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Evolved Universal Terrestrial Radio Access (E-UTRA);
Radio Resource Control (RRC);
Protocol specification
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- RSRP-Range
- RSRQ-Range
- RSRQ-Type
- TimeToTrigger

6.3.6 Other information elements

- AbsoluteTimeInfo
- AreaConfiguration
- C-RNTI
- DedicatedInfoCDMA2000
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- FilterCoefficient
- LoggingDuration
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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".


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

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

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

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

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

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

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

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


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

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

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

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

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

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

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

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


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

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

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

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

[44] 3GPP2 C.S0087-A v2.0: "E-UTRAN - cdma2000 HRPD Connectivity and Interworking Air Interface Specification"

[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 v3.0: "E-UTRAN - cdma2000 1x Connectivity and Interworking Air Interface Specification"

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

[55] 3GPP TS 36.216: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer for relaying operation"

[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"

[63] 3GPP TR 36.816: "Evolved Universal Terrestrial Radio Access (E-UTRA); Study on signalling and procedure for interference avoidance for in-device coexistence"

[64] IS-GPS-200F: "Navstar GPS Space Segment/Navigation User Segment Interfaces"
3 Definitions, symbols and abbreviations

3.1 Definitions

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

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

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

CSG member cell: A cell broadcasting the identity of the selected PLMN, registered PLMN or equivalent PLMN and for which the CSG whitelist of the UE includes an entry comprising cell’s CSG ID and the respective PLMN identity.

Dual Connectivity: A UE in RRC_CONNECTED is configured with Dual Connectivity when configured with a Master and a Secondary Cell Group.

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

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

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

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

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

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

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

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

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

Primary Timing Advance Group: Timing Advance Group containing the PCell or the PSCell.
Secondary Cell: A cell, operating on a secondary frequency, which may be configured once an RRC connection is established and which may be used to provide additional radio resources.

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

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

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

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

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

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

Timing Advance Group: A group of serving cells that is configured by RRC and that, for the cells with an UL configured, use the same timing reference cell and the same Timing Advance value. A Timing Advance Group only includes cells of the same cell group i.e. it either includes MCG cells or SCG cells.

### 3.2 Abbreviations

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

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1xRTT</td>
<td>CDMA2000 1x Radio Transmission Technology</td>
</tr>
<tr>
<td>ACK</td>
<td>Acknowledgement</td>
</tr>
<tr>
<td>AM</td>
<td>Acknowledged Mode</td>
</tr>
<tr>
<td>ANDSF</td>
<td>Access Network Discovery and Selection Function</td>
</tr>
<tr>
<td>ARQ</td>
<td>Automatic Repeat Request</td>
</tr>
<tr>
<td>AS</td>
<td>Access Stratum</td>
</tr>
<tr>
<td>ASN.1</td>
<td>Abstract Syntax Notation One</td>
</tr>
<tr>
<td>BCCH</td>
<td>Broadcast Control Channel</td>
</tr>
<tr>
<td>BCD</td>
<td>Binary Coded Decimal</td>
</tr>
<tr>
<td>BCH</td>
<td>Broadcast Channel</td>
</tr>
<tr>
<td>BLER</td>
<td>Block Error Rate</td>
</tr>
<tr>
<td>CA</td>
<td>Carrier Aggregation</td>
</tr>
<tr>
<td>CCCH</td>
<td>Common Control Channel</td>
</tr>
<tr>
<td>CCO</td>
<td>Cell Change Order</td>
</tr>
<tr>
<td>CG</td>
<td>Cell Group</td>
</tr>
<tr>
<td>CMAS</td>
<td>Commercial Mobile Alert Service</td>
</tr>
<tr>
<td>CP</td>
<td>Control Plane</td>
</tr>
<tr>
<td>C-RNTI</td>
<td>Cell RNTI</td>
</tr>
<tr>
<td>CRS</td>
<td>Cell-specific Reference Signal</td>
</tr>
<tr>
<td>CSFB</td>
<td>CS fallback</td>
</tr>
<tr>
<td>CSG</td>
<td>Closed Subscriber Group</td>
</tr>
<tr>
<td>CSI</td>
<td>Channel State Information</td>
</tr>
<tr>
<td>DC</td>
<td>Dual Connectivity</td>
</tr>
<tr>
<td>DCCH</td>
<td>Dedicated Control Channel</td>
</tr>
<tr>
<td>DCI</td>
<td>Downlink Control Information</td>
</tr>
<tr>
<td>DFN</td>
<td>Direct Frame Number</td>
</tr>
<tr>
<td>DL</td>
<td>Downlink</td>
</tr>
<tr>
<td>DL-SCH</td>
<td>Downlink Shared Channel</td>
</tr>
<tr>
<td>DRB</td>
<td>(user) Data Radio Bearer</td>
</tr>
<tr>
<td>DRX</td>
<td>Discontinuous Reception</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>DTCH</td>
<td>Dedicated Traffic Channel</td>
</tr>
<tr>
<td>EAB</td>
<td>Extended Access Barring</td>
</tr>
<tr>
<td>EHLPLMN</td>
<td>Equivalent Home Public Land Mobile Network</td>
</tr>
<tr>
<td>eIMTA</td>
<td>Enhanced Interference Management and Traffic Adaptation</td>
</tr>
<tr>
<td>ENB</td>
<td>Evolved Node B</td>
</tr>
<tr>
<td>EPC</td>
<td>Evolved Packet Core</td>
</tr>
<tr>
<td>EPDCCH</td>
<td>Enhanced Physical Downlink Control Channel</td>
</tr>
<tr>
<td>EPS</td>
<td>Evolved Packet System</td>
</tr>
<tr>
<td>ETWS</td>
<td>Earthquake and Tsunami Warning System</td>
</tr>
<tr>
<td>E-UTRA</td>
<td>Evolved Universal Terrestrial Radio Access</td>
</tr>
<tr>
<td>E-UTRAN</td>
<td>Evolved Universal Terrestrial Radio Access Network</td>
</tr>
<tr>
<td>FDD</td>
<td>Frequency Division Duplex</td>
</tr>
<tr>
<td>FFS</td>
<td>For Further Study</td>
</tr>
<tr>
<td>GERAN</td>
<td>GSM/EDGE Radio Access Network</td>
</tr>
<tr>
<td>GNSS</td>
<td>Global Navigation Satellite System</td>
</tr>
<tr>
<td>GSM</td>
<td>Global System for Mobile Communications</td>
</tr>
<tr>
<td>HARQ</td>
<td>Hybrid Automatic Repeat Request</td>
</tr>
<tr>
<td>HFN</td>
<td>Hyper Frame Number</td>
</tr>
<tr>
<td>HPLMN</td>
<td>Home Public Land Mobile Network</td>
</tr>
<tr>
<td>HRPD</td>
<td>CDMA2000 High Rate Packet Data</td>
</tr>
<tr>
<td>IDC</td>
<td>In-Device Coexistence</td>
</tr>
<tr>
<td>IE</td>
<td>Information element</td>
</tr>
<tr>
<td>IMEI</td>
<td>International Mobile Equipment Identity</td>
</tr>
<tr>
<td>IMSI</td>
<td>International Mobile Subscriber Identity</td>
</tr>
<tr>
<td>ISM</td>
<td>Industrial, Scientific and Medical</td>
</tr>
<tr>
<td>kB</td>
<td>Kilobyte (1000 bytes)</td>
</tr>
<tr>
<td>L1</td>
<td>Layer 1</td>
</tr>
<tr>
<td>L2</td>
<td>Layer 2</td>
</tr>
<tr>
<td>L3</td>
<td>Layer 3</td>
</tr>
<tr>
<td>MAC</td>
<td>Medium Access Control</td>
</tr>
<tr>
<td>MBMS</td>
<td>Multimedia Broadcast Multicast Service</td>
</tr>
<tr>
<td>MBSFN</td>
<td>Multimedia Broadcast multicast service Single Frequency Network</td>
</tr>
<tr>
<td>MCG</td>
<td>Master Cell Group</td>
</tr>
<tr>
<td>MDT</td>
<td>Minimization of Drive Tests</td>
</tr>
<tr>
<td>MIB</td>
<td>Master Information Block</td>
</tr>
<tr>
<td>MO</td>
<td>Mobile Originating</td>
</tr>
<tr>
<td>MRB</td>
<td>MBMS Point to Multipoint Radio Bearer</td>
</tr>
<tr>
<td>MRO</td>
<td>Mobility Robustness Optimisation</td>
</tr>
<tr>
<td>MSI</td>
<td>MCH Scheduling Information</td>
</tr>
<tr>
<td>MT</td>
<td>Mobile Terminating</td>
</tr>
<tr>
<td>N/A</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>NACC</td>
<td>Network Assisted Cell Change</td>
</tr>
<tr>
<td>NAICS</td>
<td>Network Assisted Interference Cancellation/Suppression</td>
</tr>
<tr>
<td>NAS</td>
<td>Non Access Stratum</td>
</tr>
<tr>
<td>PCCH</td>
<td>Paging Control Channel</td>
</tr>
<tr>
<td>PCell</td>
<td>Primary Cell</td>
</tr>
<tr>
<td>PDCCH</td>
<td>Physical Downlink Control Channel</td>
</tr>
<tr>
<td>PDCP</td>
<td>Packet Data Convergence Protocol</td>
</tr>
<tr>
<td>PDU</td>
<td>Protocol Data Unit</td>
</tr>
<tr>
<td>PLMN</td>
<td>Public Land Mobile Network</td>
</tr>
<tr>
<td>ProSe</td>
<td>Proximity based Services</td>
</tr>
<tr>
<td>PSCell</td>
<td>Primary Secondary Cell</td>
</tr>
<tr>
<td>PTAG</td>
<td>Primary Timing Advance Group</td>
</tr>
<tr>
<td>PUCCH</td>
<td>Physical Uplink Control Channel</td>
</tr>
<tr>
<td>QoS</td>
<td>Quality of Service</td>
</tr>
<tr>
<td>RACH</td>
<td>Random Access C Channel</td>
</tr>
<tr>
<td>RAT</td>
<td>Radio Access Technology</td>
</tr>
<tr>
<td>RB</td>
<td>Radio Bearer</td>
</tr>
<tr>
<td>RLC</td>
<td>Radio Link Control</td>
</tr>
<tr>
<td>RN</td>
<td>Relay Node</td>
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<tr>
<td>RNTI</td>
<td>Radio Network Temporary Identifier</td>
</tr>
<tr>
<td>ROHC</td>
<td>ROBust Header Compression</td>
</tr>
</tbody>
</table>
In the ASN.1, lower case may be used for some (parts) of the above abbreviations e.g. c-RNTI

4 General

4.1 Introduction

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

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;
  - For UEs supporting DC, use of one SCG, aggregated with the MCG, for increased bandwidth;
  - Network controlled mobility, i.e. handover and cell change order with optional network assistance (NACC) to GERAN;
  - 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**

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

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

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

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

### 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.

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

4.3 Services

4.3.1 Services provided to upper layers

The RRC protocol offers the following services to upper layers:

- Broadcast of common control information;
- Notification of UEs in RRC_IDLE, e.g. about a terminating call, for ETWS, for CMAS;
- Transfer of dedicated control information, i.e. information for one specific UE.

4.3.2 Services expected from lower layers

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

- PDCP: integrity protection and ciphering;
- RLC: reliable and in-sequence transfer of information, without introducing duplicates and with support for segmentation and concatenation.

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

4.4 Functions

The RRC protocol includes the following main functions:

- Broadcast of system information:
  - Including NAS common information;
  - Information applicable for UEs in RRC_IDLE, e.g. cell (re-)selection parameters, neighbouring cell information and information (also) applicable for UEs in RRC_CONNECTED, e.g. common channel configuration information.
- Including ETWS notification, CMAS notification;

- 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, addition/ modification/ release of SCell(s) and addition/modification/release of STAG(s);
  - In case of DC, cell management including e.g. change of PSCell, addition/ modification/ release of SCG cell(s) and addition/modification/release of SCG TAG(s).
  - QoS control including assignment/ modification of semi-persistent scheduling (SPS) configuration information for DL and UL, assignment/ modification of parameters for UL rate control in the UE, i.e. allocation of a priority and a prioritised bit rate (PBR) for each RB;
  - 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, sub-clause 5.9 covers RN-specific procedures and sub-clause 5.10 covers sidelink.

5.1.2 General requirements

The UE shall:

1> process the received messages in order of reception by RRC, i.e. the processing of a message shall be completed before starting the processing of a subsequent message;

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

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

1> consider the term 'radio bearer' (RB) to cover SRBs and DRBs but not MRBs unless explicitly stated otherwise;

1> set the $rrc$-$TransactionIdentifier$ in the response message, if included, to the same value as included in the message received from E-UTRAN that triggered the response message;

1> upon receiving a choice value set to $setup$:

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

1> upon receiving a choice value set to $release$:

2> clear the corresponding configuration and stop using the associated resources;

1> upon handover to E-UTRA; or

1> upon receiving an $RRCC$-connectionReconfiguration message including the $fullConfig$:

2> apply the Conditions in the ASN.1 for inclusion of the fields for the DRB/PDCP/RLC setup during the reconfiguration of the DRBs included in the $drb$-$ToAddModList$;

NOTE 2: At each point in time, the UE keeps a single value for each field except for during handover when the UE temporarily stores the previous configuration so it can revert back upon handover failure. In other words: when the UE reconfigures a field, the existing value is released except for during handover.

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

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

2> create a combined list by concatenating the additional entries included in the extension field to the original field while maintaining the order among both the original and the additional entries;

2> for the combined list, created according to the previous, apply the same behaviour as defined for the original field;
5.2 System information

5.2.1 Introduction

5.2.1.1 General

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

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].

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

The UE applies the system information acquisition and change monitoring procedures for the PCell. For an SCell, E-UTRAN provides, via dedicated signalling, all system information relevant for operation in RRC_CONNECTED when adding the SCell. However, a UE that is configured with DC shall acquire the MasterInformationBlock of the PSCell but use it only to determine the SFN timing of the SCG, which may be different from the MCG. Upon change of the relevant system information of a configured SCell, E-UTRAN releases and subsequently adds the concerned SCell, which may be done with a single RRCConnectionReconfiguration message. If the UE is receiving or interested to receive an MBMS service in a cell, the UE shall apply the system information acquisition and change monitoring procedure to acquire parameters relevant for MBMS operation and apply the parameters acquired from system information only for MBMS operation for this cell.

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

An RN configured with an RN subframe configuration does not need to apply the system information acquisition and change monitoring procedures. Upon change of any system information relevant to an RN, E-UTRAN provides the system information blocks containing the relevant system information to an RN configured with an RN subframe configuration via dedicated signalling using the 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, CMAS and EAB parameters) 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 time information (SystemInformationBlockType8, SystemInformationBlockType16), EAB parameters. 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 information, CMAS information and EAB parameters 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].

5.2.1.6 Notification of EAB parameters change

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

NOTE: The EAB capable UE is not expected to periodically check schedulingInfoList contained in SystemInformationBlockType1.
5.2.2 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 notification that the EAB parameters have changed, upon receiving a request from CDMA2000 upper layers and upon exceeding the maximum validity duration. Unless explicitly stated otherwise in the procedural specification, the system information acquisition procedure overwrites any stored system information, i.e. delta configuration is not applicable for system information and the UE discontinues using a field if it is absent in system information unless explicitly specified otherwise.

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), SystemInformationBlockType17 (depending on support of RAN-assisted WLAN interworking);

2> if in RRC_CONNECTED:

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

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, systemInformationBlockType12 and systemInformationBlockType14 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> not initiate the RRC connection establishment subject to EAB until the UE has a valid version of SystemInformationBlockType14, if broadcast;

1> if the UE is ETWS capable:

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

      3> discard any previously buffered warningMessageSegment;

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

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

      3> if schedulingInfoList indicates that SystemInformationBlockType10 is present:

         4> 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:
<table>
<thead>
<tr>
<th>Line</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&gt;</td>
<td>discard any previously buffered warningMessageSegment;</td>
</tr>
<tr>
<td>3&gt;</td>
<td>clear, if any, stored values of messageIdentifier and serialNumber for SystemInformationBlockType12 associated with the discarded warningMessageSegment;</td>
</tr>
<tr>
<td>2&gt;</td>
<td>when the UE acquires SystemInformationBlockType1 following CMAS indication, upon entering a cell during RRC_IDLE, following successful handover and upon connection re-establishment:</td>
</tr>
<tr>
<td>3&gt;</td>
<td>if schedulingInfoList indicates that SystemInformationBlockType12 is present:</td>
</tr>
<tr>
<td>4&gt;</td>
<td>acquire SystemInformationBlockType12;</td>
</tr>
<tr>
<td>NOTE 3: UEs shall start acquiring SystemInformationBlockType12 as described above even when systemInfoValueTag in SystemInformationBlockType1 has not changed.</td>
<td></td>
</tr>
<tr>
<td>1&gt;</td>
<td>if the UE is interested to receive MBMS services:</td>
</tr>
<tr>
<td>2&gt;</td>
<td>if schedulingInfoList indicates that SystemInformationBlockType13 is present and the UE does not have stored a valid version of this system information block:</td>
</tr>
<tr>
<td>3&gt;</td>
<td>acquire SystemInformationBlockType13;</td>
</tr>
<tr>
<td>2&gt;</td>
<td>if the UE is capable of MBMS Service Continuity:</td>
</tr>
<tr>
<td>3&gt;</td>
<td>if schedulingInfoList indicates that SystemInformationBlockType15 is present and the UE does not have stored a valid version of this system information block:</td>
</tr>
<tr>
<td>4&gt;</td>
<td>acquire SystemInformationBlockType15;</td>
</tr>
<tr>
<td>NOTE 4: EAB capable UEs start acquiring SystemInformationBlockType14 as described above even when systemInfoValueTag in SystemInformationBlockType1 has not changed.</td>
<td></td>
</tr>
<tr>
<td>NOTE 5: EAB capable UEs maintain an up to date SystemInformationBlockType14 in RRC_IDLE.</td>
<td></td>
</tr>
<tr>
<td>1&gt;</td>
<td>if the UE is EAB capable:</td>
</tr>
<tr>
<td>2&gt;</td>
<td>when the UE does not have stored a valid version of SystemInformationBlockType14 upon entering RRC_IDLE, or when the UE acquires SystemInformationBlockType1 following EAB parameters change notification or upon entering a cell during RRC_IDLE:</td>
</tr>
<tr>
<td>3&gt;</td>
<td>if schedulingInfoList indicates that SystemInformationBlockType14 is present:</td>
</tr>
<tr>
<td>4&gt;</td>
<td>start acquiring SystemInformationBlockType14 immediately;</td>
</tr>
<tr>
<td>3&gt;</td>
<td>else:</td>
</tr>
<tr>
<td>4&gt;</td>
<td>discard SystemInformationBlockType14, if previously received;</td>
</tr>
<tr>
<td>NOTE 4: EAB capable UEs start acquiring SystemInformationBlockType14 as described above even when systemInfoValueTag in SystemInformationBlockType1 has not changed.</td>
<td></td>
</tr>
<tr>
<td>NOTE 5: EAB capable UEs maintain an up to date SystemInformationBlockType14 in RRC_IDLE.</td>
<td></td>
</tr>
<tr>
<td>1&gt;</td>
<td>if the UE is capable of sidelink communication and is configured by upper layers to receive or transmit sidelink communication:</td>
</tr>
<tr>
<td>2&gt;</td>
<td>if the cell used for sidelink communication meets the S-criteria as defined in TS 36.304 [4]; and</td>
</tr>
<tr>
<td>2&gt;</td>
<td>if schedulingInfoList indicates that SystemInformationBlockType18 is present and the UE does not have stored a valid version of this system information block:</td>
</tr>
<tr>
<td>3&gt;</td>
<td>acquire SystemInformationBlockType18;</td>
</tr>
<tr>
<td>1&gt;</td>
<td>if the UE is capable of sidelink discovery and is configured by upper layers to receive or transmit sidelink discovery announcements on the primary frequency:</td>
</tr>
<tr>
<td>2&gt;</td>
<td>if schedulingInfoList of the serving cell/ PCell indicates that SystemInformationBlockType19 is present and the UE does not have stored a valid version of this system information block:</td>
</tr>
<tr>
<td>3&gt;</td>
<td>acquire SystemInformationBlockType19;</td>
</tr>
</tbody>
</table>
1> if the UE is capable of sidelink discovery and, for each of the one or more frequencies included in disInterFreqList, if included in SystemInformationBlockType19 and for which the UE is configured by upper layers to receive sidelink discovery announcements on:

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

3> acquire SystemInformationBlockType19;

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

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

5.2.2.5 Essential system information missing

The UE shall:

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

2> if the UE is unable to acquire the MasterInformationBlock 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 either via broadcast or via dedicated signalling, the UE shall:

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

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

1> if category0Allowed is not included in SystemInformationBlockType1:

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

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

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

2> forward the cellIdentity to upper layers;

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

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

forward the cellIdentity to upper layers;

forward the trackingAreaCode to upper layers;

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

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

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

apply the additionalPmax;

else:

apply the p-Max;

else:

apply the additionalSpectrumEmission in SystemInformationBlockType2 and the p-Max;

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

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

5.2.2.8 Actions upon reception of SystemInformation messages

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

5.2.2.9 Actions upon reception of SystemInformationBlockType2

Upon receiving SystemInformationBlockType2, the UE shall:

apply the configuration included in the radioResourceConfigCommon;

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

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

if the mbsfn-SubframeConfigList is included:

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

apply the specified PCCH configuration defined in 9.1.1.3;

not apply the timeAlignmentTimerCommon;
1> if in RRC_CONNECTED and UE is configured with RLF timers and constants values received within rlf-TimersAndConstants:

2> not update its values of the timers and constants in ue-TimersAndConstants except for the value of timer T300;

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

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

5.2.2.10 Actions upon reception of SystemInformationBlockType3

Upon receiving the SystemInformationBlockType3 message the UE shall:

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

2> if, for the frequency band selected by the UE (from the procedure in Section 5.2.2.7) to represent the serving cell’s carrier frequency, the freqBandInfo or the multiBandInfoList-v10j0 is present in SystemInformationBlockType3 and the UE capable of multiNS-Pmax supports at least one additionalSpectrumEmission in the NS-PmaxList within the freqBandInfo or multiBandInfoList-v10j0:

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

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

4> apply the additionalPmax;

3> else:

4> apply the p-Max;

2> else:

3> apply the p-Max;

5.2.2.11 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

Upon receiving the SystemInformationBlockType5 message the UE shall:

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

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

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

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

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

5> apply the additionalPmax;

4> else:
5> apply the \( p\)-Max;
3> else:
4> apply the \( p\)-Max;

5.2.2.13 Actions upon reception of SystemInformationBlockType6

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

5.2.2.14 Actions upon reception of SystemInformationBlockType7

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

5.2.2.15 Actions upon reception of SystemInformationBlockType8

Upon receiving SystemInformationBlockType8, the UE shall:

1> if sib8-PerPLMN-List is included and the UE is capable of network sharing for CDMA2000:
2> apply the CDMA2000 parameters below corresponding to the RPLMN;
1> if the systemTimeInfo is included:
2> forward the systemTimeInfo to CDMA2000 upper layers;
1> if the UE is in RRC_IDLE and if searchWindowSize is included:
2> forward the searchWindowSize to CDMA2000 upper layers;
1> if parametersHRPD is included:
2> forward the preRegistrationInfoHRPD to CDMA2000 upper layers only if the UE has not received the preRegistrationInfoHRPD within an RRCCofigurationReconfiguration 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> if ac-BarringConfig1XRTT is included:
   3> forward ac-BarringConfig1XRTT to the CDMA2000 upper layers;

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

5.2.2.21 Actions upon reception of SystemInformationBlockType14

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.
5.2.2.22 Actions upon reception of **SystemInformationBlockType15**

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

5.2.2.23 Actions upon reception of **SystemInformationBlockType16**

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

5.2.2.24 Actions upon reception of **SystemInformationBlockType17**

Upon receiving SystemInformationBlockType17, the UE shall:

1> if wlan-OffloadConfigCommon corresponding to the RPLMN is included:
   2> apply the wlan-Id-List corresponding to the RPLMN;
   2> if not configured with the wlan-OffloadConfigDedicated;
   3> apply the wlan-OffloadConfigCommon corresponding to the RPLMN;

5.2.2.25 Actions upon reception of **SystemInformationBlockType18**

Upon receiving SystemInformationBlockType18, the UE shall:

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

5.2.2.26 Actions upon reception of **SystemInformationBlockType19**

Upon receiving SystemInformationBlockType19, the UE shall:

1> if SystemInformationBlockType19 message includes the discConfig:
   2> from the next discovery period, as defined by discPeriod, use the resources indicated by discRxPool for sidelink discovery monitoring, as specified in 5.10.5;
   2> if SystemInformationBlockType19 message includes the discTxPoolCommon; and the UE is in RRC_IDLE:
      3> from the next discovery period, as defined by discPeriod, use the resources indicated by discTxPoolCommon for sidelink discovery announcement, as specified in 5.10.6;
   2> if the SystemInformationBlockType19 message includes the discTxPowerInfo:
      3> use the power information included in discTxPowerInfo for sidelink discovery transmission, as specified in TS 36.213 [23];

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 \( \text{schedulingInfoList} \) in \( \text{SystemInformationBlockType1} \);

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

2> the SI-window starts at the subframe \( \#a \), where \( a = x \mod 10 \), in the radio frame for which SFN mod \( T = \text{FLOOR}(x/10) \), where \( T \) is the \( \text{si-Periodicity} \) 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 \( \text{si-WindowLength} \), 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.

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

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

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

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

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 (KRRCint), one for the ciphering of RRC signalling (KRRCenc) and one for the ciphering of user data (KUPenc). All three AS keys are derived from the KeNB key. The KeNB is based on the KASME 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 (KeNB, KRRCint, KRRCenc and KUPenc) 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 KASME key taken into use with the latest successful NAS SMC procedure. The nextHopChainingCount parameter is used upon handover and connection re-establishment by the UE when deriving the new KeNB that is used to generate KRRCint, KRRCenc and KUPenc (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<sub>eNB</sub>, e.g. due to the transfer of large volumes of data, release and establishment of new RBs. In order to avoid such re-use, the eNB may e.g. use different RB identities for successive RB establishments, trigger an intra cell handover or an RRC_CONNECTED to RRC_IDLE to RRC_CONNECTED transition.

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

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

### 5.3.1.2a RN security

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

To provide integrity protection on DRBs between the RN and the E-UTRAN, the K<sub>uplink</sub> key is derived from the K<sub>eNB</sub> key as described in TS33.401 [32]. The same integrity protection algorithm used for SRBs also applies to the DRBs. The K<sub>uplink</sub> changes at every handover and RRC connection re-establishment and is based on an updated K<sub>eNB</sub> which is derived by taking into account the nextHopChainingCount. The COUNT value maintained for DRB ciphering is also used for integrity protection, if the integrity protection is configured for the DRB.

### 5.3.1.3 Connected mode mobility

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

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

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. Handover involves either SCG release or SCG change. The latter option is only supported in case of intra-eNB handover. In case the UE was configured with DC, the target eNB indicates in the handover message that the UE shall release the entire SCG configuration. Upon connection re-establishment, the UE releases the entire SCG configuration except for the DRB.
configuration, while E-UTRAN in the first reconfiguration message following the re-establishment either releases the DRB(s) or reconfigures the DRB(s) to MCG DRB(s).

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

After receiving the handover message, the UE attempts to access the target PCell at the first available RACH occasion according to Random Access resource selection defined in TS 36.321 [6], i.e. the handover is asynchronous. Consequently, when allocating a dedicated preamble for the random access in the target PCell, E-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 and STAGs, if configured, are released.

Normal measurement and mobility procedures are used to support handover to cells broadcasting a CSG identity. In addition, E-UTRAN may configure the UE to report that it is entering or leaving the proximity of cell(s) included in its CSG whitelist. Furthermore, E-UTRAN may request the UE to provide additional information broadcast by the handover candidate cell e.g. global cell identity, CSG identity, CSG membership status.

