297 0773 | - CR to 36.331 on Small correction of PHR parameter | 10.2.0 | 10.3.0 |
| RP-53 | RP-111283 0775 | 2 Clarifications to P-max on CA | 10.2.0 | 10.3.0 |
| RP-53 | RP-111280 0780 | - Clarification on for which subframes signalling MCS applies | 10.2.0 | 10.3.0 |
| RP-53 | RP-111283 0780 | - Corrections to RNC | 10.2.0 | 10.3.0 |
| RP-53 | RP-111297 0790 | 2 Replace the tables with exception list in 10.5 AS-Config | 10.2.0 | 10.3.0 |
| RP-53 | RP-111297 0796 | - Corrections to the field descriptions | 10.2.0 | 10.3.0 |
| RP-53 | RP-111283 0798 | - Configuration of simultaneous PUCCH&PUSCH | 10.2.0 | 10.3.0 |
| RP-53 | RP-111297 0806 | - Corrections to release of csi-SubframePatternConfig and coi-Mask | 10.2.0 | 10.3.0 |
| RP-53 | RP-111272 0810 | - GERAN SI format for cell change order&PS handover& enhanced redirection to GERAN | 10.2.0 | 10.3.0 |
| RP-53 | RP-111283 0811 | - Corrections to PUCCH-Config field descriptions | 10.2.0 | 10.3.0 |
| 12/2011 | RP-54 | RP-111711 0812 | 1 Clarification of PCI range for CSG cells | 10.3.0 | 10.4.0 |
| 12/2011 | RP-54 | RP-111716 0813 | - Clarifications to Default Radio Configurations | 10.3.0 | 10.4.0 |
| 12/2011 | RP-54 | RP-111716 0814 | 1 Corrections to enhancedDualLayerTDD | 10.3.0 | 10.4.0 |
| 12/2011 | RP-54 | RP-111716 0815 | - Miscellaneous small corrections | 10.3.0 | 10.4.0 |
| 12/2011 | RP-54 | RP-111716 0816 | 1 Correction on notation of SRS transmission comb | 10.3.0 | 10.4.0 |
| 12/2011 | RP-54 | RP-111706 0821 | 3 36.331 CR SPS reconfiguration | 10.3.0 | 10.4.0 |
| 12/2011 | RP-54 | RP-111716 0827 | 2 Clarification of list sizes in measurement configuration stored by UE | 10.3.0 | 10.4.0 |
| 03/2012 | RP-55 | RP-120326 0853 | 1 Limited MBMS counting responses to within the PLMN | 10.4.0 | 10.5.0 |
| 03/2012 | RP-55 | RP-120321 0857 | - CR to 36.331 on cdma2000 band classes and references | 10.4.0 | 10.5.0 |
| 03/2012 | RP-55 | RP-120326 0862 | 1 Clarification on MBMSFN and measurement resource restrictions | 10.4.0 | 10.5.0 |
| 03/2012 | RP-55 | RP-120325 0871 | - On SIB10/11 Reception Timing | 10.4.0 | 10.5.0 |
| 03/2012 | RP-55 | RP-120326 0875 | 1 Clarification on MBMS counting for uncipherable services | 10.4.0 | 10.5.0 |
| 03/2012 | RP-55 | RP-120325 0876 | - Minor correction regarding limited service access on non-CSG-member cell | 10.4.0 | 10.5.0 |
| 03/2012 | RP-55 | RP-120326 0894 | - Time to keep RLF Reporting logs | 10.4.0 | 10.5.0 |
| 03/2012 | RP-55 | RP-120356 0895 | 1 Introducing means to signal different FDD/TDD Capabilities/FGIs for Dual-xDD UE | 10.4.0 | 10.5.0 |
| 06/2012 | RP-55 | RP-120321 0899 | - Clarification on SRB2 resumption upon connection re-establishment (parallel message transmission) | 10.4.0 | 10.5.0 |
| 06/2012 | RP-56 | RP-120805 0900 | 1 Duplicated ASN.1 naming correction | 10.4.0 | 10.5.0 |
| 06/2012 | RP-56 | RP-120805 0909 | - SPS Reconfiguration | 10.5.0 | 10.6.0 |
| 09/2012 | RP-56 | RP-121395 0912 | 1 Change in Scheduling Information for ETWS | 10.5.0 | 10.6.0 |
| 09/2012 | RP-56 | RP-121395 0914 | - Clarification of mch-SchedulingPeriod configuration | 10.5.0 | 10.6.0 |
| 09/2012 | RP-56 | RP-121395 0916 | 1 Change in Scheduling Information for CMAS | 10.5.0 | 10.6.0 |
| 09/2012 | RP-56 | RP-120814 0919 | 1 Introducing means to signal different REL-10 FDD/TDD Capabilities/FGIs for Dual-xDD UE | 10.5.0 | 10.6.0 |
| 09/2012 | RP-56 | RP-120812 0920 | 1 Clarification on setting of dedicated NS value for CA by E-UTRAN | 10.5.0 | 10.6.0 |
| 09/2012 | RP-56 | RP-120808 0931 | - T321 value for UTRA SI acquisition | 10.5.0 | 10.6.0 |
| 09/2012 | RP-56 | RP-120813 0957 | 1 Korean Public Alert System (KPAS) in relation to CMAS | 10.5.0 | 10.6.0 |
| 09/2012 | RP-56 | RP-120812 0969 | 1 Introduction of supported bandwidth combinations for CA | 10.5.0 | 10.6.0 |
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| 12/2012 | RP-57 | RP-121395 1003 | - CR on scell measurement cycle | 10.6.0 | 10.7.0 |
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| 12/2012 | RP-57 | RP-121359 1007 | - Voice support Capabilities | 10.6.0 | 10.7.0 |
| 12/2012 | RP-57 | RP-121361 1012 | - Differentiating UTRAN modes in FGIs | 10.6.0 | 10.7.0 |
| 12/2012 | RP-57 | RP-121279 1059 | - Correction for PUCCH/SRS Release | 10.6.0 | 10.7.0 |
| 12/2012 | RP-58 | RP-121933 1062 | - Correction related to differentiating UTRAN modes in FGIs | 10.7.0 | 10.8.0 |
MaxLayerMIMO in HandoverPreparationInformation