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

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*;
1> if in RRC_IDLE, the *eab-ParamModification* is included and the UE is EAB capable:
   2> consider previously stored *SystemInformationBlockType14* as invalid;
   2> re-acquire *SystemInformationBlockType1* immediately, i.e., without waiting until the next system information modification period boundary as specified in 5.2.1.6;
   2> re-acquire *SystemInformationBlockType14* using the system information acquisition procedure as specified in 5.2.2.4;

5.3.3 RRC connection establishment

5.3.3.1 General

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

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

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.
5.3.3.1a Conditions for establishing RRC Connection for sidelink communication/discovery

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

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

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

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

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

2> if SystemInformationBlockType19 is broadcast by the cell on which the UE camps: and if the valid version of SystemInformationBlockType19 does not include discTxPoolCommon;

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

5.3.3.2 Initiation

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

Upon initiation of the procedure, the UE shall:

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

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

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

1> else

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

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

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

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

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]:

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

else if the UE is establishing the RRC connection for mobile originating MMTEL voice, mobile originating MMTEL video, mobile originating SMS or mobile originating SMSoIP or mobile originating SMS:
if the UE is establishing the RRC connection for mobile originating MMTEL voice and SystemInformationBlockType2 includes ac-BarringSkipForMMTELVoice; or
if the UE is establishing the RRC connection for mobile originating MMTEL video and SystemInformationBlockType2 includes ac-BarringSkipForMMTELVideo; or
if the UE is establishing the RRC connection for mobile originating SMSoIP or SMS and SystemInformationBlockType2 includes ac-BarringSkipForSMS:
consider access to the cell as not barred;
else:
if establishmentCause received from higher layers is set to mo-Signalling (including the case that mo-Signalling is replaced by highPriorityAccess according to 3GPP TS 24.301 [35] or by mo-VoiceCall according to the subclause 5.3.3.3):
perform access barring check as specified in 5.3.3.11, using T305 as "Tbarring" and ac-BarringForMO-Signalling as "AC barring parameter";
if access to the cell is barred:
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;
if establishmentCause received from higher layers is set to mo-Data (including the case that mo-Data is replaced by highPriorityAccess according to 3GPP TS 24.301 [35] or by mo-VoiceCall according to the subclause 5.3.3.3):
perform access barring check as specified in 5.3.3.11, using T303 as "Tbarring" and ac-BarringForMO-Data as "AC barring parameter";
if access to the cell is barred:
if SystemInformationBlockType2 includes ac-BarringForCSFB or the UE does not support CS fallback:
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;
else (SystemInformationBlockType2 does not include ac-BarringForCSFB and the UE supports CS fallback):
if timer T306 is not running, start T306 with the timer value of T303;
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;
apply the default physical channel configuration as specified in 9.2.4;
apply the default semi-persistent scheduling configuration as specified in 9.2.3;
apply the default MAC main configuration as specified in 9.2.2;
apply the CCCH configuration as specified in 9.1.1.2;
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 **RRCConnectionRequest** message

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

1> set the *ue-Identity* as follows:
   2> if upper layers provide an S-TMSI:
      3> set the *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 *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> if the UE supports *mo-VoiceCall* establishment cause and UE is establishing the RRC connection for mobile originating MMTETL voice and *SystemInformationBlockType2* includes *voiceServiceCauseIndication*:
   2> set the *establishmentCause* to *mo-VoiceCall*;
1> else:
   2> set the *establishmentCause* in accordance with the information received from upper layers;

The UE shall submit the **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 **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 *radioResourceConfigDedicated* and as specified in 5.3.10;
1> if stored, discard the cell reselection priority information provided by the *idleModeMobilityControlInfo* or inherited from another RAT;
1> stop timer T300;
1> stop timer T302, if running;
1> stop timer T303, if running;
1> stop timer T305, if running;
1> stop timer T306, if running;
1> perform the actions as specified in 5.3.3.7;
1> stop timer T320, if running;
1> stop timer T350, if running;
1> perform the actions as specified in 5.6.12.4;
1> enter RRC_CONNECTED;
1> stop the cell re-selection procedure;
1> consider the current cell to be the PCell;
1> set the content of RRCConnectionSetupComplete message as follows:

2> set the selectedPLMN-Identity to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]) from the PLMN(s) included in the plmn-IdentityList in SystemInformationBlockType1;

2> if upper layers provide the 'Registered MME', include and set the registeredMME as follows:

3> if the PLMN identity of the 'Registered MME' is different from the PLMN selected by the upper layers:
4> include the plmnIdentity in the registeredMME and set it to the value of the PLMN identity in the 'Registered MME' received from upper layers;
3> set the mmegi and the mmec to the value received from upper layers;

2> 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 if the RPLMN is included in plmn-IdentityList stored in VarRLF-Report:
3> include rlf-InfoAvailable;

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

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

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

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

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

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

- stop timer T302, T303, T305 and T306, whichever ones were running;
- perform the actions as specified in 5.3.3.7;

if timer T300 is running:

- stop timer T300;
- reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established;
- 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:
   - reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established;

2. if the UE supports RRC Connection Establishment failure temporary Qoffset and T300 has expired a consecutive connEstFailCount times on the same cell for which txFailParams is included in SystemInformationBlockType2:
   - for a period as indicated by connEstFailOffsetValidity:
     - use connEstFailOffset for the parameter Qoffsettemp for the concerned cell when performing cell selection and reselection according to TS 36.304 [4] and TS 25.304 [40];

   NOTE 1: When performing cell selection, if no suitable or acceptable cell can be found, it is up to UE implementation whether to stop using connEstFailOffset for the parameter Qoffsettemp during connEstFailOffsetValidity for the concerned cell.

3. store the following connection establishment failure information in the VarConnEstFailReport by setting its fields as follows:
   - clear the information included in VarConnEstFailReport, if any;
   - set the plmn-Identity to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]) from the PLMN(s) included in the plmn-IdentityList in SystemInformationBlockType1;
   - set the failedCellId to the global cell identity of the cell where connection establishment failure is detected;
   - set the measResultFailedCell to include the RSRP and RSRQ, if available, of the cell where connection establishment failure is detected and based on measurements collected up to the moment the UE detected the failure;
   - if available, set the measResultNeighCells, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency as well as 3 inter-RAT neighbours, per frequency/ set of frequencies (GERAN) per RAT and according to the following:
     - for each neighbour cell included, include the optional fields that are available;

   NOTE 2: The UE includes the latest results of the available measurements as used for cell reselection evaluation, which are performed in accordance with the performance requirements as specified in TS 36.133 [16].

3. if detailed location information is available, set the content of the locationInfo as follows:
   - include the locationCoordinates;
   - include the horizontalVelocity, if available;
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3> set the numberOfPreamblesSent to indicate the number of preambles sent by MAC for the failed random access procedure;

3> set contentionDetected to indicate whether contention resolution was not successful as specified in TS 36.321 [6] for at least one of the transmitted preambles for the failed random access procedure;

3> set maxTxPowerReached to indicate whether or not the maximum power level was used for the last transmitted preamble, see TS 36.321 [6];

2> inform upper layers about the failure to establish the RRC connection, upon which the procedure ends;

The UE may discard the connection establishment failure information, i.e. release the UE variable VarConnEstFailReport, 48 hours after the failure is detected, upon power off or upon detach.

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;

2> if timer T303 is not running:

3> inform upper layers about barring alleviation for mobile originating calls;

2> if timer T305 is not running:

3> inform upper layers about barring alleviation for mobile originating signalling;

2> if timer T306 is not running:

3> inform upper layers about barring alleviation for mobile originating CS fallback;

1> if timer T303 expires or is stopped:

2> if timer T302 is not running:

3> inform upper layers about barring alleviation for mobile originating calls;

1> if timer T305 expires or is stopped:

2> if timer T302 is not running:

3> inform upper layers about barring alleviation for mobile originating signalling;

1> if timer T306 expires or is stopped:

2> if timer T302 is not running:

3> inform upper layers about barring alleviation for mobile originating CS fallback;

5.3.3.8 Reception of the RRCConnectionReject by the UE

The UE shall:

1> stop timer T300;

1> 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> if deprioritisationReq is included and the UE supports RRC Connection Reject with deprioritisation:
2> start or restart timer T325 with the timer value set to the deprioritisationTimer signalled;
2> store the deprioritisationReq until T325 expiry;

NOTE: The UE stores the deprioritisation request irrespective of any cell reselection absolute priority assignments (by dedicated or common signalling) and regardless of RRC connections in E-UTRAN or other RATs unless specified otherwise.

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

2> select the AC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers;
2> in the remainder of this procedure, use the selected AC-BarringPerPLMN entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the common access barring parameters included in SystemInformationBlockType2;

1> else:
2> in the remainder of this procedure use the common access barring parameters (i.e. presence or absence of these parameters) included in SystemInformationBlockType2;
1> set the local variables BarringFactorForMMTEL-Voice and BarringTimeForMMTEL-Voice as follows:

2> if 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 ssac-BarringForMMTEL-Video is present:
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

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:

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

else:

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

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

forward the variables BarringFactorForMMTEL-Voice, BarringTimeForMMTEL-Voice, BarringFactorForMMTEL-Video and BarringTimeForMMTEL-Video to the upper layers;

5.3.3.11 Access barring check

if timer T302 or "Tbarring" is running:

consider access to the cell as barred;

else if SystemInformationBlockType2 includes "AC barring parameter":

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.

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:

consider access to the cell as not barred;

else:

draw a random number 'rand' uniformly distributed in the range: \(0 \leq rand < 1\);

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

consider access to the cell as not barred;

else:

consider access to the cell as 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 \(0 \leq rand < 1\);

start timer "Tbarring" with the timer value calculated as follows, using the ac-BarringTime included in "AC barring parameter":

\["Tbarring" = (0.7 + 0.6 \cdot rand) \cdot ac-BarringTime.\]

5.3.3.12 EAB check

The UE shall:
1> if SystemInformationBlockType14 is present and includes the eab-Param:

2> if the eab-Common is included in the eab-Param:

3> if the UE belongs to the category of UEs as indicated in the eab-Category contained in eab-Common; and

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

4> consider access to the cell as barred;

3> else:

4> consider access to the cell as not barred due to EAB;

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

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

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

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

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

5> consider access to the cell as barred;

4> else:

5> consider access to the cell as not barred due to EAB;

3> else:

4> consider access to the cell as not barred due to EAB;

1> else:

2> consider access to the cell as not barred due to EAB;

5.3.4 Initial security activation

5.3.4.1 General

![SecurityModeCommand](Figure 5.3.4.1-1: Security mode command, successful)
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 $K_{\text{SNB}}$ key, as specified in TS 33.401 [32];

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

1> request lower layers to verify the integrity protection of the SecurityModeCommand message, using the algorithm indicated by the integrityProtAlgorithm as included in the SecurityModeCommand message and the $K_{\text{RRCint}}$ 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 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 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

![RRC connection reconfiguration diagram](#)

Figure 5.3.5.1-1: RRC connection reconfiguration, successful

![RRC connection re-estabilishment diagram](#)

Figure 5.3.5.1-2: RRC connection reconfiguration, failure

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

5.3.5.2 Initiation

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

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

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

If the RRCConnectionReconfiguration message does not include the mobilityControlInfo and the UE is able to comply with the configuration included in this message, the UE shall:
if this is the first \textit{RRCConnectionReconfiguration} message after successful completion of the RRC Connection Re-establishment procedure:

1> 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 \textit{RRCConnectionReconfiguration} message includes the \textit{fullConfig}:
3> perform the radio configuration procedure as specified in section 5.3.5.8;
2> if the \textit{RRCConnectionReconfiguration} message includes the \textit{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.

else:

2> if the \textit{RRCConnectionReconfiguration} message includes the \textit{radioResourceConfigDedicated}:
3> perform the radio resource configuration procedure as specified in 5.3.10;

NOTE 3: If the \textit{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 \textit{SecurityModeComplete} message.

if the received \textit{RRCConnectionReconfiguration} includes the \textit{sCellToReleaseList}:

1> perform SCell release as specified in 5.3.10.3a;

if the received \textit{RRCConnectionReconfiguration} includes the \textit{sCellToAddModList}:

1> perform SCell addition or modification as specified in 5.3.10.3b;

if the received \textit{RRCConnectionReconfiguration} includes the \textit{scg-Configuration} or

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

2> perform SCG reconfiguration as specified in 5.3.10.10;

if the received \textit{RRCConnectionReconfiguration} includes the \textit{systemInformationBlockType1Dedicated}:

1> perform the actions upon reception of the \textit{SystemInformationBlockType1} message as specified in 5.2.2.7;

if the \textit{RRCConnectionReconfiguration} message includes the \textit{dedicatedInfoNASList}:

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

if the \textit{RRCConnectionReconfiguration} message includes the \textit{measConfig}:

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

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

if the \textit{RRCConnectionReconfiguration} message includes the \textit{otherConfig}:

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

if the \textit{RRCConnectionReconfiguration} message includes the \textit{sl-DiscConfig} or \textit{sl-CommConfig}:
2> perform the sidelink dedicated configuration procedure as specified in 5.3.10.15;

1> if the RRCConnectionReconfiguration message includes wlan-OffloadInfo:

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

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

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

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

1> stop timer T310, if running;

1> stop timer T312, if running;

1> start timer T304 with the timer value set to 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 MCG MAC and SCG MAC, if configured;

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

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

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

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

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

1> if the RRCConnectionReconfiguration message includes the fullConfig:

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

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

else:

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

store the \( \text{nextHopChainingCount} \) value;

if the securityAlgorithmConfig is included in the securityConfigHO:

derive the key \( K_{\text{RC}} \) associated with the integrityProtAlgorithm, as specified in TS 33.401 [32];

if connected as an RN:

derive the key \( K_{\text{UP}} \) associated with the integrityProtAlgorithm, as specified in TS 33.401 [32];

derive the key \( K_{\text{RC}} \) and the key \( K_{\text{UP}} \) associated with the cipheringAlgorithm, as specified in TS 33.401 [32];

else:

derive the key \( K_{\text{RC}} \) associated with the current integrity algorithm, as specified in TS 33.401 [32];

if connected as an RN:

derive the key \( K_{\text{UP}} \) associated with the current integrity algorithm, as specified in TS 33.401 [32];

derive the key \( K_{\text{RC}} \) and the key \( K_{\text{UP}} \) associated with the current ciphering algorithm, as specified in TS 33.401 [32];

configure lower layers to apply the integrity protection algorithm and the key \( K_{\text{RC}} \), 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;

configure lower layers to apply the ciphering algorithm, the key \( K_{\text{RC}} \) and the key \( K_{\text{UP}} \), 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;

if connected as an RN:

configure lower layers to apply the integrity protection algorithm and the key \( K_{\text{UP}} \), for current or subsequently established DRBs that are configured to apply integrity protection, if any;

if the received RRCConnectionReconfiguration includes the sCellToReleaseList:

perform SCell release as specified in 5.3.10.3a;

if the received RRCConnectionReconfiguration includes the sCellToAddModList:

perform SCell addition or modification as specified in 5.3.10.3b;

if the received RRCConnectionReconfiguration includes the scg-Configuration; or

if the current UE configuration includes one or more split DRBs and the received RRCConnectionReconfiguration includes radioResourceConfigDedicated including \( \text{drb-ToAddModList} \):

perform SCG reconfiguration as specified in 5.3.10.10;

if the received RRCConnectionReconfiguration includes the systemInformationBlockType1Dedicated:

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

perform the measurement related actions as specified in 5.5.6.1;

if the RRCConnectionReconfiguration message includes the measConfig:
perform the measurement configuration procedure as specified in 5.5.2;

release reportProximityConfig and clear any associated proximity status reporting timer;

if the RRCConnectionReconfiguration message includes the otherConfig:

perform the other configuration procedure as specified in 5.3.10.9;

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

perform the sidelink dedicated configuration procedure as specified in 5.3.10.15;

if the RRCConnectionReconfiguration message includes wlan-OffloadInfo:

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

set the content of RRCConnectionReconfigurationComplete message as follows:

if the UE has radio link failure or handover failure information available in VarRLF-Report and if the RPLMN is included in plmn-IdentityList stored in VarRLF-Report:

include rlf-InfoAvailable;

if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport and if T330 is not running:

include logMeasAvailableMBSFN;

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

include the logMeasAvailable;

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

include connEstFailInfoAvailable;

submit the RRCConnectionReconfigurationComplete message to lower layers for transmission;

if MAC successfully completes the random access procedure:

stop timer T304;

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;

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.

if the UE is configured to provide IDC indications:

if the UE has transmitted an InDeviceCoexIndication message during the last 1 second preceding reception of the RRCConnectionReconfiguration message including mobilityControlInfo:

initiate transmission of the InDeviceCoexIndication message in accordance with 5.6.9.3;

if the UE is configured to provide power preference indications:

if the UE has transmitted a UEAssistanceInformation message during the last 1 second preceding reception of the RRCConnectionReconfiguration message including mobilityControlInfo:
4> initiate transmission of the **UEAssistanceInformation** message in accordance with 5.6.10.3;

2> if **SystemInformationBlockType15** is broadcast by the PCell:

3> if the UE has transmitted a **MBMSInterestIndication** message during the last 1 second preceding reception of the **RRCConnectionReconfiguration** message including **mobilityControlInfo**:

4> ensure having a valid version of **SystemInformationBlockType15** for the PCell;

4> determine the set of MBMS frequencies of interest in accordance with 5.8.5.3;

4> initiate transmission of the **MBMSInterestIndication** message in accordance with 5.8.5.4;

2> if **SystemInformationBlockType18** is broadcast by the target PCell; and the UE transmitted a **SidelinkUEInformation** message including **commRxInterestedFreq** or **commTxResourceReq** during the last 1 second preceding reception of the **RRCConnectionReconfiguration** message including **mobilityControlInfo**; or

2> if **SystemInformationBlockType19** is broadcast by the target PCell; and the UE transmitted a **SidelinkUEInformation** message including **discRxInterest** or **discTxResourceReq** during the last 1 second preceding reception of the **RRCConnectionReconfiguration** message including **mobilityControlInfo**:

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

2> the procedure ends;

**NOTE 4:** The UE is not required to determine the SFN of the target PCell by acquiring system information from that cell before performing RACH access in the target PCell.

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### 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.

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### 5.3.5.6 T304 expiry (handover failure)

The UE shall:

1> if T304 expires (handover failure):

**NOTE 1:** Following T304 expiry any dedicated preamble, if provided within the **rach-ConfigDedicated**, is not available for use by the UE anymore.

2> revert back to the configuration used in the source PCell, excluding the configuration configured by the **physicalConfigDedicated**, the **mac-MainConfig** and the **sps-Config**;
store the following handover failure information in \textit{VarRLF-Report} by setting its fields as follows:

3> clear the information included in \textit{VarRLF-Report}, if any;

3> set the \textit{plmn-IdentityList} to include the list of EPLMNs stored by the UE (i.e. includes the RPLMN);

3> set the \textit{measResultLastServCell} to include the RSRP and RSRQ, if available, of the source PCell based on measurements collected up to the moment the UE detected handover failure and in accordance with the following:

4> if the UE includes \textit{rsrqResult}, include the \textit{lastServCellRSRQ-Type};

3> set the \textit{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 \textit{measResultListEUTRA};

4> if the UE includes \textit{rsrqResult}, include the \textit{rsrq-Type};

4> if the UE was configured to perform measurement reporting for one or more neighbouring UTRA frequencies, include the \textit{measResultListUTRA};

4> if the UE was configured to perform measurement reporting for one or more neighbouring GERAN frequencies, include the \textit{measResultListGERAN};

4> if the UE was configured to perform measurement reporting for one or more neighbouring CDMA2000 frequencies, include the \textit{measResultsCDMA2000};

4> for each neighbour cell included, include the optional fields that are available;

NOTE 2: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Blacklisted cells are not required to be reported.

3> if detailed location information is available, set the content of the \textit{locationInfo} as follows:

4> include the \textit{locationCoordinates};

4> include the \textit{horizontalVelocity}, if available;

3> set the \textit{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 \textit{previousPCellId} and set it to the global cell identity of the PCell where the last \textit{RRCCConnectionReconfiguration} message including \textit{mobilityControlInfo} was received;

3> set the \textit{timeConnFailure} to the elapsed time since reception of the last \textit{RRCCConnectionReconfiguration} message including \textit{mobilityControlInfo};

3> set the \textit{connectionFailureType} to \textquote{hof};

3> set the \textit{c-RNTI} to the C-RNTI used in the source PCell;

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

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

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

5.3.5.7a T307 expiry (SCG change failure)

The UE shall:

1> if T307 expires:

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

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

5.3.5.8 Radio Configuration involving full configuration option

The UE shall:

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

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

1> if the RRCConnectionReconfiguration message includes the mobilityControlInfo:

2> release/clear all current common radio configurations;

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

1> else:

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

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 \textit{eps-bearerIdentity} but remove the DRBs including \textit{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 \textit{eps-bearerIdentity} acts as the anchor for associating the released and re-setup DRB.

1> for each \textit{eps-BearerIdentity} value that is part of the current UE configuration but not part of the \textit{drb-ToAddModList}:

2> perform DRB release as specified in 5.3.10.2;

5.3.6 Counter check

5.3.6.1 General

![Figure 5.3.6.1-1: Counter check procedure](image)

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 \textit{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 \textit{CounterCheck} message by the UE

Upon receiving the \textit{CounterCheck} message, the UE shall:

1> for each DRB that is established:

2> if no COUNT exists for a given direction (uplink or downlink) because it is a uni-directional bearer configured only for the other direction:

3> assume the COUNT value to be 0 for the unused direction;

2> if the \textit{drb-Identity} is not included in the \textit{drb-CountMSB-InfoList}:

3> include the DRB in the \textit{drb-CountInfoList} in the \textit{CounterCheckResponse} message by including the \textit{drb-Identity}, the \textit{count-Uplink} and the \textit{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 \textit{drb-CountMSB-InfoList}:

3> include the DRB in the \textit{drb-CountInfoList} in the \textit{CounterCheckResponse} message by including the \textit{drb-Identity}, the \textit{count-Uplink} and the \textit{count-Downlink} set to the value of the corresponding COUNT;
1> for each DRB that is included in the \( drb\text{-}CountMSB\text{-}InfoList \) in the \( CounterCheck \) message that is not established:

2> include the DRB in the \( drb\text{-}CountInfoList \) in the \( CounterCheckResponse \) message by including the \( drb\text{-}Identity \), the \( count\text{-}Uplink \) and the \( count\text{-}Downlink \) with the most significant bits set identical to the corresponding values in the \( drb\text{-}CountMSB\text{-}InfoList \) 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

![RRC connection re-establishment, successful](image.png)

![RRC connection re-establishment, failure](image.png)

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

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

E-UTRAN applies the procedure as follows:

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

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

1. upon detecting radio link failure, in accordance with 5.3.11; or
2. upon handover failure, in accordance with 5.3.5.6; or
3. upon mobility from E-UTRA failure, in accordance with 5.4.3.5; or
4. upon integrity check failure indication from lower layers; or
5. 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;
2. stop timer T312, if running;
3. stop timer T313, if running;
4. stop timer T307, if running;
5. start timer T311;
6. suspend all RBs except SRB0;
7. reset MAC;
8. release the MCG SCell(s), if configured, in accordance with 5.3.10.3a;
9. apply the default physical channel configuration as specified in 9.2.4;
10. for the MCG, apply the default semi-persistent scheduling configuration as specified in 9.2.3;
11. for the MCG, apply the default MAC main configuration as specified in 9.2.2;
12. release powerPrefIndicationConfig, if configured and stop timer T340, if running;
13. release reportProximityConfig and clear any associated proximity status reporting timer;
14. release obtainLocationConfig, if configured;
15. release idc-Config, if configured;
16. release measSubframePatternPCell, if configured;
17. release the entire SCG configuration, if configured, except for the DRB configuration (as configured by drb-ToAddModListSCG);
18. release naics-Info for the PCell, if configured;
19. if connected as an RN and configured with an RN subframe configuration:
   2.1. release the RN subframe configuration;
   2.2. perform cell selection in accordance with the cell selection process as specified in TS 36.304 [4];

5.3.7.3 Actions following cell selection while T311 is running

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

1. stop timer T311;
2. start timer T301;
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> if the selected cell is a UTRA cell, and if the UE supports Radio Link Failure Report for Inter-RAT MRO, include selectedUTRA-CellId in the VarRLF-Report and set it to the physical cell identity and carrier frequency of the selected UTRA cell;

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

5.3.7.4 Actions related to transmission of RRCConnectionReestablishmentRequest message

If the procedure was initiated due to radio link failure or handover failure, the UE shall:

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

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

1> set the ue-Identity as follows:

2> set the c-RNTI to the C-RNTI used in the source PCell (handover and mobility from E-UTRA failure) or used in the PCell in which the trigger for the re-establishment occurred (other cases);

2> set the physCellId to the physical cell identity of the source PCell (handover and mobility from E-UTRA failure) or of the PCell in which the trigger for the re-establishment occurred (other cases);

2> set the shortMAC-I to the 16 least significant bits of the MAC-I calculated:

3> over the ASN.1 encoded as per section 8 (i.e., a multiple of 8 bits) VarShortMAC-Input;

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

The UE shall:
1> stop timer T301;
1> consider the current cell to be the PCell;
1> re-establish PDCP for SRB1;
1> re-establish RLC for SRB1;
1> perform the radio resource configuration procedure in accordance with the received radioResourceConfigDedicated and as specified in 5.3.10;
1> resume SRB1;

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

1> update the $K_{NB}$ key based on the $K_{ASM}$ key to which the current $K_{NB}$ 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 $K_{RRCint}$ key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];
1> derive the $K_{RRCenc}$ key and the $K_{UPenc}$ key associated with the previously configured ciphering algorithm, as specified in TS 33.401 [32];
1> if connected as an RN:
2> derive the $K_{UPint}$ key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];
1> configure lower layers to activate integrity protection using the previously configured algorithm and the $K_{RRCint}$ key immediately, i.e., integrity protection shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
1> if connected as an RN:
2> configure lower layers to apply integrity protection using the previously configured algorithm and the $K_{UPint}$ key, for subsequently resumed or subsequently established DRBs that are configured to apply integrity protection, if any;
1> configure lower layers to apply ciphering using the previously configured algorithm, the $K_{RRCenc}$ key and the $K_{UPenc}$ key immediately, i.e., ciphering shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
1> set the content of RRCConnectionReestablishmentComplete message as follows:
2> if the UE has radio link failure or handover failure information available in VarRLF-Report and if the RPLMN is included in plmn-IdentityList stored in VarRLF-Report:
3> include the rlf-InfoAvailable;
2> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport and if T330 is not running:
3> include logMeasAvailableMBSFN;
2> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport:
3> include the logMeasAvailable;
2> if the UE has connection establishment failure information available in VarConnEstFailReport and if the RPLMN is equal to plmn-Identity stored in VarConnEstFailReport:
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Upon T311 expiry, the UE shall:

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

5.3.7.7 T301 expiry or selected cell no longer suitable

The UE shall:

1> if timer T301 expires; or

1> if the selected cell becomes no longer suitable according to the cell selection criteria as specified in TS 36.304 [4];

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

5.3.7.8 Reception of RRCConnectionReestablishmentReject by the UE

Upon receiving the RRCConnectionReestablishmentReject message, the UE shall:

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

5.3.8.1 General

![Diagram](image)

*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 **RRCConnectionRelease** by the UE

The UE shall:

1. delay the following actions defined in this sub-clause 60 ms from the moment the **RRCConnectionRelease** message was received or optionally when lower layers indicate that the receipt of the **RRCConnectionRelease** message has been successfully acknowledged, whichever is earlier;

1. if the **RRCConnectionRelease** message includes the **idleModeMobilityControlInfo**:
   2. store the cell reselection priority information provided by the **idleModeMobilityControlInfo**;
   2. if the **t320** is included:
      3. start timer T320, with the timer value set according to the value of **t320**;
   1. else:
      2. apply the cell reselection priority information broadcast in the system information;
1. if the **releaseCause** received in the **RRCConnectionRelease** message indicates **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 **releaseCause** received in the **RRCConnectionRelease** message indicates **cs-FallbackHighPriority**:
   2. perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'CS Fallback High Priority';
1. else:
   2. if the **extendedWaitTime** is present and the UE supports delay tolerant access:
      3. forward the **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;
1> if the received radioResourceConfigDedicated includes the naics-Info:
2> perform NAICS neighbour cell information reconfiguration for the PCell as specified in 5.3.10.13;
1> if the received RadioResourceConfigDedicatedPSCell includes the naics-Info:
2> perform NAICS neighbour cell information reconfiguration for the PCell as specified in 5.3.10.13;
1> if the received RadioResourceConfigDedicatedSCell-r10 includes the naics-Info:
2> perform NAICS neighbour cell information reconfiguration for the SCell as specified in 5.3.10.13;

5.3.10.1   SRB addition/ modification

The UE shall:
1> 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 (MCG) security configuration, if applicable;
2> establish an (MCG) RLC entity in accordance with the received rlc-Config;
2> establish a (MCG) DCCH logical channel in accordance with the received logicalChannelConfig and with the logical channel identity set in accordance with 9.1.2;
1> for each srb-Identity value included in the srb-ToAddModList that is part of the current UE configuration (SRB reconfiguration):
2> reconfigure the RLC entity in accordance with the received rlc-Config;
2> reconfigure the DCCH logical channel in accordance with the received logicalChannelConfig;

5.3.10.2   DRB release

The UE shall:
1> for each drb-Identity value included in the drb-ToReleaseList that is part of the current UE configuration (DRB release); or
1> for each drb-identity value that is to be released as the result of full configuration option according to 5.3.5.8:
2> release the PDCP entity;
2> release the RLC entity or entities;
2> release the DTCH logical channel;
1> if the procedure was triggered due to handover:
2> indicate the release of the DRB(s) and the eps-BearerIdentity of the released DRB(s) to upper layers after successful handover;
1> else:
2> indicate the release of the DRB(s) and the eps-BearerIdentity of the released DRB(s) to upper layers immediately.

NOTE: The UE does not consider the message as erroneous if the drb-ToReleaseList includes any drb-Identity value that is not part of the current UE configuration.
5.3.10.3 DRB addition/ modification

The UE shall:

1> for each drb-Identity value included in the drb-ToAddModList that is not part of the current UE configuration (DRB establishment including the case when full configuration option is used):

2> if drb-ToAddModListSCG is not received or does not include the drb-Identity value (i.e. add MCG DRB):
   3> establish a PDCP entity and configure it with the current MCG security configuration and in accordance with the received pdcp-Config;
   3> establish an MCG RLC entity or entities in accordance with the received rlc-Config;
   3> establish an MCG DTCH logical channel in accordance with the received logicalChannelIdentity and the received logicalChannelConfig;

2> if the RRCConnectionReconfiguration message includes the fullConfig IE:
   3> associate the established DRB with corresponding included eps-BearerIdentity;

2> else:
   3> indicate the establishment of the DRB(s) and the eps-BearerIdentity of the established DRB(s) to upper layers;

1> for each drb-Identity value included in the drb-ToAddModList that is part of the current UE configuration (DRB reconfiguration):

2> if drb-ToAddModListSCG is not received or does not include the drb-Identity value:
   3> if the DRB indicated by drb-Identity is an MCG DRB (reconfigure MCG):
      4> if the pdcp-Config is included:
         5> reconfigure the PDCP entity in accordance with the received pdcp-Config;
      4> if the rlc-Config is included:
         5> reconfigure the RLC entity or entities in accordance with the received rlc-Config;
      4> if the logicalChannelConfig is included:
         5> reconfigure the DTCH logical channel in accordance with the received logicalChannelConfig;

NOTE: Removal and addition of the same drb-Identity in a single radioResourceConfigDedicated is not supported. In case drb-Identity is removed and added due to handover or re-establishment with the full configuration option, the eNB can use the same value of drb-Identity.

5.3.10.3a1 DC specific DRB addition or reconfiguration

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

1> if drb-ToAddModListSCG is received and includes the drb-Identity value; and drb-Identity value is not part of the current UE configuration (i.e. DC specific DRB establishment):

2> if drb-ToAddModList is received and includes the drb-Identity value (i.e. add split DRB):
   3> establish a PDCP entity and configure it with the current MCG security configuration and in accordance with the pdcp-Config included in drb-ToAddModList;
   3> establish an MCG RLC entity and an MCG DTCH logical channel in accordance with the rlc-Config, logicalChannelIdentity and logicalChannelConfig included in drb-ToAddModList;
   3> establish an SCG RLC entity and an SCG DTCH logical channel in accordance with the rlc-ConfigSCG, logicalChannelIdentitySCG and logicalChannelConfigSCG included in drb-ToAddModListSCG;
2> else (i.e. add SCG DRB):

3> establish a PDCP entity and configure it with the current SCG security configuration and in accordance with the \textit{pdcp-Config} included in \textit{drb-ToAddModListSCG};

3> establish an SCG RLC entity or entities and an SCG DTCH logical channel in accordance with the \textit{rlc-ConfigSCG, logicalChannelIdentitySCG} and \textit{logicalChannelConfigSCG} included in \textit{drb-ToAddModListSCG};

2> indicate the establishment of the DRB(s) and the \textit{eps-BearerIdentity} of the established DRB(s) to upper layers;

1> else (i.e. DC specific DRB modification; \textit{drb-ToAddModList} and/ or \textit{drb-ToAddModListSCG} received):

2> if the DRB indicated by \textit{drb-Identity} is a split DRB:

3> if \textit{drb-ToAddModList} is received and includes the \textit{drb-Identity} value, while for this entry \textit{drb-TypeChange} is included and set to \textit{toMCG} (i.e. split to MCG):

   4> release the SCG RLC entity and the SCG DTCH logical channel;

   4> reconfigure the PDCP entity in accordance with the \textit{pdcp-Config}, if included in \textit{drb-ToAddModList};

   4> reconfigure the MCG RLC entity and/ or the MCG DTCH logical channel in accordance with the \textit{rlc-Config} and \textit{logicalChannelConfig}, if included in \textit{drb-ToAddModList};

3> else (i.e. reconfigure split):

   4> reconfigure the PDCP entity in accordance with the \textit{pdcp-Config}, if included in \textit{drb-ToAddModList};

   4> reconfigure the MCG RLC entity and/ or the MCG DTCH logical channel in accordance with the \textit{rlc-Config} and \textit{logicalChannelConfig}, if included in \textit{drb-ToAddModList};

   4> reconfigure the SCG RLC entity and/ or the SCG DTCH logical channel in accordance with the \textit{rlc-ConfigSCG} and \textit{logicalChannelConfigSCG}, if included in \textit{drb-ToAddModListSCG};

2> if the DRB indicated by \textit{drb-Identity} is an SCG DRB:

3> if \textit{drb-ToAddModList} is received and includes the \textit{drb-Identity} value, while for this entry \textit{drb-TypeChange} is included and set to \textit{toMCG} (i.e. SCG to MCG):

   4> reconfigure the PDCP entity with the current MCG security configuration and in accordance with the \textit{pdcp-Config}, if included in \textit{drb-ToAddModList};

   4> reconfigure the SCG RLC entity or entities and the SCG DTCH logical channel to be an MCG RLC entity or entities and an MCG DTCH logical channel;

   4> reconfigure the MCG RLC entity or entities and/ or the MCG DTCH logical channel in accordance with the \textit{rlc-Config}, \textit{logicalChannelIdentity} and \textit{logicalChannelConfig}, if included in \textit{drb-ToAddModList};

3> else (i.e. \textit{drb-ToAddModListSCG} is received and includes the \textit{drb-Identity} value i.e. reconfigure SCG):

   4> reconfigure the PDCP entity in accordance with the \textit{pdcp-Config}, if included in \textit{drb-ToAddModListSCG};

   4> reconfigure the SCG RLC entity or entities and/ or the SCG DTCH logical channel in accordance with the \textit{rlc-ConfigSCG} and \textit{logicalChannelConfigSCG}, if included in \textit{drb-ToAddModListSCG};

2> if the DRB indicated by \textit{drb-Identity} is an MCG DRB:

3> if \textit{drb-ToAddModListSCG} is received and includes the \textit{drb-Identity} value, while for this entry \textit{drb-Type} is included and set to \textit{split} (i.e. MCG to split):

   4> reconfigure the PDCP entity in accordance with the \textit{pdcp-Config}, if included in \textit{drb-ToAddModList};
4> reconfigure the MCG RLC entity and/ or the MCG DTCH logical channel in accordance with the \textit{rlc-Config} and \textit{logicalChannelConfig}, if included in \textit{drb-ToAddModList};

4> establish an SCG RLC entity and an SCG DTCH logical channel in accordance with the \textit{rlc-ConfigSCG}, \textit{logicalChannelIdentitySCG} and \textit{logicalChannelConfigSCG}, included in \textit{drb-ToAddModListSCG};

3> else (i.e. \textit{drb-Type} is included and set to \textit{scg} i.e. MCG to SCG):

4> reconfigure the PDCP entity with the current SCG security configuration and in accordance with the \textit{pdcp-Config}, if included in \textit{drb-ToAddModListSCG};

4> reconfigure the MCG RLC entity or entities and the MCG DTCH logical channel to be an SCG RLC entity or entities and an SCG DTCH logical channel;

4> reconfigure the SCG RLC entity or entities and/ or the SCG DTCH logical channel in accordance with the \textit{rlc-ConfigSCG}, \textit{logicalChannelIdentitySCG} and \textit{logicalChannelConfigSCG}, if included in \textit{drb-ToAddModListSCG};

5.3.10.3a SCell release

The UE shall:

1> if the release is triggered by reception of the \textit{sCellToReleaseList} or the \textit{sCellToReleaseListSCG}:

2> for each \textit{sCellIndex} value included either in the \textit{sCellToReleaseList} or in the \textit{sCellToReleaseListSCG}:

3> if the current UE configuration includes an SCell with value \textit{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 \textit{sCellIndex} value included either in the \textit{sCellToAddModList} or in the \textit{sCellToAddModListSCG} that is not part of the current UE configuration (SCell addition):

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

2> configure lower layers to consider the SCell to be in deactivated state;

2> for each \textit{measId} included in the \textit{measIdList} within \textit{VarMeasConfig}:

3> if SCells are not applicable for the associated measurement; and

3> if the concerned SCell is included in \textit{cellsTriggeredList} defined within the \textit{VarMeasReportList} for this \textit{measId}:

4> remove the concerned SCell from \textit{cellsTriggeredList} defined within the \textit{VarMeasReportList} for this \textit{measId};

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

2> modify the SCell configuration in accordance with the \textit{radioResourceConfigDedicatedSCell}, included either in the \textit{sCellToAddModList} or in the \textit{sCellToAddModListSCG};
5.3.10.3c PSCell addition or modification

The UE shall:

1> if the PSCell is not part of the current UE configuration (i.e. PSCell addition):
   2> add the PSCell, corresponding to the cellIdentification, in accordance with the received radioResourceConfigCommonPSCell and radioResourceConfigDedicatedPSCell;
   2> configure lower layers to consider the PSCell to be in activated state;

1> if the PSCell is part of the current UE configuration (i.e. PSCell modification):
   2> modify the PSCell configuration in accordance with the received radioResourceConfigDedicatedPSCell;

5.3.10.4 MAC main reconfiguration

The UE shall:

1> if the procedure is triggered to perform SCG MAC main reconfiguration:
   2> if SCG MAC is not part of the current UE configuration (i.e. SCG establishment):
      3> create an SCG MAC entity;
   2> reconfigure the SCG MAC main configuration as specified in the following i.e. assuming it concerns the SCG MAC whenever MAC main configuration is referenced and that it is based on the received mac-MainConfigSCG instead of mac-MainConfig:
   1> reconfigure the MAC main configuration in accordance with the received mac-MainConfig other than stag-ToReleaseList and stag-ToAddModList;
   1> if the received mac-MainConfig includes the stag-ToReleaseList:
      2> for each STAG-Id value included in the stag-ToReleaseList that is part of the current UE configuration:
         3> release the STAG indicated by STAG-Id;
   1> if the received mac-MainConfig includes the stag-ToAddModList:
      2> for each stag-Id value included in stag-ToAddModList that is not part of the current UE configuration (STAG addition):
         3> add the STAG, corresponding to the stag-Id, in accordance with the received timeAlignmentTimerSTAG;
      2> for each stag-Id value included in stag-ToAddModList that is part of the current UE configuration (STAG modification):
         3> reconfigure the STAG, corresponding to the stag-Id, in accordance with the received timeAlignmentTimerSTAG;

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 \textit{cqi-ReportConfig-r10} is included in the received \textit{physicalConfigDedicated} and the previous version of this field that was received by the UE was \textit{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 \textit{physicalConfigDedicated};

1> if the \textit{antennaInfo} is included and set to \textit{explicitValue}:

2> if the configured \textit{transmissionMode} is \textit{tm1}, \textit{tm2}, \textit{tm5}, \textit{tm6} or \textit{tm7}; or

2> if the configured \textit{transmissionMode} is \textit{tm8} and \textit{pmi-RI-Report} is not present; or

2> if the configured \textit{transmissionMode} is \textit{tm9} and \textit{pmi-RI-Report} is not present; or

2> if the configured \textit{transmissionMode} is \textit{tm9} and \textit{pmi-RI-Report} is present and \textit{antennaPortsCount} within \textit{csi-RS} is set to \textit{an1}:

3> release \textit{ri-ConfigIndex} in \textit{cqi-ReportPeriodic}, if previously configured;

1> else if the \textit{antennaInfo} is included and set to \textit{defaultValue}:

2> release \textit{ri-ConfigIndex} in \textit{cqi-ReportPeriodic}, if previously configured;

5.3.10.7 Radio Link Failure Timers and Constants reconfiguration

The UE shall:

1> if the received \textit{rlf-TimersAndConstants} is set to release:

2> use values for timers T301, T310, T311 and constants N310, N311, as included in \textit{ue-TimersAndConstants} received in \textit{SystemInformationBlockType2};

1> else:

2> reconfigure the value of timers and constants in accordance with received \textit{rlf-TimersAndConstants};

1> if the received \textit{rlf-TimersAndConstantsSCG} is set to release:

2> stop timer T313, if running, and

2> release the value of timer \textit{t313} as well as constants \textit{n313} and \textit{n314};

1> else:

2> reconfigure the value of timers and constants in accordance with received \textit{rlf-TimersAndConstantsSCG};

5.3.10.8 Time domain measurement resource restriction for serving cell

The UE shall:

1> if the received \textit{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 \textit{measSubframePatternPCell};

5.3.10.9 Other configuration

The UE shall:
if the received otherConfig includes the reportProximityConfig:

1> if proximityIndicationEUTRA is set to enabled:

2> consider itself to be configured to provide proximity indications for E-UTRA frequencies in accordance with 5.3.14;

2> else:

3> consider itself not to be configured to provide proximity indications for E-UTRA frequencies;

2> if proximityIndicationUTRA is set to enabled:

3> consider itself to be configured to provide proximity indications for UTRA frequencies in accordance with 5.3.14;

2> else:

3> consider itself not to be configured to provide proximity indications for UTRA frequencies;

1> if the received otherConfig includes the obtainLocation:

2> attempt to have detailed location information available for any subsequent measurement report;

NOTE: The UE is requested to attempt to have valid detailed location information available whenever sending a measurement report for which it is configured to include available detailed location information. The UE may not succeed e.g. because the user manually disabled the GPS hardware, due to no/poor satellite coverage. Further details, e.g. regarding when to activate GNSS, are up to UE implementation.

1> if the received otherConfig includes the idc-Config:

2> if idc-Indication is included (i.e. set to setup):

3> consider itself to be configured to provide IDC indications in accordance with 5.6.9;

3> if idc-Indication-UL-CA is included (i.e. set to setup):

4> consider itself to be configured to indicate UL CA related information in IDC indications in accordance with 5.6.9;

2> else:

3> consider itself not to be configured to provide IDC indications;

2> if autonomousDenialParameters is included:

3> consider itself to be allowed to deny any transmission in a particular UL subframe if during the number of subframes indicated by autonomousDenialValidity, preceding and including this particular subframe, it autonomously denied fewer UL subframes than indicated by autonomousDenialSubframes;

2> else:

3> consider itself not to be allowed to deny any UL transmission;

1> if the received otherConfig includes the powerPrefIndicationConfig:

2> if powerPrefIndicationConfig is set to setup:

3> consider itself to be configured to provide power preference indications in accordance with 5.6.10;

2> else:

3> consider itself not to be configured to provide power preference indications;

5.3.10.10 SCG reconfiguration

The UE shall:
1> if the received scg-Configuration is set to release or includes the mobilityControlInfoSCG (i.e. SCG release/change):

   2> if mobilityControlInfo is not received (i.e. SCG release/change without HO):
      3> reset SCG MAC, if configured;
      3> for each drb-Identity value that is part of the current UE configuration:
         4> if the DRB indicated by drb-Identity is an SCG DRB:
            5> re-establish the PDCP entity and the SCG RLC entity or entities;
         4> if the DRB indicated by drb-Identity is a split DRB:
            5> perform PDCP data recovery and re-establish the SCG RLC entity;
         4> if the DRB indicated by drb-Identity is an MCG DRB; and
         4> drb-ToAddModListSCG is received and includes the drb-Identity value, while for this entry drb-Type is included and set to scg (i.e. MCG to SCG):
            5> re-establish the PDCP entity and the MCG RLC entity or entities;
      3> configure lower layers to consider the SCG SCell(s), except for the PSCell, to be in deactivated state;

1> if the received scg-Configuration is set to release:

   2> release the entire SCG configuration, except for the DRB configuration (i.e. as configured by drb-ToAddModListSCG);
   2> if the current UE configuration includes one or more split or SCG DRBs and the received RRCConnectionReconfiguration message includes radioResourceConfigDedicated including drb-ToAddModList:
      3> reconfigure the SCG or split DRB by drb-ToAddModList as specified in 5.3.10.12;
   2> stop timer T313, if running;
   2> stop timer T307, if running;
1> else:

   2> if the received scg-ConfigPartMCG includes the scg-Counter:
      3> update the S-K_{NB} key based on the K_{NB} key and using the received scg-Counter value, as specified in TS 33.401 [32];
      3> derive the K_{UPenc} key associated with the cipheringAlgorithmSCG included in mobilityControlInfoSCG within the received scg-ConfigPartSCG, as specified in TS 33.401 [32];
      3> configure lower layers to apply the ciphering algorithm and the K_{UPenc} key;
   2> if the received scg-ConfigPartSCG includes the radioResourceConfigDedicatedSCG:
      3> reconfigure the dedicated radio resource configuration for the SCG as specified in 5.3.10.11;
   2> if the current UE configuration includes one or more split or SCG DRBs and the received RRCConnectionReconfiguration message includes radioResourceConfigDedicated including drb-ToAddModList:
      3> reconfigure the SCG or split DRB by drb-ToAddModList as specified in 5.3.10.12;
   2> if the received scg-ConfigPartSCG includes the sCellToReleaseListSCG:
      3> perform SCell release for the SCG as specified in 5.3.10.3a;

NOTE: This procedure is also used to release the PSCell e.g. PSCell change, SI change for the PSCell.
if the received scg-ConfigPartSCG includes the pCellToAddMod:
  3> perform PCell addition or modification as specified in 5.3.10.3c;
if the received scg-ConfigPartSCG includes the sCellToAddModListSCG:
  3> perform SCell addition or modification as specified in 5.3.10.3b;
configure lower layers in accordance with mobilityControlInfoSCG, if received;
if the received scg-ConfigPartSCG includes the mobilityControlInfoSCG (i.e. SCG change):
  3> resume all SCG DRBs and resume SCG transmission for split DRBs, if suspended;
  3> stop timer T313, if running;
  3> start timer T307 with the timer value set to $t_{307}$, as included in the mobilityControlInfoSCG;
  3> start synchronising to the DL of the target PCell;
  3> initiate the random access procedure on the PCell, as specified in TS 36.321 [6];

NOTE 1: 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.

the procedure ends, except that the following actions are performed when MAC successfully completes the random access procedure on the PCell:

  4> stop timer T307;
  4> apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PCell, if any;
  4> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PCell (e.g. periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PCell;

NOTE 2: Whenever the UE shall setup or reconfigure a configuration in accordance with a field that is received it applies the new configuration, except for the cases addressed by the above statements.

5.3.10.11 SCG dedicated resource configuration

The UE shall:

  1> if the received radioResourceConfigDedicatedSCG includes the drb-ToAddModListSCG:
    2> for each drb-Identity value included in the drb-ToAddModListSCG perform the DC specific DRB addition or reconfiguration as specified in 5.3.10.3a1
  1> if the received radioResourceConfigDedicatedSCG includes the mac-MainConfigSCG:
    2> perform the SCG MAC main reconfiguration as specified in 5.3.10.4;
  1> if the received radioResourceConfigDedicatedSCG includes the rlf-TimersAndConstantsSCG:
    2> reconfigure the values of timers and constants as specified in 5.3.10.7;

5.3.10.12 Reconfiguration SCG or split DRB by drb-ToAddModList

The UE shall:

  1> for each split or SCG DRBs that is part of the current configuration:
    2> if the corresponding drb-Identity value is included in the received drb-ToAddModList; and:
2> if the corresponding \textit{drb-Identity} value is not included in the received \textit{drb-ToAddModListSCG} (i.e. reconfigure split, split to MCG or SCG to MCG):

3> perform the DC specific DRB addition or reconfiguration as specified in 5.3.10.3a1;

5.3.10.13 Neighbour cell information reconfiguration

The UE shall:

1> if the received \textit{naics-Info} is set to \textit{release}:

2> instruct lower layer to release all the NAICS neighbour cell information for the concerned cell, if previously configured;

1> if the received \textit{naics-Info} includes the \textit{neighCellsToReleaseList-r12}:

2> for each \textit{physCellId-r12} value included in the \textit{neighCellsToReleaseList-r12} that is part of the current NAICS neighbour cell information of the concerned cell:

3> instruct lower layer to release the NAICS neighbour cell information for the concerned cell;

1> if the received \textit{naics-Info} includes the \textit{NeighCellsToAddModList-r12}:

2> for each \textit{physCellId-r12} value included in the \textit{neighCellsToAddModList-r12} that is not part of the current NAICS neighbour cell information of the concerned cell:

3> instruct lower layer to add the NAICS neighbour cell information for the concerned cell;

2> for each \textit{physCellId-r12} value included in the \textit{neighCellsToAddModList-r12} that is part of the current NAICS neighbour cell information of the concerned cell:

3> instruct lower layer to modify the NAICS neighbour cell information in accordance with the received \textit{NeighCellsInfo} for the concerned cell;

5.3.10.14 Void

5.3.10.15 Sidelink dedicated configuration

The UE shall:

1> if the \textit{RRCConnectionReconfiguration} message includes the \textit{sl-CommConfig}:

2> if \textit{commTxResources} is included and set to \textit{setup}:

3> from the next SC period use the resources indicated by \textit{commTxResources} for sidelink communication transmission, as specified in 5.10.4;

2> else if \textit{commTxResources} is included and set to \textit{release}:

3> from the next SC period, release the resources allocated for sidelink communication transmission previously configured by \textit{commTxResources};

1> if the \textit{RRCConnectionReconfiguration} message includes the \textit{sl-DiscConfig}:

2> if \textit{discTxResources} is included and set to \textit{setup}:

3> from the next discovery period, as defined by \textit{discPeriod}, use the resources indicated by \textit{discTxResources} for sidelink discovery announcement, as specified in 5.10.6;

2> else if \textit{discTxResources} is included and set to \textit{release}:

3> from the next discovery period, as defined by \textit{discPeriod}, release the resources allocated for sidelink discovery announcement previously configured by \textit{discTxResources};
5.3.11 Radio link failure related actions

5.3.11.1 Detection of physical layer problems in RRC_CONNECTED

The UE shall:

1> upon receiving N310 consecutive "out-of-sync" indications for the PCell from lower layers while neither T300, T301, T304 nor T311 is running:
   2> start timer T310;

1> upon receiving N313 consecutive "out-of-sync" indications for the PSCell from lower layers while T307 is not running:
   2> start T313;

NOTE: Physical layer monitoring and related autonomous actions do not apply to SCells except for the PSCell.

5.3.11.2 Recovery of physical layer problems

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

1> stop timer T310;

1> stop timer T312, if running;

NOTE 1: In this case, the UE maintains the RRC connection without explicit signalling, i.e. the UE maintains the entire radio resource configuration.

NOTE 2: Periods in time where neither "in-sync" nor "out-of-sync" is reported by layer 1 do not affect the evaluation of the number of consecutive "in-sync" or "out-of-sync" indications.

Upon receiving N314 consecutive "in-sync" indications for the PSCell from lower layers while T313 is running, the UE shall:

1> stop timer T313;

5.3.11.3 Detection of radio link failure

The UE shall:

1> upon T310 expiry; or

1> upon T312 expiry; or

1> upon random access problem indication from MCG MAC while neither T300, T301, T304 nor T311 is running; or

1> upon indication from MCG RLC that the maximum number of retransmissions has been reached for an SRB or for an MCG or split DRB:
   2> consider radio link failure to be detected for the MCG i.e. RLF;

2> store the following radio link failure information in the VarRLF-Report by setting its fields as follows:
   3> clear the information included in VarRLF-Report, if any;
   3> set the plmn-IdentityList to include the list of EPLMNs stored by the UE (i.e. includes the RPLMN);
   3> set the measResultLastServCell to include the RSRP and RSRQ, if available, of the PCell based on measurements collected up to the moment the UE detected radio link failure;
3> set the measResultNeighCells to include the best measured cells, other than the PCell, ordered such that
the best cell is listed first, and based on measurements collected up to the moment the UE detected radio
link failure, and set its fields as follows;

4> if the UE was configured to perform measurements for one or more EUTRA frequencies, include the
measResultListEUTRA;

4> if the UE was configured to perform measurement reporting for one or more neighbouring UTRA
frequencies, include the measResultListUTRA;

4> if the UE was configured to perform measurement reporting for one or more neighbouring GERAN
frequencies, include the measResultListGERAN;

4> if the UE was configured to perform measurement reporting for one or more neighbouring
CDMA2000 frequencies, include the measResultsCDMA2000;

4> for each neighbour cell included, include the optional fields that are available;

NOTE 1: The measured quantities are filtered by the L3 filter as configured in the mobility measurement
configuration. The measurements are based on the time domain measurement resource restriction, if
configured. Blacklisted cells are not required to be reported.

3> if detailed location information is available, set the content of the locationInfo as follows:

4> include the locationCoordinates;

4> include the horizontalVelocity, if available;

3> set the failedPCellId to the global cell identity, if available, and otherwise to the physical cell identity and
carrier frequency of the PCell where radio link failure is detected;

3> set the tac-FailedPCell to the tracking area code, if available, of the PCell where radio link failure is
detected;

3> if an RRCConnectionReconfiguration message including the mobilityControlInfo was received before the
connection failure:

4> if the last RRCConnectionReconfiguration message including the mobilityControlInfo concerned an
intra E-UTRA handover:

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

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

4> if the last RRCConnectionReconfiguration message including the mobilityControlInfo concerned a
handover to E-UTRA from UTRA and if the UE supports Radio Link Failure Report for Inter-RAT
MRO:

5> include the previousUTRA-CellId and set it to the physical cell identity, the carrier frequency and
the global cell identity, if available, of the UTRA Cell in which the last
RRCConnectionReconfiguration message including mobilityControlInfo was received;

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

3> set the connectionFailureType to rlf;

3> set the c-RNTI to the C-RNTI used in the PCell;

3> set the rlf-Cause to the trigger for detecting radio link failure;

2> if AS security has not been activated:

3> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'other';
2> else:
    3> initiate the connection re-establishment procedure as specified in 5.3.7;

The UE shall:
1> upon T313 expiry; or
1> upon random access problem indication from SCG MAC; or
1> upon indication from SCG RLC that the maximum number of retransmissions has been reached for an SCG or split DRB:
   2> consider radio link failure to be detected for the SCG i.e. SCG-RLF;
   2> initiate the SCG failure information procedure as specified in 5.6.13 to report SCG radio link failure;

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

5.3.12 UE actions upon leaving RRC_CONNECTED

Upon leaving RRC_CONNECTED, the UE shall:
1> reset MAC;
1> stop all timers that are running except T320, T325 and T330;
1> 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> if timer T350 is configured:
      3> start timer T350;
   2> else:
      3> release the wlan-OffloadConfigDedicated, if received;
      3> if the wlan-OffloadConfigCommon corresponding to the RPLMN is broadcast by the cell:
         4> apply the wlan-OffloadConfigCommon corresponding to the RPLMN included in SystemInformationBlockType17;
   2> enter RRC_IDLE and perform procedures as specified in TS 36.304 [4, 5.2.7];
1> else:
   2> release the wlan-OffloadConfigDedicated, if received;

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 cqi-ReportConfig as specified in 9.2.4 and release cqi-ReportConfigSCell, for each SCell of the concerned CG that is configured, if any;
1> apply the default physical channel configuration for soundingRS-UL-ConfigDedicated as specified in 9.2.4, for all serving cells of the concerned CG;
Upon receiving an SRS release request from lower layers, the UE shall:

1> apply the default physical channel configuration for schedulingRequestConfig as specified in 9.2.4, for the concerned CG;

NOTE: Upon PUCCH/ SRS release request, the UE does not modify the soundingRS-UL-ConfigDedicatedAperiodic i.e. it does not apply the default for this field (release).