CR to correct UE messages to be sent only after security

Restriction to CA capability signalling

Correction to additionalSpectrumEmission

CR on Aperiodic CSI Reporting for 1.4MHz cell

UE capability for modified MPR behavior

Mandating the FGI bit 31 to true

Clarification of E-UTRA MFBI signalling

Removal of comment line from EUTRA-UE-Variables imports frequencies

Correction to InterFreqRSTDMeasurementIndication field descriptions

Clarification on measurement configuration, including FGI bit 14, 27 and 28 to true

06/2013

RP-60  1030805  1266  - Clarification on the redirection to UTRA-TDD frequency in case of CSFB High Priority

RP-60  1030804  1268  - Correction of wrong reference

RP-60  1030804  1281  - measCycleSCell upon SCcell configuration

RP-60  1030802  1297  - Security key generation in case of MFBI

RP-60  1030804  1314  - Clarification on UE CA capability

RP-60  1030805  1322  - Clarification on the configuration of the extended PHR

RP-60  1030805  1326  - Clarifications on SystemTimeInfoCDMA2000 1E

RP-60  1030804  1327  - Clarification on inclusion of non-CA band combinations

RP-60  1030818  1328  - MFBI aspects for dedicated signalling

09/2013

RP-61  1031311  1338  - Correction on the first subframe of the measurement gap

12/2013

RP-62  1031986  1365  - Introduction of capability bit for UTRA MFBI

RP-62  1031984  1367  - Addition of inter-frequency RSTD measurement capability indicator for OTDOA

RP-62  1031989  1369  - Clarification on supportedBand

RP-62  1031991  1377  - measResultLastServCell for SON-HOF report

RP-62  1031991  1381  - Correction on presence of codebookSubsetRestriction-r10

RP-62  1031991  1388  - Clarification on eRedirection to UMTS TDD with multiple UMTS TDD frequencies

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RP-64  140869  1469  - Removal of comment line from EUTRA-UE-Variables imports

RP-64  140871  1473  - Correction on measObjectList in VarMeasConfig

RP-64  140873  1487  - ACK/NACK feedback mode on PUSCH

RP-64  140871  1543  - Clarification of E-UTRA MFBI signalling

RP-64  140871  1549  - Inter-RAT ANR capability signalling in FGI3 when UE supports UTRA TDD only

RP-64  140873  1552  - Allowing TDD/FDD split for FGI111 and FGI112

09/2014

RP-65  141494  1626  - FDD/TDD split for CA

RP-65  141493  1609  - Clarification for time-domain resource restriction pattern applicable to neighbour cell RSRQ measurements

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RP-65  141113  1634  - Mandating the FGI bit 31 to true

RP-66  142115  1657  - Correction of remaining TBD for Rel-10 FGI

RP-66  142113  1684  - UE capability for modified MPR behavior

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RP-67  150368  1780  - The absence of supportedMIMO-CapabilityUL-r10

RP-67  150370  1748  - Clarification on CSI measurement subframe set

RP-67  150370  1726  - Presence of codebookSubsetRestriction

06/2015

RP-68  150916  1807  - CR on Aperiodic CSI Reporting for 1.4MHz cell

RP-68  150917  1825  - Correction to additionalSpectrumEmission

09/2015

RP-69  151438  1867  - Correction on Restriction to CA capability signalling

RP-69  151438  1896  - Correction to additionalSpectrumEmission - Option 1

12/2015

RP-70  152048  1925  - CR to correct UE messages to be sent only after security activation

RP-70  152046  1966  - MaxLayerMIMO in HandoverPreparationInformation

RP-70  152048  1921  - Enabling multiple NS and P-Max operation per cell
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