5.3.14 Proximity indication

5.3.14.1 General

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 a 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 a UTRA frequency while proximity indication is enabled for such UTRA cells:

2> if the UE has previously not transmitted a ProximityIndication for the RAT and frequency during the current RRC connection, or if more than 5 s has elapsed since the UE has last transmitted a ProximityIndication (either entering or leaving) for the RAT and frequency:

3> initiate transmission of the ProximityIndication message in accordance with 5.3.14.3;

NOTE: In the conditions above, "if the UE enters the proximity of one or more CSG member cell(s)" includes the case of already being in the proximity of such cell(s) at the time proximity indication for the corresponding RAT is enabled.

5.3.14.3 Actions related to transmission of ProximityIndication message

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

1> if the UE applies the procedure to report entering the proximity of CSG member cell(s):
The UE shall submit the ProximityIndication message to lower layers for transmission.

5.3.15 Void

5.4 Inter-RAT mobility

5.4.1 Introduction

The general principles of connected mode mobility are described in 5.3.1.3. The general principles of the security handling upon connected mode mobility are described in 5.3.1.2.

For the (network controlled) inter RAT mobility from E-UTRA for a UE in RRC_CONNECTED, a single procedure is defined that supports both handover, cell change order with optional network assistance (NACC) and enhanced CS fallback to CDMA2000 1xRTT. In case of mobility to CDMA2000, the eNB decides when to move to the other RAT while the target RAT determines to which cell the UE shall move.

5.4.2 Handover to E-UTRA

5.4.2.1 General

![Figure 5.4.2.1-1: Handover to E-UTRA, successful](image)

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

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

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

E-UTRAN applies the procedure as follows:
- to activate ciphering, possibly using NULL algorithm, if not yet activated in the other RAT;
- to establish SRB1, SRB2 and one or more DRBs, i.e. at least the DRB associated with the default EPS bearer is established;

5.4.2.3 Reception of the **RRCConnectionReconfiguration** by the UE

If the UE is able to comply with the configuration included in the **RRCConnectionReconfiguration** message, the UE shall:

1> apply the default physical channel configuration as specified in 9.2.4;
1> apply the default semi-persistent scheduling configuration as specified in 9.2.3;
1> apply the default MAC main configuration as specified in 9.2.2;
1> start timer T304 with the timer value set to \( t_{304} \), as included in the mobilityControlInfo;
1> consider the target PCell to be one on the frequency indicated by the carrierFreq with a physical cell identity indicated by the targetPhysCellId;
1> start synchronising to the DL of the target PCell;
1> set the C-RNTI to the value of the newUE-Identity;
1> for the target PCell, apply the downlink bandwidth indicated by the dl-Bandwidth;
1> for the target PCell, apply the uplink bandwidth indicated by (the absence or presence of) the ul-Bandwidth;
1> configure lower layers in accordance with the received radioResourceConfigCommon;
1> configure lower layers in accordance with any additional fields, not covered in the previous, if included in the received mobilityControlInfo;
1> perform the radio resource configuration procedure as specified in 5.3.10;
1> forward the nas-SecurityParamToEUTRA to the upper layers;
1> derive the **K\_C\_NB** key, as specified in TS 33.401 [32];
1> derive the **K\_RRC\_int** key associated with the integrityProtAlgorithm, as specified in TS 33.401 [32];
1> derive the **K\_RRC\_enc** key and the **K\_UP\_enc** key associated with the cipheringAlgorithm, as specified in TS 33.401 [32];
1> configure lower layers to apply the indicated integrity protection algorithm and the **K\_RRC\_int** key immediately, i.e. the indicated integrity protection configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
1> configure lower layers to apply the indicated ciphering algorithm, the **K\_RRC\_enc** key and the **K\_UP\_enc** key immediately, i.e. the indicated ciphering configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
1> if the received **RRCConnectionReconfiguration** includes the sCellToAddModList:
2> perform SCell addition as specified in 5.3.10.3b;
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 \textit{RRCConnectionReconfiguration} message includes the \textit{otherConfig}:

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

1> if the \textit{RRCConnectionReconfiguration} message includes \textit{wlan-OffloadInfo}:

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

1> set the content of \textit{RRCConnectionReconfigurationComplete} message as follows:

2> if the UE has radio link failure or handover failure information available in \textit{VarRLF-Report} and if the RPLMN is included in \textit{plmn-IdentityList} stored in \textit{VarRLF-Report}:

3> include \textit{rlf-InfoAvailable};

2> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in \textit{plmn-IdentityList} stored in \textit{VarLogMeasReport} and if T330 is not running:

3> include \textit{logMeasAvailableMBSFN};

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

3> include \textit{logMeasAvailable};

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

3> include \textit{connEstFailInfoAvailable};

1> submit the \textit{RRCConnectionReconfigurationComplete} message to lower layers for transmission using the new configuration;

1> if the \textit{RRCConnectionReconfiguration} message does not include \textit{rlf-TimersAndConstants} set to \textit{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;

\textbf{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;

\textbf{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.

\subsection*{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 \textit{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):
   2> reset MAC;
   2> perform the actions defined for this failure case as defined in the specifications applicable for the other RAT;

5.4.3 Mobility from E-UTRA

5.4.3.1 General

The purpose of this procedure is to move a UE in RRC_CONNECTED to a cell using another Radio Access Technology (RAT), e.g. GERAN, UTRA or CDMA2000 systems. The mobility from E-UTRA procedure covers the following type of mobility:

- handover, i.e. the MobilityFromEUTRACommand message includes radio resources that have been allocated for the UE in the target cell;
- cell change order, i.e. the MobilityFromEUTRACommand message may include information facilitating access of and/or connection establishment in the target cell, e.g. system information. Cell change order is applicable only to GERAN; and
- enhanced CS fallback to CDMA2000 1xRTT, i.e. the MobilityFromEUTRACommand message includes radio resources that have been allocated for the UE in the target cell. The enhanced CS fallback to CDMA2000 1xRTT may be combined with concurrent handover or redirection to CDMA2000 HRPD.
NOTE: For the case of dual receiver/transmitter enhanced CS fallback to CDMA2000 1xRTT, the DLInformationTransfer message is used instead of the MobilityFromEUTRACommand message (see TS 36.300 [9]).

5.4.3.2 Initiation

E-UTRAN initiates the mobility from E-UTRA procedure to a UE in RRC_CONNECTED, possibly in response to a MeasurementReport message or in response to reception of CS fallback indication for the UE from MME, by sending a MobilityFromEUTRACommand message. E-UTRAN applies the procedure as follows:
- the procedure is initiated only when AS-security has been activated, and SRB2 with at least one DRB are setup and not suspended;

5.4.3.3 Reception of the MobilityFromEUTRACommand by the UE

The UE shall be able to receive a MobilityFromEUTRACommand message and perform a cell change order to GERAN, even if no prior UE measurements have been performed on the target cell.

The UE shall:

1> stop timer T310, if running;
1> stop timer T312, if running;
1> if the MobilityFromEUTRACommand message includes the purpose set to handover:
   2> if the targetRAT-Type is set to utra or geran:
      3> consider inter-RAT mobility as initiated towards the RAT indicated by the targetRAT-Type included in the MobilityFromEUTRACommand message;
      3> forward the nas-SecurityParamFromEUTRA to the upper layers;
      3> access the target cell indicated in the inter-RAT message in accordance with the specifications of the target RAT;
      3> if the targetRAT-Type is set to geran:
         4> use the contents of systemInformation, if provided for PS Handover, as the system information to begin access on the target GERAN cell;

NOTE 1: If there are DRBs for which no radio bearers are established in the target RAT as indicated in the targetRAT-MessageContainer in the message, the E-UTRA RRC part of the UE does not indicate the release of the concerned DRBs to the upper layers. Upper layers may derive which bearers are not established from information received from the AS of the target RAT.

NOTE 2: In case of SR-VCC, the DRB to be replaced is specified in [61].

2> else if the targetRAT-Type is set to cdma2000-1XRTT or cdma2000-HRPD:
   3> forward the targetRAT-Type and the targetRAT-MessageContainer to the CDMA2000 upper layers for the UE to access the cell(s) indicated in the inter-RAT message in accordance with the specifications of the CDMA2000 target-RAT;
1> else if the MobilityFromEUTRACommand message includes the purpose set to cellChangeOrder:
   2> start timer T304 with the timer value set to t304, as included in the MobilityFromEUTRACommand message;
   2> if the targetRAT-Type is set to geran:
      3> if networkControlOrder is included in the MobilityFromEUTRACommand message:
         4> apply the value as specified in TS 44.060 [36];
      3> else:
4> acquire `networkControlOrder` and apply the value as specified in TS 44.060 [36];
3> use the contents of `systemInformation`, if provided, as the system information to begin access on the target GERAN cell;
2> establish the connection to the target cell indicated in the `CellChangeOrder`;

NOTE 3: The criteria for success or failure of the cell change order to GERAN are specified in TS 44.060[36].

1> if the `MobilityFromEUTRACommand` message includes the `purpose` set to e-CSFB:

2> if `messageContCDMA2000-1XRTT` is present:
3> forward the `messageContCDMA2000-1XRTT` to the CDMA2000 upper layers for the UE to access the cell(s) indicated in the inter-RAT message in accordance with the specification of the target RAT;

2> if `mobilityCDMA2000-HRPD` is present and is set to `handover`:
3> forward the `messageContCDMA2000-HRPD` to the CDMA2000 upper layers for the UE to access the cell(s) indicated in the inter-RAT message in accordance with the specification of the target RAT;

2> if `mobilityCDMA2000-HRPD` is present and is set to `redirection`:
3> forward the `redirectCarrierCDMA2000-HRPD` to the CDMA2000 upper layers;

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

NOTE 5: The UE should perform the handover, the cell change order or enhanced 1xRTT CS fallback as soon as possible following the reception of the RRC message `MobilityFromEUTRACommand`, which could be before confirming successful reception (HARQ and ARQ) of this message.

### 5.4.3.4 Successful completion of the mobility from E-UTRA

Upon successfully completing the handover, the cell change order or enhanced 1xRTT CS fallback, the UE shall:

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

NOTE: If the UE performs enhanced 1xRTT CS fallback along with concurrent mobility to CDMA2000 HRPD and the connection to either CDMA2000 1xRTT or CDMA2000 HRPD succeeds, then the mobility from E-UTRA is considered successful.

### 5.4.3.5 Mobility from E-UTRA failure

The UE shall:

1> if T304 expires (mobility from E-UTRA failure); or
1> if the UE does not succeed in establishing the connection to the target radio access technology; or
1> if the UE is unable to comply with (part of) the configuration included in the `MobilityFromEUTRACommand` message; or
1> if there is a protocol error in the inter RAT information included in the `MobilityFromEUTRACommand` message, causing the UE to fail the procedure according to the specifications applicable for the target RAT:

2> stop T304, if running;
2> if the `cs-FallbackIndicator` in the `MobilityFromEUTRACommand` message was set to `TRUE` or e-CSFB was present:
3> indicate to upper layers that the CS Fallback procedure has failed;
2> revert back to the configuration used in the source PCell, excluding the configuration configured by the `physicalConfigDedicated`, `mac-MainConfig` and `sps-Config`;
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-UTRAN 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 concurrPrepCDMA2000-HRPD is present in the received message:
   3> forward concurrPrepCDMA2000-HRPD to the CDMA2000 upper layers;

2> else:
3> forward concurrPrepCDMA2000-HRPD, with its value set to FALSE, to the CDMA2000 upper layers;

5.4.5  UL handover preparation transfer (CDMA2000)

5.4.5.1  General

![Diagram](image)

**Figure 5.4.5.1-1: UL handover preparation transfer**

The purpose of this procedure is to tunnel the handover related CDMA2000 dedicated information or enhanced 1xRTT CS fallback related CDMA2000 dedicated information from UE to E-UTRAN when requested by the higher layers. The procedure is triggered by the higher layers on receipt of `HandoverFromEUTRAPreparationRequest` message. If preparing for enhanced CS fallback to CDMA2000 1xRTT and handover to CDMA2000 HRPD, the UE sends two consecutive `ULHandoverPreparationTransfer` messages to E-UTRAN, one per addressed CDMA2000 RAT Type. This procedure applies to CDMA2000 capable UEs only.

5.4.5.2  Initiation

A UE in RRC_CONNECTED initiates the UL Handover Preparation Transfer procedure whenever there is a need to transfer handover or enhanced 1xRTT CS fallback related non-3GPP dedicated information. The UE initiates the UL handover preparation transfer procedure by sending the `ULHandoverPreparationTransfer` message.

5.4.5.3  Actions related to transmission of the `ULHandoverPreparationTransfer` message

The UE shall set the contents of the `ULHandoverPreparationTransfer` message as follows:

1> include the `cdma2000-Type` and the `dedicatedInfo`;
1> if the `cdma2000-Type` is set to `type1XRTT`:
2> include the `meid` and set it to the value received from the CDMA2000 upper layers;
1> submit the `ULHandoverPreparationTransfer` message to lower layers for transmission, upon which the procedure ends;

5.4.5.4  Failure to deliver the `ULHandoverPreparationTransfer` message

The UE shall:

1> if the UE is unable to guarantee successful delivery of `ULHandoverPreparationTransfer` messages:
2> inform upper layers about the possible failure to deliver the information contained in the concerned `ULHandoverPreparationTransfer` message;

5.4.6  Inter-RAT cell change order to E-UTRAN

5.4.6.1  General

The purpose of the inter-RAT cell change order to E-UTRAN procedure is to transfer, under the control of the source radio access technology, a connection between the UE and another radio access technology (e.g. GSM/ GPRS) to E-UTRAN.
5.4.6.2 Initiation

The procedure is initiated when a radio access technology other than E-UTRAN, e.g. GSM/GPRS, using procedures specific for that RAT, orders the UE to change to an E-UTRAN cell. In response, upper layers request the establishment of an RRC connection as specified in subclause 5.3.3.

NOTE: Within the message used to order the UE to change to an E-UTRAN cell, the source RAT should specify the identity of the target E-UTRAN cell as specified in the specifications for that RAT.

The UE shall:

1. upon receiving an RRCConnectionSetup message:

2. consider the inter-RAT cell change order procedure to have completed successfully;

5.4.6.3 UE fails to complete an inter-RAT cell change order

If the inter-RAT cell change order fails the UE shall return to the other radio access technology and proceed as specified in the appropriate specifications for that RAT.

The UE shall:

1. upon failure to establish the RRC connection as specified in subclause 5.3.3:

2. consider the inter-RAT cell change order procedure to have failed;

NOTE: The cell change was network ordered. Therefore, failure to change to the target PCell should not cause the UE to move to UE-controlled cell selection.

5.5 Measurements

5.5.1 Introduction

The UE reports measurement information in accordance with the measurement configuration as provided by E-UTRAN. E-UTRAN provides the measurement configuration applicable for a UE in RRC_CONNECTED by means of dedicated signalling, i.e. using the RRCConnectionReconfiguration 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;
1> if the received measConfig includes the allowInterruptions:
   2> set the parameter allowInterruptions within VarMeasConfig to the received value of allowInterruptions;
5.5.2.2 Measurement identity removal

The UE shall:

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

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

5.5.2.2a Measurement identity autonomous removal

The UE shall:

1> for each measId included in the measIdList within VarMeasConfig:
   
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 measId’s applies only for measurement events A1, A2, A6, and also applies for events A3 and A5 if configured for PSCell.

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> if the UE is a category 0 UE according to TS 36.306 [5]:
         6> start timer T321 with the timer value set to 190 ms for this measId;
      5> else:
         6> start timer T321 with the timer value set to 150 ms for this measId;
   4> else:
      5> start timer T321 with the timer value set to 1 second for this measId;
3> else if the measObject associated with this measId concerns UTRA:
   4> if the si-RequestForHO is included in the reportConfig associated with this measId:
      5> for UTRA FDD, start timer T321 with the timer value set to 2 seconds for this measId;
      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> reconfigure the entry with the value received for this measObject, except for the fields cellsToAddModList, blackCellsToAddModList, altTTT-CellsToAddModList, cellsToRemoveList, blackCellsToRemoveList, altTTT-CellsToRemoveList, measSubframePatternConfigNeigh and measDS-Config;
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`;

NOTE 1: For each `cellIndex` included in the `blackCellsToRemoveList` that concerns overlapping ranges of cells, a cell is removed from the black list of cells only if all cell indexes containing it are removed.

3> if the received `measObject` includes the `blackCellsToAddModList`:
   4> for each `cellIndex` included in the `blackCellsToAddModList`:
      5> if an entry with the matching `cellIndex` is included in the `blackCellsToAddModList`:
         6> replace the entry with the value received for this `cellIndex`;
      5> else:
         6> add a new entry for the received `cellIndex` to the `blackCellsToAddModList`;
3> if the received `measObject` includes the `altTTT-CellsToRemoveList`:
   4> for each `cellIndex` included in the `altTTT-CellsToRemoveList`:
      5> remove the entry with the matching `cellIndex` from the `altTTT-CellsToAddModList`;

NOTE 2: For each `cellIndex` included in the `altTTT-CellsToRemoveList` that concerns overlapping ranges of cells, a cell is removed from the list of cells only if all cell indexes containing it are removed.

3> if the received `measObject` includes the `altTTT-CellsToAddModList`:
   4> for each `cellIndex` value included in the `altTTT-CellsToAddModList`:
      5> if an entry with the matching `cellIndex` exists in the `altTTT-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 `altTTT-CellsToAddModList`;
3> if the received `measObject` includes `measSubframePatternConfigNeigh`:
   4> set `measSubframePatternConfigNeigh` within the `VarMeasConfig` to the value of the received field
3> if the received `measObject` includes `measDS-Config`:
   4> if `measDS-Config` is set to `setup`:
      5> if the received `measDS-Config` includes the `measCSI-RS-ToRemoveList`:
for each measCSI-RS-Id included in the measCSI-RS-ToRemoveList:

- remove the entry with the matching measCSI-RS-Id from the measCSI-RS-ToAddModList;

if the received measDS-Config includes the measCSI-RS-ToAddModList, for each measCSI-RS-Id value included in the measCSI-RS-ToAddModList:

- if an entry with the matching measCSI-RS-Id exists in the measCSI-RS-ToAddModList:
  - replace the entry with the value received for this measCSI-RS-Id;

- else:
  - add a new entry for the received measCSI-RS-Id to the measCSI-RS-ToAddModList;

set other fields of the measDS-Config within the VarMeasConfig to the value of the received fields;

perform the discovery signals measurement timing configuration procedure as specified in 5.5.2.10;

else:

- release the discovery signals measurement configuration;

for each measId associated with this measObjectId in the measIdList within the VarMeasConfig, if any:

- remove the measurement reporting entry for this measId from the VarMeasReportList, if included;

- stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. timeToTrigger) for this measId;

else:

- add a new entry for the received measObject to the measObjectList within VarMeasConfig;

NOTE 3: UE does not need to retain cellForWhichToReportCGI in the measObject after reporting cgi-Info.

5.5.2.6 Reporting configuration removal

The UE shall:

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

NOTE: The UE does not consider the message as erroneous if the 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:

- for each reportConfigId included in the received reportConfigToAddModList:
if an entry with the matching reportConfigId exists in the reportConfigList within the VarMeasConfig, for this entry:

3> reconfigure the entry with the value received for this reportConfig;

3> for each measId associated with this reportConfigId included in the_measIdList within the VarMeasConfig, if any:

4> remove the measurement reporting entry for this measId from in VarMeasReportList, if included;

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

2> else:

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

5.5.2.8 Quantity configuration

The UE shall:

1> for each RAT for which the received quantityConfig includes parameter(s):

2> set the corresponding parameter(s) in quantityConfig within VarMeasConfig to the value of the received quantityConfig parameter(s);

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

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

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

5.5.2.9 Measurement gap configuration

The UE shall:

1> if measGapConfig is set to setup:

2> if a measurement gap configuration is already setup, release the measurement gap configuration;

2> setup the measurement gap configuration indicated by the measGapConfig in accordance with the received gapOffset, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition (SFN and subframe of MCG cells):

\[
\text{SFN mod } T = \text{FLOOR}\left(\frac{\text{gapOffset}}{10}\right);
\]

\[
\text{subframe } = \text{gapOffset} \mod 10;
\]

with \( T = \text{MGRP/10} \) as defined in TS 36.133 [16];

NOTE: The UE applies a single gap, which timing is relative to the MCG cells, even when configured with DC.

1> else:

2> release the measurement gap configuration;

5.5.2.10 Discovery signals measurement timing configuration

The UE shall setup the discovery signals measurement timing configuration (DMTC) in accordance with the received dmtc-PeriodOffset, i.e., the first subframe of each DMTC occasion occurs at an SFN and subframe of the PCell meeting the following condition:

\[
\text{SFN mod } T = \text{FLOOR}\left(\frac{\text{dmtc-Offset}}{10}\right);
\]

\[
\text{subframe } = \text{dmtc-Offset} \mod 10;
\]
with $T = \frac{dmtc-Periodicity}{10}$;

On the concerned frequency, the UE shall not consider discovery signals transmission in subframes outside the DMTC occasion.

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 as follows:

2> for the PCell, apply the time domain measurement resource restriction in accordance with measSubframePatternPCell, if configured;

2> if the UE supports CRS based discovery signals measurement:

3> for each SCell in deactivated state, apply the discovery signals measurement timing configuration in accordance with measDS-Config, if configured within the measObject corresponding to the frequency of the SCell;

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

2> if the purpose for the associated reportConfig is set to reportCGI:

3> if si-RequestForHO is configured for the associated reportConfig:

4> perform the corresponding measurements on the frequency and RAT indicated in the associated measObject using autonomous gaps as necessary;

3> else:

4> perform the corresponding measurements on the frequency and RAT indicated in the associated measObject using available idle periods or using autonomous gaps as necessary;

NOTE 1: If autonomous gaps are used to perform measurements, the UE is allowed to temporarily abort communication with all serving cell(s), i.e. create autonomous gaps to perform the corresponding measurements within the limits specified in TS 36.133 [16]. Otherwise, the UE only supports the measurements with the purpose set to reportCGI only if E-UTRAN has provided sufficient idle periods.

3> try to acquire the global cell identity of the cell indicated by the cellForWhichToReportCGI in the associated measObject by acquiring the relevant system information from the concerned cell;

3> if the cell indicated by the cellForWhichToReportCGI included in the associated measObject is an E-UTRAN cell:

4> try to acquire the CSG identity, if the CSG identity is broadcast in the concerned cell;

4> try to acquire the trackingAreaCode in the concerned cell;

4> try to acquire the list of additional PLMN Identities, as included in the plmn-IdentityList, if multiple PLMN identities are broadcast in the concerned cell;

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; or

4> if `measDS-Config` is configured in the associated `measObject`:

5> if the UE supports CSI-RS based discovery signals measurement; and

5> if the `eventId` in the associated `reportConfig` is set to `eventC1` or `eventC2`, or if `reportStrongestCSI-RSs` is included in the associated `reportConfig`:

6> perform the corresponding measurements of CSI-RS resources on the frequency indicated in the concerned `measObject`, applying the discovery signals measurement timing configuration in accordance with `measDS-Config` in the concerned `measObject`;

6> if `reportCRS-Meas` is included in the associated `reportConfig`, perform the corresponding measurements of neighbouring cells on the frequencies indicated in the concerned `measObject` as follows:

7> for neighbouring cells on the primary frequency, apply the time domain measurement resource restriction in accordance with `measSubframePatternConfigNeigh`, if configured in the concerned `measObject`;

7> apply the discovery signals measurement timing configuration in accordance with `measDS-Config` in the concerned `measObject`;

5> else:

6> perform the corresponding measurements of neighbouring cells on the frequencies and RATs indicated in the concerned `measObject` as follows:

7> for neighbouring cells on the primary frequency, apply the time domain measurement resource restriction in accordance with `measSubframePatternConfigNeigh`, if configured in the concerned `measObject`;

7> if the UE supports CRS based discovery signals measurement, apply the discovery signals measurement timing configuration in accordance with `measDS-Config`, 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
- \( a = 1/2^{k/4} \), where \( k \) is the filterCoefficient for the corresponding measurement quantity received by the quantityConfig;

2> adapt the filter such that the time characteristics of the filter are preserved at different input rates, observing that the filterCoefficient \( k \) assumes a sample rate equal to 200 ms;

NOTE 2: If \( k \) is set to 0, no layer 3 filtering is applicable.

NOTE 3: The filtering is performed in the same domain as used for evaluation of reporting criteria or for measurement reporting, i.e., logarithmic filtering for logarithmic measurements.

NOTE 4: The filter input rate is implementation dependent, to fulfil the performance requirements set in [16]. For further details about the physical layer measurements, see TS 36.133 [16].

5.5.4 Measurement report triggering

5.5.4.1 General

If security has been activated successfully, the UE shall:

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

2> if the corresponding reportConfig includes a purpose set to reportStrongestCellsForSON:

3> consider any neighbouring cell detected on the associated frequency to be applicable;

2> else if the corresponding reportConfig includes a purpose set to reportCGI:

3> consider any neighbouring cell detected on the associated frequency/ set of frequencies (GERAN) which has a physical cell identity matching the value of the cellForWhichToReportCGI included in the corresponding measObject within the VarMeasConfig to be applicable;

2> else:

3> if the corresponding measObject concerns E-UTRA:
if the \textit{ue-RxTxTimeDiffPeriodical} is configured in the corresponding \textit{reportConfig}:

consider only the PCell to be applicable;

else if the \textit{eventA1} or \textit{eventA2} is configured in the corresponding \textit{reportConfig}:

consider only the serving cell to be applicable;

else if \textit{eventC1} or \textit{eventC2} is configured in the corresponding \textit{reportConfig}; or if \textit{reportStrongestCSI-RSs} is included in the corresponding \textit{reportConfig}:

consider a CSI-RS resource on the associated frequency to be applicable when the concerned CSI-RS resource is included in the \textit{measCSI-RS-ToAddModList} defined within the \textit{VarMeasConfig} for this \textit{measId};

else:

consider any neighbouring cell detected on the associated frequency to be applicable when the concerned cell is not included in the \textit{blackCellsToAddModList} defined within the \textit{VarMeasConfig} for this \textit{measId};

for events involving a serving cell on one frequency and neighbours on another frequency, consider the serving cell on the other frequency as a neighbouring cell;

if the corresponding \textit{reportConfig} includes \textit{alternativeTimeToTrigger} and if the UE supports \textit{alternativeTimeToTrigger}:

use the value of \textit{alternativeTimeToTrigger} as the time to trigger instead of the value of \textit{timeToTrigger} in the corresponding \textit{reportConfig} for cells included in the \textit{altTTT-CellsToAddModList} of the corresponding \textit{measObject};

else if the corresponding \textit{measObject} concerns UTRA or CDMA2000:

consider a neighbouring cell on the associated frequency to be applicable when the concerned cell is included in the \textit{cellsToAddModList} defined within the \textit{VarMeasConfig} for this \textit{measId} (i.e. the cell is included in the white-list);

NOTE 0: The UE may also consider a neighbouring cell on the associated UTRA frequency to be applicable when the concerned cell is included in the \textit{csg-allowedReportingCells} within the \textit{VarMeasConfig} for this \textit{measId}, if configured in the corresponding \textit{measObjectUTRA} (i.e. the cell is included in the range of physical cell identities for which reporting is allowed);

else if the corresponding \textit{measObject} concerns GERAN:

consider a neighbouring cell on the associated set of frequencies to be applicable when the concerned cell matches the \textit{ncc-Permitted} defined within the \textit{VarMeasConfig} for this \textit{measId};

if the \textit{triggerType} is set to \textit{event} and if the entry condition applicable for this event, i.e. the event corresponding with the \textit{eventId} of the corresponding \textit{reportConfig} within \textit{VarMeasConfig}, is fulfilled for one or more applicable cells for all measurements after layer 3 filtering taken during \textit{timeToTrigger} defined for this event within the \textit{VarMeasConfig}, while the \textit{VarMeasReportList} does not include an measurement reporting entry for this \textit{measId} (a first cell triggers the event):

include a measurement reporting entry within the \textit{VarMeasReportList} for this \textit{measId};

set the \textit{numberOfReportsSent} defined within the \textit{VarMeasReportList} for this \textit{measId} to 0;

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

if the UE supports T312 and if \textit{useT312} is included for this event and if T310 is running:

if T312 is not running:

start timer T312 with the value configured in the corresponding \textit{measObject};

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):

3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
3> include the concerned cell(s) in the cellsTriggeredList defined within the VarMeasReportList for this measId;
3> if the UE supports T312 and if useT312 is included for this event and if T310 is running:
   4> if T312 is not running:
      5> start timer T312 with the value configured in the corresponding measObject;
3> initiate the measurement reporting procedure, as specified in 5.5.5;

if the triggerType is set to event and if the leaving condition applicable for this event is fulfilled for one or more of the cells included in the cellsTriggeredList defined within the VarMeasReportList for this measId for all measurements after layer 3 filtering taken during timeToTrigger defined within the VarMeasConfig for this event:

3> remove the concerned cell(s) in the cellsTriggeredList defined within the VarMeasReportList for this measId;
3> if the UE supports T312 and if useT312 is included for this event and if T310 is running:
   4> if T312 is not running:
      5> start timer T312 with the value configured in the corresponding measObject;
3> if reportOnLeave is set to TRUE for the corresponding reporting configuration or if a6-ReportOnLeave is set to TRUE for the corresponding reporting configuration:
   4> initiate the measurement reporting procedure, as specified in 5.5.5;
3> if the cellsTriggeredList defined within the VarMeasReportList for this measId is empty:
   4> remove the measurement reporting entry within the VarMeasReportList for this measId;
   4> stop the periodical reporting timer for this measId, if running;

if the triggerType is set to event and if the entry condition applicable for this event, i.e. the event corresponding with the eventId of the corresponding reportConfig within VarMeasConfig, is fulfilled for one or more applicable CSI-RS resources for all measurements after layer 3 filtering taken during timeToTrigger defined for this event within the VarMeasConfig, while the VarMeasReportList does not include an measurement reporting entry for this measId (i.e. a first CSI-RS resource triggers the event):

3> include a measurement reporting entry within the VarMeasReportList for this measId;
3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
3> include the concerned CSI-RS resource(s) in the csi-RS-TriggeredList defined within the VarMeasReportList for this measId;
3> initiate the measurement reporting procedure, as specified in 5.5.5;

if the triggerType is set to event and if the entry condition applicable for this event, i.e. the event corresponding with the eventId of the corresponding reportConfig within VarMeasConfig, is fulfilled for one or more applicable CSI-RS resources not included in the csi-RS-TriggeredList for all measurements after layer 3 filtering taken during timeToTrigger defined for this event within the VarMeasConfig (i.e. a subsequent CSI-RS resource triggers the event):

3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
3> include the concerned CSI-RS resource(s) in the csi-RS-TriggeredList defined within the VarMeasReportList for this measId;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> if the triggerType is set to event and if the leaving condition applicable for this event is fulfilled for one or more of the CSI-RS resources included in the csi-RS-TriggeredList defined within the VarMeasReportList for this measId for all measurements after layer 3 filtering taken during timeToTrigger defined within the VarMeasConfig for this event:

3> remove the concerned CSI-RS resource(s) in the csi-RS-TriggeredList defined within the VarMeasReportList for this measId;

3> if c1-ReportOnLeave is set to TRUE for the corresponding reporting configuration or if c2-ReportOnLeave is set to TRUE for the corresponding reporting configuration:

4> initiate the measurement reporting procedure, as specified in 5.5.5;

3> if the csi-RS-TriggeredList defined within the VarMeasReportList for this measId is empty:

4> remove the measurement reporting entry within the VarMeasReportList for this measId;

4> stop the periodical reporting timer for this measId, if running;

2> if 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 reportStrongestCSI-RSs is not included 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 reportStrongestCSI-RSs is not included 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)

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

Inequality A1-2 (Leaving condition)

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

The variables in the formula are defined as follows:

\( M_s \) is the measurement result of the serving cell, not taking into account any offsets.

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

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

\( M_s \) 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 \( M_s \).

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)

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

Inequality A2-2 (Leaving condition)

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

The variables in the formula are defined as follows:

\( M_s \) is the measurement result of the serving cell, not taking into account any offsets.

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

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

\( M_s \) is expressed in dBm in case of RSRP, or in dB in case of RSRQ.
**Hys** is expressed in dB.

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

### 5.5.4.4 Event A3 (Neighbour becomes offset better than PCell/ PSCell)

The UE shall:

1. consider the entering condition for this event to be satisfied when condition A3-1, as specified below, is fulfilled;
2. consider the leaving condition for this event to be satisfied when condition A3-2, as specified below, is fulfilled;
3. if **usePSCell** of the corresponding **reportConfig** is set to **true**:
   1. use the PSCell for **Mp**, **Ofp** and **Ocp**;
   2. else:
      1. use the PCell for **Mp**, **Ofp** and **Ocp**;

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

**Inequality 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/ PSCell, not taking into account any offsets.
- **Ofp** is the frequency specific offset of the frequency of the PCell/ PSCell (i.e. **offsetFreq** as defined within **measObjectEUTRA** corresponding to the frequency of the PCell/ PSCell).
- **Ocp** is the cell specific offset of the PCell/ PSCell (i.e. **cellIndividualOffset** as defined within **measObjectEUTRA** corresponding to the frequency of the PCell/ PSCell), and is set to zero if not configured for the PCell/ PSCell.
- **Hys** is the hysteresis parameter for this event (i.e. **hysteresis** as defined within **reportConfigEUTRA** for this event).
- **Off** is the offset parameter for this event (i.e. **a3-Offset** as defined within **reportConfigEUTRA** for this event).
- **Mn, Mp** are expressed in dBm in case of RSRP, or in dB in case of RSRQ.
- **Ofn, Ocn, Ofp, Ocp, Hys, Off** are expressed in dB.

### 5.5.4.5 Event A4 (Neighbour becomes better than threshold)

The UE shall:

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

**Inequality A4-1 (Entering condition)**

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

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 \( Mn \).

### 5.5.4.6 Event A5 (PCell/ PSCell becomes worse than threshold1 and neighbour becomes better than threshold2)

The UE shall:

1. consider the entering condition for this event to be satisfied when both condition A5-1 and condition A5-2, as specified below, are fulfilled;
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;
3. if \( usePSCell \) of the corresponding \( reportConfig \) is set to \textit{true}:
   1. use the PSCell for \( Mp \);
   2. else:
      1. use the PCell for \( Mp \);

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

Inequality A5-1 (Entering condition 1)

\[ Mp + Hys < Thresh \]

Inequality A5-2 (Entering condition 2)

\[ Mn + Ofn + Ocn - Hys > Thresh2 \]

Inequality A5-3 (Leaving condition 1)

\[ Mp - Hys > Thresh1 \]

Inequality A5-4 (Leaving condition 2)

\[ Mn + Ofn + Ocn + Hys < Thresh2 \]

The variables in the formula are defined as follows:
**Mp** is the measurement result of the PCell/ PSCell, 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.

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

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

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

### 5.5.4.6a Event A6 (Neighbour becomes offset better than SCell)

The UE shall:

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

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

1> for this measurement, consider the (secondary) cell that is configured on the frequency indicated in the associated **measObjectEUTRA** to be the serving cell;

NOTE: The neighbour(s) is on the same frequency as the SCell i.e. both are on the frequency indicated in the associated **measObject**.

**Inequality A6-1 (Entering condition)**

\[ \text{Mn} + \text{Ocn} - \text{Hys} > \text{Ms} + \text{Ocs} + \text{Off} \]

**Inequality A6-2 (Leaving condition)**

\[ \text{Mn} + \text{Ocn} + \text{Hys} < \text{Ms} + \text{Ocs} + \text{Off} \]

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

Inequality B1-1 (Entering condition)

\[ Mn + Ofn - Hys > Thresh \]

Inequality B1-2 (Leaving condition)

\[ Mn + Ofn + Hys < Thresh \]

The variables in the formula are defined as follows:

- \( Mn \) is the measurement result of the inter-RAT neighbour cell, not taking into account any offsets. For CDMA 2000 measurement result, pilotStrength is divided by -2.
- \( Ofn \) is the frequency specific offset of the frequency of the inter-RAT neighbour cell (i.e. offsetFreq as defined within the measObject corresponding to the frequency of the neighbour inter-RAT cell).
- \( Hys \) is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigInterRAT for this event).
- \( Thresh \) is the threshold parameter for this event (i.e. b1-Threshold as defined within reportConfigInterRAT for this event). For CDMA2000, \( b1-Threshold \) is divided by -2.

\( Mn \) is expressed in dBm or in dB, depending on the measurement quantity of the inter-RAT neighbour cell.
\( Ofn, Hys \) are expressed in dB.
\( Thresh \) is expressed in the same unit as \( Mn \).

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

The UE shall:

1> for UTRA and CDMA2000, only trigger the event for cells included in the corresponding measurement object;
1> consider the entering condition for this event to be satisfied when both condition B2-1 and condition B2-2, as specified below, are fulfilled;
1> consider the leaving condition for this event to be satisfied when condition B2-3 or condition B2-4, i.e. at least one of the two, as specified below, is fulfilled;

Inequality B2-1 (Entering condition 1)

\[ Mp + Hys < Thresh1 \]

Inequality B2-2 (Entering condition 2)

\[ Mn + Ofn - Hys > Thresh2 \]

Inequality B2-3 (Leaving condition 1)

\[ Mp - Hys > Thresh1 \]

Inequality B2-4 (Leaving condition 2)

\[ Mn + Ofn + Hys < Thresh2 \]

The variables in the formula are defined as follows:
**Mp** is the measurement result of the PCell, not taking into account any offsets.

**Mn** is the measurement result of the inter-RAT neighbour cell, not taking into account any offsets. For CDMA2000 measurement result, *pilotStrength* is divided by -2.

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

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

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

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

**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**.

### 5.5.4.9 Event C1 (CSI-RS resource becomes better than threshold)

The UE shall:

1. consider the entering condition for this event to be satisfied when condition C1-1, as specified below, is fulfilled;
1. consider the leaving condition for this event to be satisfied when condition C1-2, as specified below, is fulfilled;

**Inequality C1-1 (Entering condition)**

\[ \text{Mcr} + \text{Ocr} - \text{Hys} > \text{Thresh} \]

**Inequality C1-2 (Leaving condition)**

\[ \text{Mcr} + \text{Ocr} + \text{Hys} < \text{Thresh} \]

The variables in the formula are defined as follows:

- **Mcr** is the measurement result of the CSI-RS resource, not taking into account any offsets.
- **Ocr** is the CSI-RS specific offset (i.e. *csi-RS-IndividualOffset* as defined within *measObjectEUTRA* corresponding to the frequency of the CSI-RS resource), and set to zero if not configured for the CSI-RS resource.
- **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. *c1-Threshold* as defined within *reportConfigEUTRA* for this event).

**Mcr, Thresh** are expressed in dBm.

**Ocr, Hys** are expressed in dB.

### 5.5.4.10 Event C2 (CSI-RS resource becomes offset better than reference CSI-RS resource)

The UE shall:

1. consider the entering condition for this event to be satisfied when condition C2-1, as specified below, is fulfilled;
1. consider the leaving condition for this event to be satisfied when condition C2-2, as specified below, is fulfilled;
NOTE: The CSI-RS resource(s) that triggers the event is on the same frequency as the reference CSI-RS resource, i.e. both are on the frequency indicated in the associated measObject.

Inequality C2-1 (Entering condition)
\[ M_{cr} + O_{cr} - H_{ys} > M_{ref} + O_{ref} + Off \]

Inequality C2-2 (Leaving condition)
\[ M_{cr} + O_{cr} + H_{ys} < M_{ref} + O_{ref} + Off \]

The variables in the formula are defined as follows:

- \( M_{cr} \) is the measurement result of the CSI-RS resource, not taking into account any offsets.
- \( O_{cr} \) is the CSI-RS specific offset of the CSI-RS resource (i.e. \( \text{csi-RS-IndividualOffset} \) as defined within \( \text{measObjectEUTRA} \) corresponding to the frequency of the CSI-RS resource), and set to zero if not configured for the CSI-RS resource.
- \( M_{ref} \) is the measurement result of the reference CSI-RS resource (i.e. \( \text{c2-RefCSI-RS} \) as defined within \( \text{reportConfigEUTRA} \) for this event), not taking into account any offsets.
- \( O_{ref} \) is the CSI-RS specific offset of the reference CSI-RS resource (i.e. \( \text{csi-RS-IndividualOffset} \) as defined within \( \text{measObjectEUTRA} \) corresponding to the frequency of the reference CSI-RS resource), and is set to zero if not configured for the reference CSI-RS resource.
- \( H_{ys} \) is the hysteresis parameter for this event (i.e. \( \text{hysteresis} \) as defined within \( \text{reportConfigEUTRA} \) for this event).
- \( Off \) is the offset parameter for this event (i.e. \( \text{c2-Offset} \) as defined within \( \text{reportConfigEUTRA} \) for this event).

\( M_{cr}, M_{ref} \) are expressed in dBm.
\( O_{cr}, O_{ref}, H_{ys}, Off \) are expressed in dB.

### 5.5.5 Measurement reporting

![Measurement reporting diagram](image_url)

The purpose of this procedure is to transfer measurement results from the UE to E-UTRAN. The UE shall initiate this procedure only after successful security activation.

For the measId for which the measurement reporting procedure was triggered, the UE shall set the measResults within the MeasurementReport message as follows:

1. set the measId to the measurement identity that triggered the measurement reporting;
2. set the measResultPCell to include the quantities of the PCell;
3. set the measResultServFreqList to include for each SCell that is configured, if any, within measResultSCell the quantities of the concerned SCell, if available according to performance requirements in [16];
4. if the reportConfig associated with the measId that triggered the measurement reporting includes reportAddNeighMeas:
   1. for each serving frequency for which measObjectId is referenced in the measIdList, other than the frequency corresponding with the measId that triggered the measurement reporting:
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 1: The reliability of the report (i.e. the certainty it contains the strongest cells on the concerned frequency) depends on the measurement configuration i.e. the reportInterval. The related performance requirements are specified in TS 36.133 [16].

3> for each cell that is included in the measResultNeighCells, include the physCellId;

3> if the triggerType is set to event; or the purpose is set to reportStrongestCells or to reportStrongestCellsForSON:

4> for each included cell, include the layer 3 filtered measured results in accordance with the reportConfig for this measId, ordered as follows:

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

6> set the measResult to include the quantity(ies) indicated in the reportQuantity within the concerned reportConfig in order of decreasing triggerQuantity, i.e. the best cell is included first;

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

6> set the measResult to include the quantities indicated by the reportQuantityUTRA-FDD in order of decreasing measQuantityUTRA-FDD within the quantityConfig, i.e. the best cell is included first;

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

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

6> set the measResult to 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;

3> else if the purpose is set to reportCGI:

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

5> if the cell broadcasts a CSG identity:

6> include the csg-Identity;

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

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

6> include the cgi-Info containing all the fields other than the plmn-IdentityList that have been successfully acquired;
include, within the `cgi-Info`, the field `plmn-IdentityList` in accordance with the following:

if the cell is a CSG member cell, determine the subset of the PLMN identities, starting from the second entry of PLMN identities in the broadcast information, that meet the following conditions:

a) equal to the RPLMN or an EPLMN; and
b) the CSG whitelist of the UE includes an entry comprising of the concerned PLMN identity and the CSG identity broadcast by the cell;

if the subset of PLMN identities determined according to the previous includes at least one PLMN identity, include the `plmn-IdentityList` and set it to include this subset of the PLMN identities;

if the cell is a CSG member cell, include the `primaryPLMN-Suitable` if the primary PLMN meets conditions a) and b) specified above;

else:

include the `cgi-Info` containing all the fields that have been successfully acquired and in accordance with the following:

include in the `plmn-IdentityList` the list of identities starting from the second entry of PLMN Identities in the broadcast information;

for the cells included according to the previous (i.e. covering the PCell, the SCells, the best non-serving cells on serving frequencies as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in 36.133 [16];

if there is at least one applicable CSI-RS resource to report:

set the `measResultCSI-RS-List` to include the best CSI-RS resources up to `maxReportCells` in accordance with the following:

if the `triggerType` is set to `event`:

include the CSI-RS resources included in the `csi-RS-TriggeredList` as defined within the `VarMeasReportList` for this `measId`;

else:

include the applicable CSI-RS resources for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;

NOTE 2: The reliability of the report (i.e. the certainty it contains the strongest CSI-RS resources on the concerned frequency) depends on the measurement configuration i.e. the `reportInterval`. The related performance requirements are specified in TS 36.133 [16].

for each CSI-RS resource that is included in the `measResultCSI-RS-List`:

include the `measCSI-RS-Id`;

include the layer 3 filtered measured results in accordance with the `reportConfig` for this `measId`, ordered as follow:

set the `csi-RSRP-Result` to include the quantity indicated in the `reportQuantity` within the concerned `reportConfig` in order of decreasing `triggerQuantityCSI-RS`, i.e. the best CSI-RS resource is included first;

if `reportCRS-Meas` is included within the associated `reportConfig`, and the cell indicated by `physCellId` of this CSI-RS resource is not a serving cell:

set the `measResultNeighCells` to include the cell indicated by `physCellId` of this CSI-RS resource, and include the `physCellId`;
5> set the rsrpResult to include the RSRP of the concerned cell, if available according to performance requirements in [16];

5> set the rsrqResult to include the RSRQ of the concerned cell, if available according to performance requirements in [16];

1> if the ue-RxTxTimeDiffPeriodical is configured within the corresponding reportConfig for this measId;

2> set the ue-RxTxTimeDiffResult to the measurement result provided by lower layers;

2> set the currentSFN;

1> if the includeLocationInfo is configured in the corresponding reportConfig for this measId and detailed location information that has not been reported is available, set the content of the locationInfo as follows:

2> include the locationCoordinates;

2> if available, include the gnss-TOD-msec;

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

1> stop the periodical reporting timer, if running;

1> if the numberOfReportsSent as defined within the VarMeasReportList for this measId is less than the reportAmount as defined within the corresponding reportConfig for this measId:

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

1> else:

2> if the triggerType is set to periodical:

3> remove the entry within the VarMeasReportList for this measId;

3> remove this measId from the measIdList within VarMeasConfig;

1> if the measured results are for CDMA2000 HRPD:

2> set the preRegistrationStatusHRPD to the UE’s CDMA2000 upper layer’s HRPD preRegistrationStatus;

1> if the measured results are for CDMA2000 1xRTT:

2> set the preRegistrationStatusHRPD to FALSE;

1> submit the MeasurementReport message to lower layers for transmission, upon which the procedure ends;

5.5.6 Measurement related actions

5.5.6.1 Actions upon handover and re-establishment

E-UTRAN applies the handover procedure as follows:

- when performing the handover procedure, as specified in 5.3.5.4, ensure that a measObjectId corresponding to each handover target serving frequency is configured as a result of the procedures described in this sub-clause and in 5.3.5.4;

- when changing the band while the physical frequency remains unchanged, E-UTRAN releases the measObject corresponding to the source frequency and adds a measObject corresponding to the target frequency (i.e. it does not reconfigure the measObject);

E-UTRAN applies the re-establishment procedure as follows:

- when performing the connection re-establishment procedure, as specified in 5.3.7, ensure that a measObjectId corresponding each target serving frequency is configured as a result of the procedure described in this sub-
clause and the subsequent connection reconfiguration procedure immediately following the re-establishment procedure;

- in the first reconfiguration following the re-establishment when changing the band while the physical frequency remains unchanged, E-UTRAN releases the $measObject$ corresponding to the source frequency and adds a $measObject$ corresponding to the target frequency (i.e. it does not reconfigure the $measObject$);

The UE shall:

1> for each $measId$ included in the $measIdList$ within $VarMeasConfig$:
   2> if the $triggerType$ is set to $periodical$:
      3> remove this $measId$ from the $measIdList$ within $VarMeasConfig$;
1> if the procedure was triggered due to a handover or successful re-establishment and the procedure involves a change of primary frequency, update the $measId$ values in the $measIdList$ within $VarMeasConfig$ as follows:
2> if a $measObjectId$ value corresponding to the target primary frequency exists in the $measObjectList$ 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 \textit{timeToTrigger} value multiplied by \textit{sf-Medium} within \textit{VarMeasConfig};

1> else:
2> no scaling is applied;

5.5.7 Inter-frequency RSTD measurement indication

5.5.7.1 General

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure5.5.7.1-1.png}
\caption{Inter-frequency RSTD measurement indication}
\end{figure}

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].

\textbf{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;

\textbf{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;

\textbf{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 \textit{InterFreqRSTDMeasurementIndication} message

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

1> set the \textit{rstd-InterFreqIndication} as follows:
2> if the procedure is initiated to indicate start of inter-frequency RSTD measurements:
3> set the \textit{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

![DL Information Transfer Diagram](image)

Figure 5.6.1.1-1: DL information transfer

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

![UL Information Transfer Diagram](image)

Figure 5.6.2.1-1: UL information transfer

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 Initialisation

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 ULInformationTransfer message

The UE shall:

1> if mobility (i.e. handover, RRC connection re-establishment) occurs before the successful delivery of ULInformationTransfer messages has been confirmed by lower layers:
   2> inform upper layers about the possible failure to deliver the information contained in the concerned ULInformationTransfer messages;

5.6.3 UE capability transfer

5.6.3.1 General

![Figure 5.6.3.1-1: UE capability transfer](image)

The purpose of this procedure is to transfer UE radio access capability information from the UE to E-UTRAN.

If the UE has changed its E-UTRAN radio access capabilities, the UE shall request higher layers to initiate the necessary NAS procedures (see TS 23.401 [41]) that would result in the update of UE radio access capabilities using a new RRC connection.

NOTE: Change of the UE’s GERAN UE radio capabilities in RRC_IDLE is supported by use of Tracking Area Update.
5.6.3.2 Initiation

E-UTRAN initiates the procedure to a UE in RRC_CONNECTED when it needs (additional) UE radio access capability information.

5.6.3.3 Reception of the **UECapabilityEnquiry** by the UE

The UE shall:

1> set the contents of **UECapabilityInformation** message as follows:

2> if the **ue-CapabilityRequest** includes **utra**:

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

3> if the UE supports FDD and TDD:

4> set all fields of **UECapabilityInformation**, except field **fdd-Add-UE-EUTRA-Capabilities** and **tdd-Add-UE-EUTRA-Capabilities** (including their sub-fields), to include the values applicable for both FDD and TDD (i.e. functionality supported by both modes);

4> if (some of) the UE capability fields have a different value for FDD and TDD:

5> if for FDD, the UE supports additional functionality compared to what is indicated by the previous fields of **UECapabilityInformation**:

6> include field **fdd-Add-UE-EUTRA-Capabilities** and set it to include fields reflecting the additional functionality applicable for FDD;

5> if for TDD, the UE supports additional functionality compared to what is indicated by the previous fields of **UECapabilityInformation**:

6> include field **tdd-Add-UE-EUTRA-Capabilities** and set it to include fields reflecting the additional functionality applicable for TDD;

NOTE: The UE includes fields of **XDD-Add-UE-EUTRA-Capabilities** in accordance with the following:

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

3> else (UE supports single xDD mode):

4> set all fields of **UECapabilityInformation**, except field **fdd-Add-UE-EUTRA-Capabilities** and **tdd-Add-UE-EUTRA-Capabilities** (including their sub-fields), to include the values applicable for the xDD mode supported by the UE;

3> if the **UECapabilityEnquiry** message includes **requestedFrequencyBands** and UE supports **requestedFrequencyBands**:

4> create a set of band combinations supported by the UE, including non-CA combinations, target for being included in **supportedBandCombination** while observing the following order (i.e. listed in order of decreasing priority):

- include all non-CA bands, regardless of whether UE supports carrier aggregation, only:
  - if the UE includes **ue-Category-v1020** (i.e. indicating category 6 to 8); or
- if for at least one of the non-CA bands, the UE supports more MIMO layers with TM9 and TM10 than implied by the UE category; or
- if the UE supports TM10 with one or more CSI processes;
- include all 2DL+1UL CA band combinations, only consisting of bands included in requestedFrequencyBands;
- include all other 2DL+1UL CA band combinations;
- include all other CA band combinations, only consisting of bands included in requestedFrequencyBands, and prioritized in the order of requestedFrequencyBands, (i.e. first include remaining band combinations containing the first-listed band, then include remaining band combinations containing the second-listed band, and so on);

4> include in supportedBandCombination as many of the target band combinations as possible, determined according to the above, while observing the priority order;

4> include in supportedBandCombinationAdd as many of the remaining target band combinations as possible, i.e. the target band combinations the UE was not able to include in supportedBandCombination, and limited to those consisting of bands included in requestedFrequencyBands, while observing the priority order;

4> indicate in requestedBands the same bands and in the same order as included in the received requestedFrequencyBands;

3> else

4> create a set of band combinations supported by the UE, including non-CA combinations, target for being included in supportedBandCombination:

- include all non-CA bands, regardless of whether UE supports carrier aggregation, only:
  - if the UE includes ue-Category-v1020 (i.e. indicating category 6 to 8); or
  - if for at least one of the non-CA bands, the UE supports more MIMO layers with TM9 and TM10 than implied by the UE category; or
  - if the UE supports TM10 with one or more CSI processes;
- include all 2DL+1UL CA band combinations;
- include all other CA band combinations;

4> include in supportedBandCombination as many of the target band combinations as possible, determined according to the above;

4> if the number of non-CA and CA band combinations supported by UE exceeds the maximum number of band combinations of supportedBandCombination, the selection of subset of band combinations is up to UE implementation;

NOTE: If the UECapabilityEnquiry message does not include requestedFrequencyBands, UE does not include supportedBandCombinationAdd.

3> if the UE is a category 0 UE according to TS 36.306 [5]:

4> include ue-RadioPagingInfo including ue-Category;

2> if the ue-CapabilityRequest includes geran-cs and if the UE supports GERAN CS domain:

3> include the UE radio access capabilities for GERAN CS within a ue-CapabilityRAT-Container and with the rat-Type set to geran-cs;

2> if the ue-CapabilityRequest includes geran-ps and if the UE supports GERAN PS domain:

3> include the UE radio access capabilities for GERAN PS within a ue-CapabilityRAT-Container and with the rat-Type set to geran-ps;
2> if the ue-CapabilityRequest includes utra and if the UE supports UTRA:
3> include the UE radio access capabilities for UTRA within a ue-CapabilityRAT-Container and with the rat-Type set to utra;
2> if the ue-CapabilityRequest includes cdma2000-1XRTT and if the UE supports CDMA2000 1xRTT:
3> include the UE radio access capabilities for CDMA2000 within a ue-CapabilityRAT-Container and with the rat-Type set to cdma2000-1XRTT;
1> submit the UE Capability Information message to lower layers for transmission, upon which the procedure ends;

5.6.4 CSFB to 1x Parameter transfer

5.6.4.1 General

![Diagram](image)

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

![Diagram of UE Information Procedure]

The UE information procedure is used by E-UTRAN to request the UE to report information.

5.6.5.2 Initiation

E-UTRAN initiates the procedure by sending the `UEInformationRequest` message. E-UTRAN should initiate this procedure only after successful security activation.

5.6.5.3 Reception of the `UEInformationRequest` message

Upon receiving the `UEInformationRequest` message, the UE shall, only after successful security activation:

1> if `rach-ReportReq` is set to `true`, set the contents of the `rach-Report` in the `UEInformationResponse` message as follows:

   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`;
   2> 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 if the RPLMN is included in `plmn-IdentityList` stored in `VarRLF-Report`:

   2> set `timeSinceFailure` in `VarRLF-Report` to the time that elapsed since the last radio link or handover failure in E-UTRA;
   2> set the `rlf-Report` in the `UEInformationResponse` message to the value of `rlf-Report` in `VarRLF-Report`;
   2> discard the `rlf-Report` from `VarRLF-Report` upon successful delivery of the `UEInformationResponse` message confirmed by lower layers;

1> if `connEstFailReportReq` is set to `true` and the UE has connection establishment failure information in `VarConnEstFailReport` and if the RPLMN is equal to `plmn-Identity` stored in `VarConnEstFailReport`:

   2> set `timeSinceFailure` in `VarConnEstFailReport` to the time that elapsed since the last connection establishment failure in E-UTRA;
   2> set the `connEstFailReport` in the `UEInformationResponse` message to the value of `connEstFailReport` in `VarConnEstFailReport`;
If the \textit{logMeasReportReq} is present and if the RPLMN is included in \textit{plmn-IdentityList} stored in \textit{VarLogMeasReport}:

2> if \textit{VarLogMeasReport} includes one or more logged measurement entries, set the contents of the \textit{logMeasReport} in the \textit{UEInformationResponse} message as follows:

3> include the \textit{absoluteTimeStamp} and set it to the value of \textit{absoluteTimeInfo} in the \textit{VarLogMeasReport};

3> include the \textit{traceReference} and set it to the value of \textit{traceReference} in the \textit{VarLogMeasReport};

3> include the \textit{traceRecordingSessionRef} and set it to the value of \textit{traceRecordingSessionRef} in the \textit{VarLogMeasReport};

3> include the \textit{tce-Id} and set it to the value of \textit{tce-Id} in the \textit{VarLogMeasReport};

3> include the \textit{logMeasInfoList} and set it to include one or more entries from \textit{VarLogMeasReport} starting from the entries logged first;

3> if the \textit{VarLogMeasReport} includes one or more additional logged measurement entries that are not included in the \textit{logMeasInfoList} within the \textit{UEInformationResponse} message:

4> include the \textit{logMeasAvailable};

1> if \textit{mobilityHistoryReportReq} is set to \textit{true}:

2> include the \textit{mobilityHistoryReport} and set it to include entries from \textit{VarMobilityHistoryReport};

2> include in the \textit{mobilityHistoryReport} an entry for the current cell, possibly after removing the oldest entry if required, and set its fields as follows:

3> set \textit{visitedCellId} to the global cell identity of the current cell;

3> set field \textit{timeSpent} to the time spent in the current cell;

1> if the \textit{logMeasReport} is included in the \textit{UEInformationResponse}:

2> submit the \textit{UEInformationResponse} message to lower layers for transmission via SRB2;

2> discard the logged measurement entries included in the \textit{logMeasInfoList} from \textit{VarLogMeasReport} upon successful delivery of the \textit{UEInformationResponse} message confirmed by lower layers;

1> else:

2> submit the \textit{UEInformationResponse} message to lower layers for transmission via SRB1;

5.6.6 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 and to perform logging of measurement results for MBSFN in both RRC_IDLE and RRC_CONNECTED. The procedure applies to logged measurements capable UEs that are in RRC_CONNECTED.

NOTE E-UTRAN may retrieve stored logged measurement information by means of the UE Information procedure.

5.6.6.2 Initiation

E-UTRAN initiates the logged measurement configuration procedure to UE in RRC_CONNECTED by sending the LoggedMeasurementConfiguration message.

5.6.6.3 Reception of the LoggedMeasurementConfiguration by the UE

Upon receiving theLoggedMeasurementConfiguration 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> if theLoggedMeasurementConfiguration message includes plmn-IdentityList:
2> setplmn-IdentityList in VarLogMeasReport to include the RPLMN as well as the PLMNs included in plmn-IdentityList;
1> else:
2> setplmn-IdentityList in VarLogMeasReport to include the RPLMN;
1> store the received absoluteTimeInfo, traceReference, traceRecordingSessionRef and tce-Id in VarLogMeasReport;
1> store the received targetMBSFN-AreaList, if included, in VarLogMeasConfig;
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;

1> if stored, discard the logged measurement configuration as well as the logged measurement information, i.e. release the UE variables VarLogMeasConfig and VarLogMeasReport;

5.6.8 Measurements logging

5.6.8.1 General

This procedure specifies the logging of available measurements by a UE in RRC_IDLE that has a logged measurement configuration and the logging of available measurements by a UE in both RRC_IDLE and RRC_CONNECTED if targetMBSFN-AreaList is included in VarLogMeasConfig.

5.6.8.2 Initiation

While T330 is running, the UE shall:

1> perform the logging in accordance with the following:

2> if targetMBSFN-AreaList is included in VarLogMeasConfig:

3> if the UE is camping normally on an E-UTRA cell or is connected to E-UTRA; and

3> if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport; and

3> if the PCell (in RRC_CONNECTED) or cell where the UE is camping (in RRC_IDLE) is part of the area indicated by areaConfiguration if configured in VarLogMeasConfig:

4> for MBSFN areas, indicated in targetMBSFN-AreaList, from which the UE is receiving MBMS service:

5> perform MBSFN measurements in accordance with the performance requirements as specified in TS 36.133 [16];

NOTE 1: When configured to perform MBSFN measurement logging by targetMBSFN-AreaList, the UE is not required to receive additional MBSFN subframes, i.e. logging is based on the subframes corresponding to the MBMS services the UE is receiving.

5> perform logging at regular time intervals as defined by the loggingInterval in VarLogMeasConfig, but only for those intervals for which MBSFN measurement results are available as specified in TS 36.133 [16];

2> else if the UE is camping normally on an E-UTRA cell and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport and, if the cell is part of the area indicated by areaConfiguration if configured in VarLogMeasConfig:

3> perform the logging at regular time intervals, as defined by the loggingInterval in VarLogMeasConfig;

5> perform MBSFN measurements in accordance with the performance requirements as specified in TS 36.133 [16];

NOTE 1: When configured to perform MBSFN measurement logging by targetMBSFN-AreaList, the UE is not required to receive additional MBSFN subframes, i.e. logging is based on the subframes corresponding to the MBMS services the UE is receiving.

5> perform logging at regular time intervals as defined by the loggingInterval in VarLogMeasConfig, but only for those intervals for which MBSFN measurement results are available as specified in TS 36.133 [16];
when adding a logged measurement entry in `VarLogMeasReport`, include the fields in accordance with the following:

3> set the `relativeTimeStamp` to indicate the elapsed time since the moment at which the logged measurement configuration was received;

3> if detailed location information became available during the last logging interval, set the content of the `locationInfo` as follows:

4> include the `locationCoordinates`;

3> if `targetMBSFN-AreaList` is included in `VarLogMeasConfig`:

4> for each MBSFN area, for which the mandatory measurements result fields became available during the last logging interval:

5> set the `rsrpResultMBSFN`, `rsrqResultMBSFN` to include measurement results that became available during the last logging interval;

5> include the fields `signallingBLER-Result` or `dataBLER-MCH-ResultList` if the concerned BLER results are available,

5> set the `mbsfn-AreaId` and `carrierFrequency` to indicate the MBSFN area in which the UE is receiving MBSFN transmission;

4> if in RRC_CONNECTED:

5> set the `servCellIdentity` to indicate global cell identity of the PCell;

5> set the `measResultServCell` to include the layer 3 filtered measured results of the PCell;

5> if available, set the `measResultNeighCells` to include the layer 3 filtered measured results of SCell(s) and neighbouring cell(s) measurements that became available during the last logging interval, in order of decreasing RSRP, for at most the following number of cells: 6 intra-frequency and 3 inter-frequency cells per frequency and according to the following:

6> for each cell included, include the optional fields that are available;

5> if available, optionally set the `measResultNeighCells` to include the layer 3 filtered measured results of neighbouring cell(s) measurements that became available during the last logging interval, in order of decreasing RSCP(UTRA)/RSSI(GERAN)/PilotStrength(cdma2000), for at most the following number of cells: 3 inter-RAT cells per frequency (UTRA, cdma2000)/set of frequencies (GERAN), and according to the following:

6> for each cell included, include the optional fields that are available;

4> if in RRC_IDLE:

5> set the `servCellIdentity` to indicate global cell identity of the serving cell;

5> set the `measResultServCell` to include the quantities of the serving cell;

5> if available, set the `measResultNeighCells`, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements that became available during the last logging interval for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency and according to the following:

6> for each neighbour cell included, include the optional fields that are available;

5> if available, optionally set the `measResultNeighCells`, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements that became available during the last logging interval, for at most the following number of cells: 3 inter-RAT cells per frequency (UTRA, cdma2000)/set of frequencies (GERAN), and according to the following:

6> for each cell included, include the optional fields that are available;
4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in TS 36.133 [16];

4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include RSRQ type if the result was based on measurements using a wider band or using all OFDM symbols;

NOTE 2: The UE includes the latest results in accordance with the performance requirements as specified in TS 36.133 [16]. E.g. RSRP and RSRQ results are available only if the UE has a sufficient number of results/receives a sufficient number of subframes during the logging interval.

3> else:

4> set the servCellIdentity to indicate global cell identity of the cell the UE is camping on;

4> set the measResultServCell to include the quantities of the cell the UE is camping on;

4> if available, set the measResultNeighCells, in order of decreasing ranking-criterion as used for cell reselection, to include neighbouring cell measurements that became available during the last logging interval for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency as well as 3 inter-RAT neighbours, per frequency/ set of frequencies (GERAN) per RAT and according to the following:

5> for each neighbour cell included, include the optional fields that are available;

4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in TS 36.133 [16];

4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include RSRQ type if the result was based on measurements using a wider band or using all OFDM symbols;

NOTE 3: The UE includes the latest results of the available measurements as used for cell reselection evaluation in RRC_IDLE or as used for evaluation of reporting criteria or for measurement reporting according to 5.5.3 in RRC_CONNECTED, which are performed in accordance with the performance requirements as specified in TS 36.133 [16].

2> when the memory reserved for the logged measurement information becomes full, stop timer T330 and perform the same actions as performed upon expiry of T330, as specified in 5.6.6.4;

5.6.9 In-device coexistence indication

5.6.9.1 General

![Figure 5.6.9.1-1: In-device coexistence indication](image)

The purpose of this procedure is to inform E-UTRAN about (a change of) the In-Device Coexistence (IDC) problems experienced by the UE in RRC_CONNECTED, as described in TS 36.300 [9], and to provide the E-UTRAN with information in order to resolve them.
5.6.9.2 Initiation

A UE capable of providing IDC indications may initiate the procedure when it is configured to provide IDC indications and upon change of IDC problem information.

Upon initiating the procedure, the UE shall:

1. if configured to provide IDC indications:
   2. if the UE did not transmit an *InDeviceCoexIndication* message since it was configured to provide IDC indications:
      3. if the set of frequencies, for which a *measObjectEUTRA* is configured, the UE is experiencing IDC problems that it cannot solve by itself, is different from the set indicated in the last transmitted *InDeviceCoexIndication* message; or
      3. if the TDM assistance information is different from the assistance information included in the last transmitted *InDeviceCoexIndication* message; or
      3. if configured to provide IDC indications for UL CA; and if the *victimSystemType* is different from the value indicated in the last transmitted *InDeviceCoexIndication* message; or
      3. if configured to provide IDC indications for UL CA; and if the set of supported UL CA combinations on which the UE is experiencing IDC problems that it cannot solve by itself and that the UE includes in *affectedCarrierFreqCombList* according to 5.6.9.3, is different from the set indicated in the last transmitted *InDeviceCoexIndication* message:
        4. initiate transmission of the *InDeviceCoexIndication* message in accordance with 5.6.9.3;
   2. else:
      3. if the set of frequencies, for which a *measObjectEUTRA* is configured and on which the UE is experiencing IDC problems that it cannot solve by itself, is different from the set indicated in the last transmitted *InDeviceCoexIndication* message; or
      3. if on one or more frequencies for which a *measObjectEUTRA* is configured, the UE is experiencing IDC problems that it cannot solve by itself; or
      3. if configured to provide IDC indications for UL CA; and if on one or more supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, the UE is experiencing IDC problems that it cannot solve by itself:
        4. initiate transmission of the *InDeviceCoexIndication* message in accordance with 5.6.9.3;

NOTE 1: The term “IDC problems” refers to interference issues applicable across several subframes/slots where not necessarily all the subframes/slots are affected.

NOTE 2: For the frequencies on which a serving cell or serving cells is configured that is activated, IDC problems consist of interference issues that the UE cannot solve by itself, during either active data exchange or upcoming data activity which is expected in up to a few hundred milliseconds.
For frequencies on which a SCell or SCells is configured that is deactivated, reporting IDC problems indicates an anticipation that the activation of the SCell or SCells would result in interference issues that the UE would not be able to solve by itself.
For a non-serving frequency, reporting IDC problems indicates an anticipation that if the non-serving frequency or frequencies became a serving frequency or serving frequencies then this would result in interference issues that the UE would not be able to solve by itself.

5.6.9.3 Actions related to transmission of *InDeviceCoexIndication* message

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

1. if there is at least one E-UTRA carrier frequency, for which a measurement object is configured, that is affected by IDC problems:
2> include the IE `affectedCarrierFreqList` with an entry for each affected E-UTRA carrier frequency for which a measurement object is configured;

2> for each E-UTRA carrier frequency included in the IE `affectedCarrierFreqList`, include `interferenceDirection` and set it accordingly;

2> include Time Domain Multiplexing (TDM) based assistance information:
   3> if the UE has DRX related assistance information that could be used to resolve the IDC problems:
      4> include `drx-CycleLength`, `drx-Offset` and `drx-ActiveTime`;
   3> else (the UE has desired subframe reservation patterns related assistance information that could be used to resolve the IDC problems):
      4> include `idc-SubframePatternList`;

3> use the MCG as timing reference if TDM based assistance information regarding the SCG is included;

4> if the UE is configured to provide UL CA information and there is a supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, that is affected by IDC problems:
   2> include `victimSystemType` in `ul-CA-AssistanceInfo`;
   2> if the UE sets `victimSystemType` to `wlan` or `Bluetooth`:
      3> include `affectedCarrierFreqCombList` in `ul-CA-AssistanceInfo` with an entry for each supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, that is affected by IDC problems;
   2> else:
      3> optionally include `affectedCarrierFreqCombList` in `ul-CA-AssistanceInfo` with an entry for each supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, that is affected by IDC problems;

NOTE 1: When sending an `InDeviceCoexIndication` message to inform E-UTRAN the IDC problems, the UE includes all assistance information (rather than providing e.g. the changed part(s) of the assistance information).

NOTE 2: Upon not anymore experiencing a particular IDC problem that the UE previously reported, the UE provides an IDC indication with the modified contents of the `InDeviceCoexIndication` message (e.g. by an empty message).

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

5.6.10 UE Assistance Information

5.6.10.1 General

The UE shall submit the `InDeviceCoexIndication` message to lower layers for transmission.
The purpose of this procedure is to inform E-UTRAN of the UE’s power saving preference. Upon configuring the UE to provide power preference indications E-UTRAN may consider that the UE does not prefer a configuration primarily optimised for power saving until the UE explicitly indicates otherwise.

5.6.10.2 Initiation

A UE capable of providing power preference indications in RRC_CONNECTED may initiate the procedure in several cases including upon being configured to provide power preference indications and upon change of power preference.

Upon initiating the procedure, the UE shall:

1. if configured to provide power preference indications:
   2. if the UE did not transmit a UEAssistanceInformation message since it was configured to provide power preference indications; or
   2. if the current power preference is different from the one indicated in the last transmission of the UEAssistanceInformation message and timer T340 is not running:
      3. initiate transmission of the UEAssistanceInformation message in accordance with 5.6.10.3;

5.6.10.3 Actions related to transmission of UEAssistanceInformation message

The UE shall set the contents of the UEAssistanceInformation message:

1. if the UE prefers a configuration primarily optimised for power saving:
   2. set powerPrefIndication to lowPowerConsumption;
1. else:
   2. start or restart timer T340 with the timer value set to the powerPrefIndicationTimer;
   2. set powerPrefIndication to normal;

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

5.6.11 Mobility history information

5.6.11.1 General

This procedure specifies how the mobility history information is stored by the UE, covering RRC_CONNECTED and RRC_IDLE.

5.6.11.2 Initiation

If the UE supports storage of mobility history information, the UE shall:

1. Upon change of cell, consisting of PCell in RRC_CONNECTED or serving cell in RRC_IDLE, to another E-UTRA or inter-RAT cell or when entering out of service:
   2. include an entry in variable VarMobilityHistoryReport possibly after removing the oldest entry, if necessary, according to the following:
      3. if the global cell identity of the previous PCell/ serving cell is available:
         4. include the global cell identity of that cell in the field visitedCellId of the entry;
      3. else:
         4. include the physical cell identity and carrier frequency of that cell in the field visitedCellId of the entry;
      3. set the field timeSpent of the entry as the time spent in the previous PCell/ serving cell;
1. upon entering E-UTRA (in RRC_CONNECTED or RRC_IDLE) while previously out of service and/or using another RAT:

2. include an entry in variable VarMobilityHistoryReport possibly after removing the oldest entry, if necessary, according to following:

3. set the field timeSpent of the entry as the time spent outside E-UTRA;

5.6.12 RAN-assisted WLAN interworking

5.6.12.1 General

The purpose of this procedure is to facilitate access network selection and traffic steering between E-UTRAN and WLAN.

If required by upper layers (see TS 24.312 [66], the UE shall provide an up-to-date set of the applicable parameters provided by wlan-OffloadConfigCommon or wlan-OffloadConfigDedicated to upper layers, and inform upper layers when no parameters are configured. The parameter set from either wlan-OffloadConfigCommon or wlan-OffloadConfigDedicated is selected as specified in subclauses 5.2.2.24, 5.3.12, 5.6.12.2 and 5.6.12.4.

5.6.12.2 Dedicated WLAN offload configuration

The UE shall:

1. if the received wlan-OffloadInfo is set to release:

2. release wlan-OffloadConfigDedicated and t350;

3. if the wlan-OffloadConfigCommon corresponding to the RPLMN is broadcast by the cell:

4. apply the wlan-OffloadConfigCommon corresponding to the RPLMN included in SystemInformationBlockType17;

1. else:

2. apply the received wlan-OffloadConfigDedicated;

5.6.12.3 WLAN offload RAN evaluation

The UE shall:

1. if the UE is configured with either wlan-OffloadConfigCommon or wlan-OffloadConfigDedicated:

2. provide measurement results required for the evaluation of the network selection and traffic steering rules as defined in TS 24.312 [66] to upper layers;

3. evaluate the network selection and traffic steering rules as defined in TS 36.304 [4];

5.6.12.4 T350 expiry or stop

The UE shall:

1. if T350 expires or is stopped:

2. release the wlan-OffloadConfigDedicated and t350;

3. if the wlan-OffloadConfigCommon corresponding to the RPLMN is broadcast by the cell:

4. apply the wlan-OffloadConfigCommon corresponding to the RPLMN included in SystemInformationBlockType17;
5.6.12.5  Cell selection/ re-selection while T350 is running

The UE shall:

1> if, while T350 is running, the UE selects/ reselects a cell which is not the PCell when the wlan-OffloadDedicated was configured:

2> stop timer T350;

2> perform the actions as specified in 5.6.12.4;

5.6.13  SCG failure information

5.6.13.1  General

The purpose of this procedure is to inform E-UTRAN about an SCG failure the UE has experienced i.e. SCG radio link failure, SCG change failure.

5.6.13.2  Initiation

A UE initiates the procedure to report SCG failures when SCG transmission is not suspended and when one of the following conditions is met:

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

1> upon SCG change failure, in accordance with 5.3.5.7a; or

1> upon stopping uplink transmission towards the PSCell due to exceeding the maximum uplink transmission timing difference when powerControlMode is configured to 1, in accordance with subclause 7.17.2 of TS 36.133 [29];

Upon initiating the procedure, the UE shall:

1> suspend all SCG DRBs and suspend SCG transmission for split DRBs;

1> reset SCG-MAC;

1> stop T307;

1> initiate transmission of the SCGFailureInformation message in accordance with 5.6.13.3;

5.6.13.3  Actions related to transmission of SCGFailureInformation message

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

1> if the UE initiates transmission of the SCGFailureInformation message to provide SCG radio link failure information:

2> include failureType and set it to the trigger for detecting SCG radio link failure;
else if the UE initiates transmission of the SCGFailureInformation message to provide SCG change failure information:

- include failureType and set it to scg-ChangeFailure;

else if the UE initiates transmission of the SCGFailureInformation message due to exceeding maximum uplink transmission timing difference:

- include failureType and set it to maxUL-TimingDiff;

set the measResultServFreqList to include for each SCG cell that is configured, if any, within measResultSCell the quantities of the concerned SCell, if available according to performance requirements in [16];

for each SCG serving frequency included in measResultServFreqList, include within measResultBestNeighCell the physCellId and the quantities of the best non-serving cell, based on RSRP, on the concerned serving frequency;

set the measResultNeighCells to include the best measured cells on non-serving E-UTRA frequencies, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected the failure, and set its fields as follows;

- if the UE was configured to perform measurements for one or more non-serving EUTRA frequencies and measurement results are available, include the measResultListEUTRA;

- for each neighbour cell included, include the optional fields that are available;

NOTE 2: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Blacklisted cells are not required to be reported.

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

5.7 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:

- when receiving an RRC message on the BCCH, PCCH, CCCH, MCCH or SBCCH for which the abstract syntax is invalid [13];

  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
The UE shall, apply the following principles regarding the levels applicable in case of nested error handling:

- an extension addition group is not regarded as a level on its own. E.g. in the ASN.1 extract in the previous, a error regarding the conditionality of field3 would result in the entire itemInfo entry to be ignored (rather than just the extension addition group containing field3 and field4)

- a traditional nonCriticalExtension is not regarded as a level on its own. E.g. in the ASN.1 extract in the previous, a error regarding the conditionality of field3 would result in the entire BroadcastInfoBlock1 to be ignored (rather than just the non critical extension containing field3 and field4).

5.7.5 Not comprehended field

The UE shall, when receiving an RRC message on any logical channel:

1> if the message includes a field that the UE does not comprehend:

2> treat the rest of the message as if the field was absent;

NOTE: This section does not apply to the case of an extension to the value range of a field. Such cases are addressed instead by the requirements in section 5.7.3.

5.8 MBMS

5.8.1 Introduction

5.8.1.1 General

In general the control information relevant only for UEs supporting MBMS is separated as much as possible from unicast control information. Most of the MBMS control information is provided on a logical channel specific for MBMS common control information: the MCCH. E-UTRA employs one MCCH logical channel per MBSFN area. In case the network configures multiple MBSFN areas, the UE acquires the MBMS control information from the MCCHs that are configured to identify if services it is interested to receive are ongoing. The action applicable when the UE is unable to simultaneously receive MBMS and unicast services is up to UE implementation. In this release of the specification, an MBMS capable UE is only required to support reception of a single MBMS service at a time, and reception of more than one MBMS service (also possibly on more than one MBSFN area) in parallel is left for UE
implementation. The MCCH carries the \textit{MBSFNAreaConfiguration} message, which indicates the MBMS sessions that are ongoing as well as the (corresponding) radio resource configuration. The MCCH may also carry the \textit{MBMSCountingRequest} message, when E-UTRAN wishes to count the number of UEs in RRC\_CONNECTED that are receiving or interested to receive one or more specific MBMS services.

A limited amount of MBMS control information is provided on the BCCH. This primarily concerns the information needed to acquire the MCCH(s). This information is carried by means of a single MBMS specific \textit{SystemInformationBlock: SystemInformationBlockType13}. An MBSFN area is identified solely by the \textit{mbsfn-AreaId} in \textit{SystemInformationBlockType13}. At mobility, the UE considers that the MBSFN area is continuous when the source cell and the target cell broadcast the same value in the \textit{mbsfn-AreaId}.

### 5.8.1.2 Scheduling

The MCCH information is transmitted periodically, using a configurable repetition period. Scheduling information is not provided for MCCH i.e. both the time domain scheduling as well as the lower layer configuration are semi-statically configured, as defined within \textit{SystemInformationBlockType13}.

For MBMS user data, which is carried by the MTCH logical channel, E-UTRAN periodically provides MCH scheduling information (MSI) at lower layers (MAC). This MCH information only concerns the time domain scheduling i.e. the frequency domain scheduling and the lower layer configuration are semi-statically configured. The periodicity of the MSI is configurable and defined by the MCH scheduling period.

### 5.8.1.3 MCCH information validity and notification of changes

Change of MCCH information only occurs at specific radio frames, i.e. the concept of a modification period is used. Within a modification period, the same MCCH information may be transmitted a number of times, as defined by its scheduling (which is based on a repetition period). The modification period boundaries are defined by SFN values for which SFN mod \(m = 0\), where \(m\) is the number of radio frames comprising the modification period. The modification period is configured by means of \textit{SystemInformationBlockType13}.

When the network changes (some of) the MCCH information, it notifies the UEs about the change during a first modification period. In the next modification period, the network transmits the updated MCCH information. These general principles are illustrated in figure 5.8.1.3-1, in which different colours indicate different MCCH information.

Upon receiving a change notification, a UE interested to receive MBMS services acquires the new MCCH information immediately from the start of the next modification period. The UE applies the previously acquired MCCH information until the UE acquires the new MCCH information.

![Figure 5.8.1.3-1: Change of MCCH Information](image)

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 \textit{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 \textit{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 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

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.

5.8.2.2 Initiation

An MBMS capable UE shall:

1> if the procedure is triggered by an MCCH information change notification:

2> start acquiring the MBSFNAreaConfiguration message and the MBMSCountingRequest message if present, from the beginning of the modification period following the one in which the change notification was received;
NOTE 1: The UE continues using the previously received MCCH information until the new MCCH information has been acquired.

1> if the UE enters an MBSFN area:
   2> acquire the MBSFNAreaConfiguration message and the MBMSCountingRequest message if present, at the next repetition period;

1> if the UE is receiving an MBMS service:
   2> start acquiring the MBSFNAreaConfiguration message and the MBMSCountingRequest message if present, that both concern the MBSFN area of the service that is being received, from the beginning of each modification period;

5.8.2.4 Actions upon reception of the MBSFNAreaConfiguration message

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

5.8.2.5 Actions upon reception of the MBMSCountingRequest message

Upon receiving MBMSCountingRequest message, the UE shall perform the MBMS Counting procedure as specified in 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 logicalChannelIdentity, applicable for the MRB, as included in the MBSFNAreaConfiguration message;

1> configure the physical layer in accordance with the pmch-Config, applicable for the MRB, as included in the MBSFNAreaConfiguration message;

1> 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

![MBMS Counting procedure diagram]

The MBMS Counting procedure is used by the E-UTRAN to count the number of RRC_CONNECTED mode UEs which are receiving via an MRB or interested to receive via an MRB the specified MBMS services.

The UE determines interest in an MBMS service, that is identified by the TMGI, by interaction with upper layers.

5.8.4.2 Initiation

E-UTRAN initiates the procedure by sending an MBMSCountingRequest message.

5.8.4.3 Reception of the MBMSCountingRequest message by the UE

Upon receiving the MBMSCountingRequest message, the UE in RRC_CONNECTED mode shall:

1> if the SystemInformationBlockType1, that provided the scheduling information for the systemInformationBlockType13 that included the configuration of the MCCH via which the MBMSCountingRequest message was received, contained the identity of the Registered PLMN; and

1> if the UE is receiving via an MRB or interested to receive via an MRB at least one of the services in the received countingRequestList:

2> if more than one entry is included in the mbsfn-AreaInfoList received in the SystemInformationBlockType13 that included the configuration of the MCCH via which the MBMSCountingRequest message was received:

3> include the mbsfn-AreaIndex in the MBMSCountingResponse message and set it to the index of the entry in the mbsfn-AreaInfoList within the received SystemInformationBlockType13 that corresponds with the MBSFN area used to transfer the received MBMSCountingRequest message;

2> for each MBMS service included in the received countingRequestList:

3> if the UE is receiving via an MRB or interested to receive via an MRB this MBMS service:

4> include an entry in the countingResponseList within the MBMSCountingResponse message with countingResponseService set it to the index of the entry in the countingRequestList within the received
MBMSCountingRequest that corresponds with the MBMS service the UE is receiving or interested to receive;

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

NOTE 1: UEs that are receiving an MBMS User Service [56] by means of a Unicast Bearer Service [57] (i.e. via a DRB), but are interested to receive the concerned MBMS User Service [56] via an MBMS Bearer Service (i.e. via an MRB), respond to the counting request.

NOTE 2: If ciphering is used at upper layers, the UE does not respond to the counting request if it cannot decipher the MBMS service for which counting is performed (see TS 22.146 [62, 5.3]).

NOTE 3: The UE treats the MBMSCountingRequest messages received in each modification period independently. In the unlikely case E-UTRAN would repeat an MBMSCountingRequest (i.e. including the same services) in a subsequent modification period, the UE responds again. The UE provides at most one MBMSCountingResponse message to multiple transmission attempts of an MBMSCountingRequest messages in a given modification period.

5.8.5 MBMS interest indication

5.8.5.1 General

The purpose of this procedure is to inform E-UTRAN that the UE is receiving or is interested to receive MBMS via an MRB, and if so, to inform E-UTRAN about the priority of MBMS versus unicast reception.

5.8.5.2 Initiation

An MBMS capable UE in RRC_CONNECTED may initiate the procedure in several cases including upon successful connection establishment, upon entering or leaving the service area, upon session start or stop, upon change of interest, upon change of priority between MBMS reception and unicast reception or upon change to a PCell broadcasting SystemInformationBlockType15.

Upon initiating the procedure, the UE shall:

1> if SystemInformationBlockType15 is broadcast by the PCell:

2> ensure having a valid version of SystemInformationBlockType15 for the PCell;

2> if the UE did not transmit an MBMSInterestIndication message since last entering RRC_CONNECTED state;

or

2> if since the last time the UE transmitted an MBMSInterestIndication message, the UE connected to a PCell not broadcasting SystemInformationBlockType15;

3> if the set of MBMS frequencies of interest, determined in accordance with 5.8.5.3, is not empty:

4> initiate transmission of the MBMSInterestIndication message in accordance with 5.8.5.4;

2> else:
3> if the set of MBMS frequencies of interest, determined in accordance with 5.8.5.3, has changed since the last transmission of the MBMSInterestIndication message; or

3> if the prioritisation of reception of all indicated MBMS frequencies compared to reception of any of the established unicast bearers has changed since the last transmission of the MBMSInterestIndication message:

4> initiate transmission of the MBMSInterestIndication message in accordance with 5.8.5.4;

NOTE: The UE may send an MBMSInterestIndication even when it is able to receive the MBMS services it is interested in i.e. to avoid that the network allocates a configuration inhibiting MBMS reception.

5.8.5.3 Determine MBMS frequencies of interest

The UE shall:

1> consider a frequency to be part of the MBMS frequencies of interest if the following conditions are met:

2> at least one MBMS session the UE is receiving or interested to receive via an MRB is ongoing or about to start; and

NOTE 1: The UE may determine whether the session is ongoing from the start and stop time indicated in the User Service Description (USD), see 3GPP TS 36.300 [9] or 3GPP TS 26.346 [57].

2> for at least one of these MBMS sessions SystemInformationBlockType15 acquired from the PCell includes for the concerned frequency one or more MBMS SAIs as indicated in the USD for this session; and

NOTE 2: The UE considers a frequency to be part of the MBMS frequencies of interest even though E-UTRAN may (temporarily) not employ an MRB for the concerned session. I.e. the UE does not verify if the session is indicated on MCCH

NOTE 3: The UE considers the frequencies of interest independently of any synchronization state, e.g. [9, Annex J.1]

2> the UE is capable of simultaneously receiving the set of MBMS frequencies of interest, regardless of whether a serving cell is configured on each of these frequencies or not; and

2> the supportedBandCombination the UE included in UE-EUTRA-Capability contains at least one band combination including the set of MBMS frequencies of interest;

NOTE 4: Indicating a frequency implies that the UE supports SystemInformationBlockType13 acquisition for the concerned frequency i.e. the indication should be independent of whether a serving cell is configured on that frequency.

NOTE 5: When evaluating which frequencies it can receive simultaneously, the UE does not take into account the serving frequencies that are currently configured i.e. it only considers MBMS frequencies it is interested to receive.

NOTE 6: The set of MBMS frequencies of interest includes at most one frequency for a given physical frequency. The UE only considers a physical frequency to be part of the MBMS frequencies of interest if it supports at least one of the bands indicated for this physical frequency in SystemInformationBlockType1 (for serving frequency) or SystemInformationBlockType15 (for neighbouring frequencies). In this case, E-UTRAN may assume the UE supports MBMS reception on any of the bands supported by the UE (i.e. according to supportedBandCombination).

5.8.5.4 Actions related to transmission of MBMSInterestIndication message

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

1> if the set of MBMS frequencies of interest, determined in accordance with 5.8.5.3, is not empty:

2> include mbms-FreqList and set it to include the MBMS frequencies of interest, using the EARFCN corresponding with freqBandIndicator included in SystemInformationBlockType1 (for serving frequency), if applicable, and the EARFCN(s) as included in SystemInformationBlockType15 (for neighbouring frequencies);
NOTE 1: The EARFCN included in mbms-FreqList is merely used to indicate a physical frequency the UE is interested to receive i.e. the UE may not support the band corresponding to the included EARFCN (but it does support at least one of the bands indicated in system information for the concerned physical frequency).

2> include mbms-Priority if the UE prioritises reception of all indicated MBMS frequencies above reception of any of the unicast bearers;

NOTE 2: If the UE prioritises MBMS reception and unicast data cannot be supported because of congestion on the MBMS carrier(s), E-UTRAN may initiate release of unicast bearers. It is up to E-UTRAN implementation whether all bearers or only GBR bearers are released. E-UTRAN does not initiate re-establishment of the released unicast bearers upon alleviation of the congestion.

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

5.9 RN procedures

5.9.1 RN reconfiguration

5.9.1.1 General

The purpose of this procedure is to configure/reconfigure the RN subframe configuration and/or to update the system information relevant for the RN in RRC_CONNECTED.

5.9.1.2 Initiation

E-UTRAN may initiate the RN reconfiguration procedure to an RN in RRC_CONNECTED when AS security has been activated.

5.9.1.3 Reception of the RNReconfiguration by the RN

The RN shall:

1> if the rn-SystemInfo is included:

2> if the systemInformationBlockType1 is included:

3> act upon the received SystemInformationBlockType1 as specified in 5.2.2.7;

2> if the SystemInformationBlockType2 is included:

3> act upon the received SystemInformationBlockType2 as specified in 5.2.2.9;

1> if the rn-SubframeConfig is included:

2> reconfigure lower layers in accordance with the received subframeConfigPatternFDD or subframeConfigPatternTDD.
2> if the rpdcch-Config is included:

3> reconfigure lower layers in accordance with the received rpdcch-Config;

1> submit the RNReconfigurationComplete message to lower layers for transmission, upon which the procedure ends;

5.10 Sidelink

5.10.1 Introduction

The sidelink communication/discovery/synchronisation resource configuration applies for the frequency at which it was received/acquired. Moreover, for a UE configured with one or more SCells, the sidelink communication/discovery/synchronisation resource configuration provided by dedicated signalling applies for the PCell/the primary frequency. Furthermore, the UE shall not use the sidelink communication/discovery/synchronisation transmission resources configured for one cell with the timing of another cell.

NOTE 1: Upper layers configure the UE to receive or transmit sidelink communication on a specific frequency, to monitor sidelink discovery announcements on one or more frequencies or to transmit sidelink discovery announcements on a specific frequency, but only if the UE is authorised to perform these particular ProSe related sidelink activities.

NOTE 2: It is up to UE implementation which actions to take (e.g. termination of unicast services, detach) when it is unable to perform the desired sidelink activities, e.g. due to UE capability limitations.

5.10.1a Conditions for sidelink operation

When it is specified that the UE shall perform a particular sidelink operation only if the conditions defined in this section are met, the UE shall perform the concerned sidelink operation only if:

1> if the UE’s serving cell is suitable (RRC_IDLE or RRC_CONNECTED); and if either the selected cell on the frequency used for sidelink operation belongs to the registered or equivalent PLMN as specified in TS 24.334 [69] or the UE is out of coverage on the frequency used for sidelink operation as defined in TS 36.304 [4, 11.4]; or

1> if the UE is camped on a serving cell (RRC_IDLE) on which it fulfils the conditions to support sidelink communication in limited service state as specified in TS 23.303 [68, 4.5.6]; and if either the serving cell is on the frequency used for sidelink operation or the UE is out of coverage on the frequency used for sidelink operation as defined in TS 36.304 [4, 11.4]; or

1> if the UE has no serving cell (RRC_IDLE);

5.10.2 Sidelink UE information

5.10.2.1 General

![Figure 5.10.2-1: Sidelink UE information](image-url)
The purpose of this procedure is to inform E-UTRAN that the UE is interested or no longer interested to receive sidelink communication or discovery, as well as to request assignment or release of transmission resources for sidelink communication or discovery announcements.
5.10.2.2 Initiation

A UE capable of sidelink communication or discovery that is in RRC_CONNECTED may initiate the procedure to indicate it is (interested in) receiving sidelink communication or discovery in several cases including upon successful connection establishment, upon change of interest, upon change to a PCell broadcasting SystemInformationBlockType18 or SystemInformationBlockType19. A UE capable of sidelink communication or discovery may initiate the procedure to request assignment of dedicated resources for the concerned sidelink communication transmission or discovery announcements.

NOTE 1: A UE in RRC_IDLE that is configured to transmit sidelink communication/discovery announcements, while SystemInformationBlockType18/ SystemInformationBlockType19 does not include the resources for transmission (in normal conditions), initiates connection establishment in accordance with 5.3.3.1a.

Upon initiating the procedure, the UE shall:

1> if SystemInformationBlockType18 is broadcast by the PCell:

2> ensure having a valid version of SystemInformationBlockType18 for the PCell;

2> if configured by upper layers to receive sidelink communication:

3> if the UE did not transmit a SidelinkUEInformation message since last entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType18; or

NOTE 2: After handover/re-establishment from a source PCell not broadcasting SystemInformationBlockType18 the UE repeats the same interest information that it provided previously as such a source PCell may not forward the interest information.

3> if the last transmission of the SidelinkUEInformation message did not include commRxInterestedFreq; or

if the frequency configured by upper layers to receive sidelink communication on has changed since the last transmission of the SidelinkUEInformation message:

4> initiate transmission of the SidelinkUEInformation message to indicate the sidelink communication reception frequency of interest in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelinkUEInformation message included commRxInterestedFreq:

4> initiate transmission of the SidelinkUEInformation message to indicate it is no longer interested in sidelink communication reception in accordance with 5.10.2.3;

2> if configured by upper layers to transmit sidelink communication:

3> if the UE did not transmit a SidelinkUEInformation message since entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType18; or

3> if the last transmission of the SidelinkUEInformation message did not include commTxResourceReq; or if the information carried by the commTxResourceReq has changed since the last transmission of the SidelinkUEInformation message:

4> initiate transmission of the SidelinkUEInformation message to indicate the sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelinkUEInformation message included commTxResourceReq:

4> initiate transmission of the SidelinkUEInformation message to indicate it does no longer require sidelink communication transmission resources in accordance with 5.10.2.3;
1> if SystemInformationBlockType19 is broadcast by the PCell:

2> ensure having a valid version of SystemInformationBlockType19 for the PCell;

2> if configured by upper layers to receive sidelink discovery announcements on a serving frequency or on one or more frequencies included in discInterFreqList, if included in SystemInformationBlockType19:

3> if the UE did not transmit a SidelinkUEInformation message since last entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType19; or

3> if the last transmission of the SidelinkUEInformation message did not include discRxInterest:

4> initiate transmission of the SidelinkUEInformation message to indicate it is interested in sidelink discovery reception in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelinkUEInformation message included discRxInterest:

4> initiate transmission of the SidelinkUEInformation message to indicate it is no longer interested in sidelink discovery reception in accordance with 5.10.2.3;

2> if the UE is configured by upper layers to transmit sidelink discovery announcements:

3> if the UE did not transmit a SidelinkUEInformation message since entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType19; or

3> if the last transmission of the SidelinkUEInformation message did not include discTxResourceReq; or if the sidelink discovery announcement resources required by the UE have changed (i.e. resulting in a change of discTxResourceReq) since the last transmission of the SidelinkUEInformation message:

4> initiate transmission of the SidelinkUEInformation message to indicate the sidelink discovery announcement resources required by the UE in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelinkUEInformation message included discTxResourceReq:

4> initiate transmission of the SidelinkUEInformation message to indicate it does no longer require sidelink discovery announcement resources in accordance with 5.10.2.3;

5.10.2.3 Actions related to transmission of SidelinkUEInformation message

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

1> if SystemInformationBlockType18 is broadcast by the PCell:

2> if configured by upper layers to receive sidelink communication:

3> include commRxInterestedFreq and set it to the sidelink communication frequency;

2> if configured by upper layers to transmit sidelink communication:

3> include commTxResourceReq and set its fields as follows:

4> set carrierFreq to indicate the sidelink communication frequency i.e. the same value as indicated in commRxInterestedFreq if included;

4> set destinationInfoList to include the sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;

1> if SystemInformationBlockType19 is broadcast by the PCell:
2> if configured by upper layers to receive sidelink discovery announcements on a serving frequency or one or more frequencies included in discInterFreqList, if included in SystemInformationBlockType19:

3> include discRxInterest;

2> if the UE is configured by upper layers to transmit sidelink discovery announcements:

3> include discTxResourceReq and set it to indicate the number of discovery messages for sidelink discovery announcement(s) for which it requests E-UTRAN to assign dedicated resources;

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

5.10.3 Sidelink communication monitoring

A UE capable of sidelink communication that is configured by upper layers to receive sidelink communication shall:

1> if the conditions for sidelink operation as defined in 5.10.1a are met:

2> if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:

3> if the cell chosen for sidelink communication reception broadcasts SystemInformationBlockType18 including commRxPool:

4> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources indicated by commRxPool;

NOTE 1: If commRxPool includes one or more entries including rxParametersNCell, the UE may only monitor such entries if the associated PSS/SSS or SLSSIDs is detected. When monitoring such pool(s), the UE applies the timing of the concerned PSS/SSS or SLSS.

2> else (i.e. out of coverage on the sidelink carrier):

3> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources that were preconfigured (i.e. preconfigComm in SL-Preconfiguration defined in 9.3);

NOTE 2: The UE may monitor in accordance with the timing of the selected SyncRef UE, or if the UE does not have a selected SyncRef UE, based on the UE’s own timing.
5.10.4 Sidelink communication transmission

A UE capable of sidelink communication that is configured by upper layers to transmit sidelink communication and has related data to be transmitted shall:

1> if the conditions for sidelink operation as defined in 5.10.1a are met:

2> if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:

3> if the UE is in RRC_CONNECTED and uses the PCell for sidelink communication:

4> if the UE is configured, by the current PCell/ the PCell in which physical layer problems or radio link failure was detected, with commTxResources set to scheduled;

5> if T310 or T311 is running; and if the PCell at which the UE detected physical layer problems or radio link failure broadcasts SystemInformationBlockType18 including commTxPoolExceptional; or

5> if T301 is running and the cell on which the UE initiated connection re-establishment broadcasts SystemInformationBlockType18 including commTxPoolExceptional:

6> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in commTxPoolExceptional;

5> else:

6> configure lower layers to request E-UTRAN to assign transmission resources for sidelink communication;

4> else if the UE is configured with commTxPoolNormalDedicated:

5> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in commTxPoolNormalDedicated;

3> else (i.e. sidelink communication in RRC_IDLE or on cell other than PCell in RRC_CONNECTED):

4> if the cell chosen for sidelink communication transmission broadcasts SystemInformationBlockType18:

5> if SystemInformationBlockType18 includes commTxPoolNormalCommon:

6> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in commTxPoolNormalCommon;

5> else:

6> if the last connection establishment was initiated to request sidelink communication transmission resources and resulted in T300 expiry; and

6> if the cell on which the UE initiated connection establishment broadcasts SystemInformationBlockType18 including commTxPoolExceptional:

7> from the moment T300 expired, as specified in 5.3.3.6, until receiving an RRCConnectionReconfiguration including sl-CommConfig or until receiving an RRCConnectionRelease or an RRCConnectionReject;

8> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in commTxPoolExceptional;

2> else (i.e. out of coverage on sidelink carrier):

3> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources that were preconfigured i.e. indicated by the first entry in preconfigComm in SL-Preconfiguration defined in 9.3 and in accordance with the timing of the selected SyncRef UE, or if the UE does not have a selected SyncRef UE, based on the UEs own timing;
5.10.5 Sidelink discovery monitoring

A UE capable of sidelink discovery that is configured by upper layers to monitor sidelink discovery announcements shall:

1> for each frequency the UE is configured to monitor sidelink discovery announcements on, prioritising the frequencies included in discInterFreqList, if included in SystemInformationBlockType19:

2> configure lower layers to monitor sidelink discovery announcements using the pool of resources indicated by discRxPool in SystemInformationBlockType19 without affecting normal operation i.e. receive during idle periods or by using a spare receiver;

NOTE 1: The requirement not to affect normal UE operation also applies for the acquisition of sidelink discovery related system and synchronisation information from inter-frequency cells.

NOTE 2: The UE is not required to monitor all pools simultaneously.

NOTE 3: It is up to UE implementation to decide whether a cell is sufficiently good to be used to monitor sidelink discovery announcements.

NOTE 4: If discRxPool includes one or more entries including rxParameters, the UE may only monitor such entries if the associated SLSSIDs are detected. When monitoring such pool(s) the UE applies the timing of the corresponding SLSS.

5.10.6 Sidelink discovery announcement

A UE capable of sidelink discovery that is configured by upper layers to transmit sidelink discovery announcements shall:

NOTE 1: In case the configured resources are insufficient it is up to UE implementation to decide which sidelink discovery announcements to transmit.

1> if the UE’s serving cell (RRC_IDLE) or PCell (RRC_CONNECTED) is suitable as defined in TS 36.304 [4]:

2> if the UE is in RRC_CONNECTED (i.e. PCell is used for sidelink discovery announcement):

3> if the UE is configured with discTxResources set to scheduled:

4> configure lower layers to transmit the sidelink discovery announcement using the assigned resources indicated by scheduled in discTxResources;

3> else if the UE is configured with discTxPoolDedicated (i.e. discTxResources set to ue-Selected):

4> if poolSelection within poolToAddModList is set to rsrpBased:

5> select an entry of poolToAddModList for which the RSRP measurement of the PCell, after applying the layer 3 filter defined by quantityConfig as specified in 5.5.3.2, is in-between threshLow and threshHigh;

4> else:

5> randomly select, using a uniform distribution, an entry of poolToAddModList;

4> configure lower layers to transmit the sidelink discovery announcement using the selected pool of resources:

2> else if T300 is not running (i.e. UE in RRC_IDLE, announcing via serving cell):

3> if SystemInformationBlockType19 of the serving cell includes discTxPoolCommon:

4> if poolSelection is set to rsrpBased:

5> select an entry of discTxPoolCommon for which RSRP measurement of the serving cell is in-between threshLow and threshHigh;

4> else:
randomly select, using a uniform distribution, an entry of discTxPoolCommon;

configure lower layers to transmit the sidelink discovery announcement using the selected pool of resources;

NOTE 2: When performing resource pool selection based on RSRP, the UE uses the latest results of the available measurements used for cell reselection evaluation in RRC_IDLE/ for measurement report triggering evaluation in RRC_CONNECTED, which are performed in accordance with the performance requirements specified in TS 36.133 [16].

5.10.7 Sidelink synchronisation information transmission

5.10.7.1 General

Figure 5.10.7.1-1: Synchronisation information transmission for sidelink communication, in (partial) coverage

Figure 5.10.7.1-2: Synchronisation information transmission for sidelink communication, out of coverage

Figure 5.10.7.1-3: Synchronisation information transmission for sidelink discovery

The purpose of this procedure is to provide synchronisation information to a UE. The synchronisation information concerns a Sidelink Synchronisation Signal (SLSS) for sidelink discovery, while it concerns an SLSS, timing information and some additional configuration parameters (i.e. the MasterInformationBlock-SL message) for sidelink communication. A UE transmits synchronisation information either when E-UTRAN configures it to do so by dedicated signalling (i.e. network based), or when not configured by dedicated signalling (i.e. UE based) and E-UTRAN broadcasts (in coverage) or pre-configures a threshold (out of coverage).
The synchronisation information transmitted by the UE may be derived from information/s signals received from E-UTRAN (in coverage) or received from a UE acting as synchronisation reference for the transmitting UE. In the remainder, the UE acting as synchronisation reference is referred to as SyncRef UE.

5.10.7.2 Initiation

A UE capable of SLSS transmission shall, when transmitting sidelink discovery announcements in accordance with 5.10.6 and when the following conditions are met:

1. if the UE’s serving cell (RRC_IDLE) or PCell (RRC_CONNECTED) is suitable as defined in TS 36.304 [4]:
2. if in RRC_CONNECTED; and if networkControlledSyncTx is configured and set to on; or
2. if networkControlledSyncTx is not configured; and syncTxThreshIC is included in SystemInformationBlockType19; and the RSRP measurement of the serving cell (RRC_IDLE) or PCell (RRC_CONNECTED) is below the value of syncTxThreshIC;
3. transmit SLSS in accordance with 5.10.7.3 and TS 36.211 [21], unless the UE uses the selected subframe for regular uplink transmission;

A UE capable of sidelink communication that is configured by upper layers to transmit sidelink communication shall, irrespective of whether or not it has data to transmit:

1. if the conditions for sidelink operation as defined in 5.10.1a are met:
2. if in RRC_CONNECTED; and if networkControlledSyncTx is configured and set to on:
3. transmit SLSS in accordance with 5.10.7.3 and TS 36.211 [21];
3. transmit the MasterInformationBlock-SL message, in the same subframe as SLSS, and in accordance with 5.10.7.4;

A UE shall, when transmitting sidelink communication in accordance with 5.10.4 and when the following conditions are met:

1. if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:
2. if the UE is in RRC_CONNECTED; and networkControlledSyncTx is not configured; and syncTxThreshIC is included in SystemInformationBlockType18; and the RSRP measurement of the cell chosen for sidelink communication transmission is below the value of syncTxThreshIC; or
2. if the UE is in RRC_IDLE; and syncTxThreshIC is included in SystemInformationBlockType18; and the RSRP measurement of the cell chosen for sidelink communication transmission is below the value of syncTxThreshIC:
3. transmit SLSS in accordance with 5.10.7.3 and TS 36.211 [21];
3. transmit the MasterInformationBlock-SL message, in the same subframe as SLSS, and in accordance with 5.10.7.4;
1. else (i.e. out of coverage):
2. if syncTxThreshOoC is included in the preconfigured sidelink parameters (i.e. SL-Preconfiguration defined in 9.3); and the UE has no selected SyncRef UE or the S-RSRP measurement result of the selected SyncRef UE is below the value of syncTxThreshOoC:
3. transmit SLSS in accordance with 5.10.7.3 and TS 36.211 [21];
3. transmit the MasterInformationBlock-SL message, in the same subframe as SLSS, and in accordance with 5.10.7.4;

5.10.7.3 Transmission of SLSS

The UE shall select the SLSSID and the subframe in which to transmit SLSS as follows:
1> if triggered by sidelink discovery announcement:
   2> select the SLSSID included in the entry of discSyncConfig included in the received SystemInformationBlockType19, that includes txParameters;
   2> use syncOffsetIndicator corresponding to the selected SLSSID;
   2> for each pool used for the transmission of discovery announcements (each corresponding to the selected SLSSID):
      3> if a subframe indicated by syncOffsetIndicator corresponds to the first subframe of the discovery transmission pool;
      4> select the concerned subframe;
      3> else
      4> select the subframe indicated by syncOffsetIndicator that precedes and which, in time domain, is nearest to the first subframe of the discovery transmission pool;
1> if triggered by sidelink communication:
   2> if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:
      3> select the SLSSID included in the entry of commSyncConfig that is included in the received SystemInformationBlockType18 and includes txParameters;
      3> use syncOffsetIndicator corresponding to the selected SLSSID;
      3> if in RRC_CONNECTED; and if networkControlledSyncTx is configured and set to on:
         4> select the subframe(s) indicated by syncOffsetIndicator;
      3> else (when transmitting communication):
         4> select the subframe(s) indicated by syncOffsetIndicator within the SC period in which the UE intends to transmit sidelink control information or data;
   2> else (i.e. out of coverage on sidelink carrier):
      3> select the synchronisation reference UE (i.e. SyncRef UE) as defined in 5.10.8;
      3> if the UE has a selected SyncRef UE and inCoverage in the MasterInformationBlock-SL message received from this UE is set to TRUE; or
      3> if the UE has a selected SyncRef UE and inCoverage in the MasterInformationBlock-SL message received from this UE is set to FALSE while the SLSS from this UE is part of the set defined for out of coverage, see TS 36.211 [21]:
         4> select the same SLSSID as the SLSSID of the selected SyncRef UE;
      4> select the subframe in which to transmit the SLSS according to the syncOffsetIndicator1 or syncOffsetIndicator2 included in the preconfigured sidelink parameters (i.e. preconfigSync in SL-Preconfiguration defined in 9.3), such that the subframe timing is different from the SLSS of the selected SyncRef UE;
      3> else if the UE has a selected SyncRef UE:
         4> select the SLSSID from the set defined for out of coverage having an index that is 168 more than the index of the SLSSID of the selected SyncRef UE, see TS 36.211 [21];
         4> select the subframe in which to transmit the SLSS according to syncOffsetIndicator1 or syncOffsetIndicator2 included in the preconfigured sidelink parameters (i.e. preconfigSync in SL-Preconfiguration defined in 9.3), such that the subframe timing is different from the SLSS of the selected SyncRef UE;
      3> else (i.e. no SyncRef UE selected):
4> randomly select, using a uniform distribution, an SLSSID from the set of sequences defined for out of coverage, see TS 36.211 [21];

4> select the subframe in which to transmit the SLSS according to the syncOffsetIndicator1 or syncOffsetIndicator2 (arbitrary selection between these) included in the preconfigured sidelink parameters (i.e. preconfigSync in SL-Preconfiguration defined in 9.3);

5.10.7.4 Transmission of MasterInformationBlock-SL message

The UE shall set the contents of the MasterInformationBlock-SL message as follows:

1> if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:

2> set inCoverage to TRUE;

2> set sl-Bandwidth to the value of ul-Bandwidth as included in the received SystemInformationBlockType2 of the cell chosen for sidelink communication;

2> if tdd-Config is included in the received SystemInformationBlockType1:

3> set subframeAssignmentSL to the value representing the same meaning as of subframeAssignment that is included in tdd-Config in the received SystemInformationBlockType1;

2> else:

3> set subframeAssignmentSL to none;

2> if syncInfoReserved is included in an entry of commSyncConfig from the received SystemInformationBlockType18:

3> set reserved to the value of syncInfoReserved in the received SystemInformationBlockType18;

2> else:

3> set all bits in reserved to 0;

1> else if the UE has a selected SyncRef UE (as defined in 5.10.8):

2> set inCoverage to FALSE;

2> set sl-Bandwidth, subframeAssignmentSL and reserved to the value of the corresponding field included in the received MasterInformationBlock-SL;

1> else (i.e. no SyncRef UE selected):

2> set inCoverage to FALSE;

2> set sl-Bandwidth, subframeAssignmentSL and reserved to the value of the corresponding field included in the preconfigured sidelink parameters (i.e. preconfigGeneral in SL-Preconfiguration defined in 9.3);

1> set directFrameNumber and directSubframeNumber according to the subframe used to transmit the SLSS, as specified in 5.10.7.3;

1> submit the MasterInformationBlock-SL message to lower layers for transmission upon which the procedure ends;

5.10.7.5 Void

5.10.8 Sidelink synchronisation reference

5.10.8.1 General

The purpose of this procedure is to select a synchronisation reference and used a.o. when transmitting sidelink communication or synchronisation information.
5.10.8.2 Selection and reselection of synchronisation reference UE (SyncRef UE)

The UE shall:

1> if out of coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:
2> perform a full search (i.e. covering all subframes and all possible SLSSIDs) to detect candidate SLSS, in accordance with TS 36.133 [16]
2> when evaluating the one or more detected SLSSIDs, apply layer 3 filtering as specified in 5.5.3.2 using the preconfigured filterCoefficient as defined in 9.3, before using the S-RSRP measurement results;
2> if the UE has selected a SyncRef UE:
3> if the S-RSRP of the strongest candidate SyncRef UE exceeds the minimum requirement TS 36.133 [16] by syncRefMinHyst and the strongest candidate SyncRef UE belongs to the same priority group as the current SyncRef UE and the S-RSRP of the strongest candidate SyncRef UE exceeds the S-RSRP of the current SyncRef UE by syncRefDiffHyst; or
3> if the S-RSRP of the candidate SyncRef UE exceeds the minimum requirement TS 36.133 [16] by syncRefMinHyst and the candidate SyncRef UE belongs to a higher priority group than the current SyncRef UE; or
3> if the S-RSRP of the current SyncRef UE is less than the minimum requirement TS 36.133 [16]:
4> consider no SyncRef UE to be selected;
2> if the UE has not selected a SyncRef UE,
3> if the UE detects one or more SLSSIDs for which the S-RSRP exceeds the minimum requirement defined in TS 36.133 [16] by syncRefMinHyst and for which the UE received the corresponding MasterInformationBlock-SL message (candidate SyncRef UEs), select a SyncRef UE according to the following priority order:
4> UEs of which inCoverage, included in the MasterInformationBlock-SL message received from this UE, is set to TRUE, starting with the UE with the highest S-RSRP result (priority group 1);
4> UE which SLSSID is part of the set defined for in coverage, starting with the UE with the highest S-RSRP result (priority group 2);
4> Other UEs, starting with the UE with the highest S-RSRP result (priority group 3);

5.10.9 Sidelink common control information

5.10.9.1 General

The sidelink common control information is carried by a single message, the MasterInformationBlock-SL (MIB-SL) message. The MIB-SL includes timing information as well as some configuration parameters and is transmitted via SL-BCH.

The MIB-SL uses a fixed schedule with a periodicity of 40 ms without repetitions. In particular, the MIB-SL is scheduled in subframes indicated by syncOffsetIndicator i.e. for which (10*DFN + subframe number) mod 40 = syncOffsetIndicator.

The sidelink common control information may change at any transmission i.e. neither a modification period nor a change notification mechanism is used.

A UE configured to receive or transmit sidelink communication shall:

1> if the UE has a selected SyncRef UE, as specified in 5.10.8.2:
2> ensure having a valid version of the MasterInformationBlock-SL message of that SyncRefUE:
5.10.9.2 Actions related to reception of MasterInformationBlock-SL message

Upon receiving MasterInformationBlock-SL, the UE shall:

1> apply the values of sl-Bandwidth, subframeAssignmentSL, directFrameNumber and directSubframeNumber included in the received MasterInformationBlock-SL message;

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 fields specified in the message syntax. The syntax of the information elements that are defined as stand-alone abstract types is further specified in a similar manner in sub-clause 6.3.

The need for fields to be present in a message or an abstract type, i.e., the ASN.1 fields that are specified as 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 fields to be present

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cond conditionTag</td>
<td>Conditioned present</td>
</tr>
<tr>
<td>(Used in downlink</td>
<td>A field for which the need is specified by means of conditions. For each</td>
</tr>
<tr>
<td></td>
<td>conditionTag, the need is specified in a tabular form following the</td>
</tr>
<tr>
<td></td>
<td>ASN.1 segment. In case, according to the conditions, a field is not</td>
</tr>
<tr>
<td></td>
<td>present, the UE takes no action and where applicable shall continue to</td>
</tr>
<tr>
<td></td>
<td>use the existing value (and/ or the associated functionality) unless</td>
</tr>
<tr>
<td></td>
<td>explicitly stated otherwise (e.g. in the conditional presence table or</td>
</tr>
<tr>
<td></td>
<td>in the description of the field itself).</td>
</tr>
<tr>
<td>Need OP</td>
<td>Optionally present</td>
</tr>
<tr>
<td>(Used in downlink</td>
<td>A field that is optional to signal. For downlink messages, the UE is</td>
</tr>
<tr>
<td>only)</td>
<td>not required to take any special action on absence of the IE beyond</td>
</tr>
<tr>
<td></td>
<td>what is specified in the procedural text or the field description table</td>
</tr>
<tr>
<td></td>
<td>following the ASN.1 segment. The UE behaviour on absence should be</td>
</tr>
<tr>
<td></td>
<td>captured either in the procedural text or in the field description.</td>
</tr>
<tr>
<td>Need ON</td>
<td>Optionally present, No action</td>
</tr>
<tr>
<td>(Used in downlink</td>
<td>A field that is optional to signal. If the message is received by the</td>
</tr>
<tr>
<td>only)</td>
<td>UE, and in case the information element is absent, the UE takes no</td>
</tr>
<tr>
<td></td>
<td>action and where applicable shall continue to use the existing value (and/</td>
</tr>
<tr>
<td></td>
<td>or the associated functionality).</td>
</tr>
<tr>
<td>Need OR</td>
<td>Optionally present, Release</td>
</tr>
<tr>
<td>(Used in downlink</td>
<td>A field that is optional to signal. If the message is received by the</td>
</tr>
<tr>
<td>only)</td>
<td>UE, and in case the information element is absent, the UE shall</td>
</tr>
<tr>
<td></td>
<td>discontinue/ stop using/ delete any existing value (and/ or the</td>
</tr>
<tr>
<td></td>
<td>associated functionality).</td>
</tr>
</tbody>
</table>

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

Need codes may not be specified for a parent extension field/ extension group, used in downlink, which includes one or more child extension fields. Upon absence of such a parent extension field/ extension group, the UE shall:

- For each individual child extension field, including extensions that are mandatory to include in the optional group, act in accordance with the need code that is defined for the extension;
- Apply this behaviour not only for child extension fields included directly within the optional parent extension field/ extension group, but also for extension fields defined at further nesting levels as long as for none of the fields in-between the concerned extension field and the parent extension field a need code is specified;

NOTE 1: The above applies for groups of non critical extensions using double brackets (referred to as extension groups), as well as non-critical extensions at the end of a message or at the end of a structure contained in a BIT STRING or OCTET STRING (referred to as parent extension fields).
Need codes, conditions and ASN.1 defaults specified for a particular (child) field only apply in case the (parent) field including the particular field is present. This rule does not apply for optional parent extension fields/extension groups without need codes,

**NOTE 2:** The previous rule implies that E-UTRAN has to include such a parent extension field to release a child field that is either:

- Optional with need OR, or
- Conditional while the UE releases the child field when absent.

The handling of need codes as specified in the previous is illustrated by means of an example, as shown in the following ASN.1.

```asn1
RRCMessage-r8-IEs ::= SEQUENCE {
  field1         InformationElement1, OPTIONAL, -- Need ON
  field2         InformationElement2 OPTIONAL, -- Need OR
  nonCriticalExtension     RRCMessage-v8a0-IEs OPTIONAL
}

RRCMessage-v8a0-IEs ::= SEQUENCE {
  field3         InformationElement3 OPTIONAL, -- Need ON
  nonCriticalExtension     RRCMessage-v940-IEs OPTIONAL
}

RRCMessage-v940-IEs ::= SEQUENCE {
  field4         InformationElement4 OPTIONAL, -- Need OR
  nonCriticalExtension     SEQUENCE {} OPTIONAL
}

InformationElement1 ::= SEQUENCE {
  field11        InformationElement11 OPTIONAL, -- Need ON
  field12        InformationElement12 OPTIONAL, -- Need OR
  ...,
  [ [ field13        InformationElement13 OPTIONAL, -- Need OR
     field14        InformationElement14 OPTIONAL -- Need ON
    ] ]
}

InformationElement2 ::= SEQUENCE {
  field21        InformationElement11 OPTIONAL, -- Need OR
  ...,
}
```

The handling of need codes as specified in the previous implies that:

- if `field2` in `RRCMessage-r8-IEs` is absent, the UE does not modify `field21`;
- if `field2` in `RRCMessage-r8-IEs` is present but does not include `field21`, the UE releases `field21`;
- if the extension group containing `field13` is absent, the UE releases `field13` and does not modify `field14`;
- if `nonCriticalExtension` defined by IE `RRCMessage-v8a0-IEs` is absent, the UE does not modify `field3` and releases `field4`;

### 6.2 RRC messages

**NOTE:** The messages included in this section reflect the current status of the discussions. Additional messages may be included at a later stage.
6.2.1 General message structure

– **EUTRA-RRC-Definitions**

This ASN.1 segment is the start of the E-UTRA RRC PDU definitions.

```
-- ASN1START
EUTRA-RRC-Definitions DEFINITIONS AUTOMATIC TAGS ::= BEGIN
-- ASN1STOP
```

– **BCCH-BCH-Message**

The **BCCH-BCH-Message** class is the set of RRC messages that may be sent from the E-UTRAN to the UE via BCH on the BCCH logical channel.

```
-- ASN1START
BCCH-BCH-Message ::= SEQUENCE {
  message     BCCH-BCH-MessageType
}
BCCH-BCH-MessageType ::= MasterInformationBlock
-- ASN1STOP
```

– **BCCH-DL-SCH-Message**

The **BCCH-DL-SCH-Message** class is the set of RRC messages that may be sent from the E-UTRAN to the UE via DL-SCH on the BCCH logical channel.

```
-- ASN1START
BCCH-DL-SCH-Message ::= SEQUENCE {
  message     BCCH-DL-SCH-MessageType
}
BCCH-DL-SCH-MessageType ::= CHOICE {
  c1       CHOICE {
    systemInformation      SystemInformation,
    systemInformationBlockType1    SystemInformationBlockType1
  },
  messageClassExtension SEQUENCE {}
}
-- ASN1STOP
```

– **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{
```
-- PCCH-Message

The **PCCH-Message** class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the PCCH logical channel.

```asn1
PCCH-Message ::= SEQUENCE {
  message     PCCH-MessageType
}
PCCH-MessageType ::= CHOICE {
  c1      CHOICE {
    paging         Paging
  },
  messageClassExtension SEQUENCE {}
}
```

-- DL-CCCH-Message

The **DL-CCCH-Message** class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the downlink CCCH logical channel.

```asn1
DL-CCCH-Message ::= SEQUENCE {
  message     DL-CCCH-MessageType
}
DL-CCCH-MessageType ::= CHOICE {
  c1      CHOICE {
    rrcConnectionReestablishment   RRCConnectionReestablishment,
    rrcConnectionReestablishmentReject  RRCConnectionReestablishmentReject,
    rrcConnectionReject      RRCConnectionReject,
    rrcConnectionSetup      RRCConnectionSetup
  },
  messageClassExtension SEQUENCE {}
}
```

-- DL-DCCH-Message

The **DL-DCCH-Message** class is the set of RRC messages that may be sent from the E-UTRAN to the UE or from the E-UTRAN to the RN on the downlink DCCH logical channel.

```asn1
DL-DCCH-Message ::= SEQUENCE {
  message     DL-DCCH-MessageType
}
DL-DCCH-MessageType ::= CHOICE {
  c1      CHOICE {
    csfbParametersResponseCDMA2000   CSFBParametersResponseCDMA2000,
    dlInformationTransfer             DLInformationTransfer,
    handoverFromEUTRAPreparationRequest  HandoverFromEUTRAPreparationRequest,
    mobilityFromEUTRACommand          MobilityFromEUTRACommand,
    rrcConnectionReconfiguration      RRCConnectionReconfiguration,
  },
  messageClassExtension SEQUENCE {}
}
```
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.

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

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.

```
UL-DCCH-Message ::= SEQUENCE {
  message     UL-DCCH-MessageType
}
UL-DCCH-MessageType ::= CHOICE {
  c1      CHOICE {
    csfbParametersRequestCDMA2000   CSFBParametersRequestCDMA2000,
    measurementReport              MeasurementReport,
    rrcConnectionReconfigurationComplete RRCConnectionReconfigurationComplete,
    rrcConnectionReestablishmentComplete RRCConnectionReestablishmentComplete,
    rrcConnectionSetupComplete      RRCConnectionSetupComplete,
    securityModeComplete           SecurityModeComplete,
    securityModeFailure            SecurityModeFailure,
    ueCapabilityInformation         UECapabilityInformation,
    ulHandoverPreparationTransfer   ULMHandoverPreparationTransfer,
    ulInformationTransfer          ULMInformationTransfer,
    counterCheckResponse           CounterCheckResponse,
    ueInformationResponse-r9       UEInformationResponse-r9,
    proximityIndication-r9         ProximityIndication-r9,
    rnReconfigurationComplete-r10  RNReconfigurationComplete-r10,
    mbmsCountingResponse-r10       MBMSSCountingResponse-r10,
    interFreqRSTDMeasurementIndication-r10 InterFreqRSTDMeasurementIndication-r10
  },
  messageClassExtension CHOICE {
    c2       CHOICE {
      ueAssistanceInformation-r11 UEAssistanceInformation-r11,
      inDeviceCoexIndication-r11  InDeviceCoexIndication-r11,
      mbmsInterestIndication-r11 MBMSSInterestIndication-r11,
      scgFailureInformation-r12  SCGFailureInformation-r12,
    }
  }
}
```
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

```
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,  nonCriticalExtension    SEQUENCE {}       OPTIONAL   }
DRB-CountMSB-InfoList ::= SEQUENCE (SIZE (1..maxDRB)) OF DRB-CountMSB-Info
DRB-CountMSB-Info ::= SEQUENCE {  drb-Identity     DRB-Identity,  countMSB-Uplink     INTEGER(0..33554431),  countMSB-Downlink    INTEGER(0..33554431)   }
```
**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**

```plaintext
-- ASN1START
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 ::= SEQUENCE {
  drb-Identity     DRB-Identity,
  count-Uplink     INTEGER(0..4294967295),
  count-Downlink    INTEGER(0..4294967295)
}
-- ASN1STOP
```

**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**

```asm
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
}
```

---

**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

```asm
CSFBParametersResponseCDMA2000 ::= SEQUENCE {
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  criticalExtensions CHOICE {
    csfbParametersResponseCDMA2000-r8 CSFBParametersResponseCDMA2000-r8-IEs,
    criticalExtensionsFuture SEQUENCE {}
  }
}
CSFBParametersResponseCDMA2000-r8-IEs ::= SEQUENCE {
  rand RAND-CDMA2000,
  mobilityParameters MobilityParametersCDMA2000,
  nonCriticalExtension CSFBParametersResponseCDMA2000-v8a0-IEs OPTIONAL
}
CSFBParametersResponseCDMA2000-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL
}
```

---
– **DLInformationTransfer**

The *DLInformationTransfer* message is used for the downlink transfer of NAS or non-3GPP dedicated information.

Signalling radio bearer: SRB2 or SRB1 (only if SRB2 not established yet. If SRB2 is suspended, E-UTRAN does not send this message until SRB2 is resumed.)

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

**DLInformationTransfer message**

```
-- ASN1START
DLInformationTransfer ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1         CHOICE {
      dlInformationTransfer-r8   DLInformationTransfer-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}
DLInformationTransfer-r8-IEs ::= SEQUENCE {
  dedicatedInfoType     CHOICE {
    dedicatedInfoNAS     DedicatedInfoNAS,
    dedicatedInfoCDMA2000-1XRTT   DedicatedInfoCDMA2000,
    dedicatedInfoCDMA2000-HRPD   DedicatedInfoCDMA2000
  },
  nonCriticalExtension    DLInformationTransfer-v8a0-IEs  OPTIONAL
}
DLInformationTransfer-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
-- ASN1STOP
```

– **HandoverFromEUTRAPreparationRequest (CDMA2000)**

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**

```
-- ASN1START
HandoverFromEUTRAPreparationRequest ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1         CHOICE {
      handoverFromEUTRAPreparationRequest-r8   HandoverFromEUTRAPreparationRequest-r8-IEs,
    }
  }
}
HandoverFromEUTRAPreparationRequest-r8-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
-- 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.

---

### Conditional presence

<table>
<thead>
<tr>
<th>Field</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 dualRxTxRedirectIndicator is present; otherwise it is not present.</td>
</tr>
</tbody>
</table>

---

**InDeviceCoexIndication**

The *InDeviceCoexIndication* message is used to inform E-UTRAN about IDC problems which can not be solved by the UE itself, as well as to provide information that may assist E-UTRAN when resolving these problems.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

---

**InDeviceCoexIndication message**

---

---
InDeviceCoexIndication-r11 ::= InDeviceCoexIndication-r11-IEs, spare3 NULL, spare2 NULL, spare1 NULL
}
criticalExtensionsFuture SEQUENCE {}

InDeviceCoexIndication-r11-IEs ::= SEQUENCE {
affectedCarrierFreqList-r11 AffectedCarrierFreqList-r11 OPTIONAL,
tdm-AssistanceInfo-r11 TDM-AssistanceInfo-r11 OPTIONAL, lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension InDeviceCoexIndication-v11d0-IEs OPTIONAL
}

InDeviceCoexIndication-v11d0-IEs ::= SEQUENCE {
ul-CA-AssistanceInfo-r11 SEQUENCE {
affectedCarrierFreqCombList-r11 AffectedCarrierFreqCombList-r11 OPTIONAL,
victimSystemType-r11 VictimSystemType-r11 OPTIONAL,
nonCriticalExtension SEQUENCE () OPTIONAL
}

AffectedCarrierFreqList-r11 ::= SEQUENCE (SIZE (1..maxFreqIDC-r11)) OF AffectedCarrierFreq-r11

AffectedCarrierFreq-r11 ::= SEQUENCE {
carrierFreq-r11 MeasObjectId,
interferenceDirection-r11 ENUMERATED {eutra, other, both, spare}
}

AffectedCarrierFreqCombList-r11 ::= SEQUENCE (SIZE (1..maxCombIDC-r11)) OF AffectedCarrierFreqComb-r11

AffectedCarrierFreqComb-r11 ::= SEQUENCE (SIZE (2..maxServCell-r10)) OF MeasObjectId

TDM-AssistanceInfo-r11 ::= CHOICE {
  drx-AssistanceInfo-r11 SEQUENCE {
drx-CycleLength-r11 ENUMERATED {sf40, sf64, sf80, sf128, sf160, sf256, spare2, spare1},
drx-Offset-r11 INTEGER (0..255) OPTIONAL,
drx-ActiveTime-r11 ENUMERATED {sf20, sf30, sf40, sf60, sf80, sf100, spare2, spare1}
},
  idc-SubframePatternList-r11 IDC-SubframePatternList-r11, ...
}

IDC-SubframePatternList-r11 ::= SEQUENCE (SIZE (1..maxSubframePatternIDC-r11)) OF IDC-SubframePattern-r11

IDC-SubframePattern-r11 ::= CHOICE {
  subframePatternFDD-r11 BIT STRING (SIZE (4)),
  subframePatternTDD-r11 CHOICE {
    subframeConfig0-r11 BIT STRING (SIZE (70)),
    subframeConfig1-5-r11 BIT STRING (SIZE (10)),
    subframeConfig6-r11 BIT STRING (SIZE (60))
  },
  ...
}

VictimSystemType-r11 ::= SEQUENCE {
gps-r11 ENUMERATED {true} OPTIONAL,
glonass-r11 ENUMERATED {true} OPTIONAL,
bd-s-r11 ENUMERATED {true} OPTIONAL,
galileo-r11 ENUMERATED {true} OPTIONAL,
wlan-r11 ENUMERATED {true} OPTIONAL,
bluetooth-r11 ENUMERATED {true} OPTIONAL
}

-- ASN1STOP
**InDeviceCoexIndication field descriptions**

**affectedCarrierFreqCombList**  
Indicates a list of E-UTRA carrier frequencies that are affected by IDC problems due to Inter-Modulation Distortion and harmonics from E-UTRA when configured with UL CA.

**affectedCarrierFreqList**  
List of E-UTRA carrier frequencies affected by IDC problems.

**drx-ActiveTime**  
Indicates the desired active time that the E-UTRAN is recommended to configure. Value in number of subframes. Value sf20 corresponds to 20 subframes, sf30 corresponds to 30 subframes and so on.

**drx-CycleLength**  
Indicates the desired DRX cycle length that the E-UTRAN is recommended to configure. Value in number of subframes. Value sf40 corresponds to 40 subframes, sf64 corresponds to 64 subframes and so on.

**drx-Offset**  
Indicates the desired DRX starting offset that the E-UTRAN is recommended to configure. The UE shall set the value of drx-Offset smaller than the value of drx-CycleLength. The starting frame and subframe satisfy the relation: \[(SFN \times 10) + \text{subframe number}\] modulo (drx-CycleLength) = drx-Offset.

**idc-SubframePatternList**  
A list of one or more subframe patterns indicating which HARQ process E-UTRAN is requested to abstain from using. Value 0 indicates that E-UTRAN is requested to abstain from using the subframe. For FDD, the radio frame in which the pattern starts (i.e. the radio frame in which the first/leftmost bit of the subframePatternFDD corresponds to subframe #0) occurs when SFN mod 2 = 0. For TDD, the first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string divided by 10. The UE shall indicate a subframe pattern that follows HARQ time line, as specified in TS 36.213 [23], i.e., if a subframe is set to 1 in the subframe pattern, also the corresponding subframes carrying the potential UL grant [23, 8.0], the UL HARQ retransmission [23, 8.0] and the DL/UL HARQ feedback [23, 7.3, 8.3 and 9.1.2] shall be set to 1.

**interferenceDirection**  
Indicates the direction of IDC interference. Value eutra indicates that only E-UTRA is victim of IDC interference, value other indicates that only another radio is victim of IDC interference and value both indicates that both E-UTRA and another radio are victims of IDC interference. The other radio refers to either the ISM radio or GNSS (see 3GPP TR 36.816 [63]).

**victimSystemType**  
Indicate the list of victim system types to which IDC interference is caused from E-UTRA when configured with UL CA. Value gps, glonass, bds and galileo indicates the type of GNSS. Value wlan indicates WLAN and value bluetooth indicates Bluetooth.

---

**InterFreqRSTDMeasurementIndication**

The InterFreqRSTDMeasurementIndication message is used to indicate that the UE is going to either start or stop OTDOA inter-frequency RSTD measurement which requires measurement gaps as specified in TS 36.133 [16, 8.1.2.6].

Signalling radio bearer: SRB1

RCL-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

**InterFreqRSTDMeasurementIndication message**

```asn1
-- ASN1START
InterFreqRSTDMeasurementIndication-r10 ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1         CHOICE {
      InterFreqRSTDMeasurementIndication-r10-IEs
    }
    criticalExtensionsFuture   SEQUENCE {}
  }
}

InterFreqRSTDMeasurementIndication-r10-IEs ::= SEQUENCE {
  start        SEQUENCE {
    rstd-InterFreqInfoList-r10    RSTD-InterFreqInfoList-r10
  },
  stop        NULL
}
-- ASN1END
```
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension SEQUENCE {} OPTIONAL

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

---

**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 or to perform logging of measurement results for MBSFN while in both RRC_IDLE and RRC_CONNECTED. It is used to transfer the logged measurement configuration for network performance optimisation, see TS 37.320 [60].

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

LoggedMeasurementConfiguration message

```asn1
LoggedMeasurementConfiguration-r10 ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE {
      loggedMeasurementConfiguration-r10  LoggedMeasurementConfiguration-r10-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {}
  }
}

LoggedMeasurementConfiguration-r10-IEs ::= SEQUENCE {
  traceReference-r10  TraceReference-r10,
  traceRecordingSessionRef-r10 OCTET STRING {SIZE (2)},
  tce-Id-r10  OCTET STRING {SIZE (1)},
  absoluteTimeInfo-r10 AbsoluteTimeInfo-r10,
  areaConfiguration-r10 AreaConfiguration-r10 OPTIONAL, -- Need OR
  loggingDuration-r10 LoggingDuration-r10,
  loggingInterval-r10 LoggingInterval-r10,
  nonCriticalExtension LoggedMeasurementConfiguration-v1080-IEs OPTIONAL
}

LoggedMeasurementConfiguration-v1080-IEs ::= SEQUENCE {
  lateNonCriticalExtension-r10 OCTET STRING OPTIONAL,
  nonCriticalExtension LoggedMeasurementConfiguration-v1130-IEs OPTIONAL
}

LoggedMeasurementConfiguration-v1130-IEs ::= SEQUENCE {
  plmn-IdentityList-r11 PLMN-IdentityList3-r11 OPTIONAL, -- Need OR
  areaConfiguration-v1130 AreaConfiguration-v1130 OPTIONAL, -- Need OR
  nonCriticalExtension LoggedMeasurementConfiguration-v1250-IEs OPTIONAL
}

LoggedMeasurementConfiguration-v1250-IEs ::= SEQUENCE {
  targetMBSFN-AreaList-r12 TargetMBSFN-AreaList-r12 OPTIONAL, -- Need OP
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

TargetMBSFN-AreaList-r12 ::= SEQUENCE (SIZE (0..maxMBSFN-Area)) OF TargetMBSFN-Area-r12

TargetMBSFN-Area-r12 ::= SEQUENCE {
  mbsfn-AreaId-r12 MBSFN-AreaId-r12 OPTIONAL, -- Need OR
  carrierFreq-r12 ARFCN-ValueEUTRA-r9,
  ...
}
```

-- ASN1STOP
LoggedMeasurementConfiguration field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>absoluteTimeInfo</td>
<td>Indicates the absolute time in the current cell.</td>
</tr>
<tr>
<td>areaConfiguration</td>
<td>Used to restrict the area in which the UE performs measurement logging to cells broadcasting either one of the included cell identities or one of the included tracking area codes/identities.</td>
</tr>
<tr>
<td>plmn-IdentityList</td>
<td>Indicates a set of PLMNs defining when the UE performs measurement logging as well as the associated status indication and information retrieval i.e. the UE performs these actions when the RPLMN is part of this set of PLMNs.</td>
</tr>
<tr>
<td>targetMBSFN-AreaList</td>
<td>Used to indicate logging of MBSFN measurements and further restrict the area and frequencies for which the UE performs measurement logging for MBSFN. If both MBSFN area id and carrier frequency are present, a specific MBSFN area is indicated. If only carrier frequency is present, all MBSFN areas on that carrier frequency are indicated. If there is no entry in the list, any MBSFN area is indicated.</td>
</tr>
<tr>
<td>tce-Id</td>
<td>Parameter Trace Collection Entity Id: See TS 32.422 [58].</td>
</tr>
<tr>
<td>traceRecordingSessionRef</td>
<td>Parameter Trace Recording Session Reference: See TS 32.422 [58]</td>
</tr>
</tbody>
</table>

---

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

```
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))
}
```

---

MasterInformationBlock field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dl-Bandwidth</td>
<td>Parameter: transmission bandwidth configuration, NRB in downlink, see TS 36.101 [42, table 5.6-1]. n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on.</td>
</tr>
<tr>
<td>systemFrameNumber</td>
<td>Defines the 8 most significant bits of the SFN. As indicated in TS 36.211 [21, 6.6.1], the 2 least significant bits of the SFN are acquired implicitly in the P-BCH decoding, i.e. timing of 40ms P-BCH TTI indicates 2 least significant bits (within 40ms P-BCH TTI, the first radio frame: 00, the second radio frame: 01, the third radio frame: 10, the last radio frame: 11). One value applies for all serving cells of a Cell Group (i.e. MCG or SCG). The associated functionality is common (i.e. not performed independently for each cell).</td>
</tr>
</tbody>
</table>

---

MBMSCountingRequest

The MBMSCountingRequest message is used by E-UTRAN to count the UEs that are receiving or interested to receive specific MBMS services.

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

**MBMSCountingRequest message**

```asn1
-- ASN1START
MBMSCountingRequest-r10 ::= SEQUENCE {
  countingRequestList-r10   CountingRequestList-r10,
  lateNonCriticalExtension  OCTET STRING      OPTIONAL,
  nonCriticalExtension     SEQUENCE {}       OPTIONAL
}
CountingRequestList-r10 ::= SEQUENCE (SIZE (1..maxServiceCount)) OF CountingRequestInfo-r10
CountingRequestInfo-r10 ::= SEQUENCE {
  tmgi-r10       TMGI-r9,
  ...
}  
-- ASN1STOP
```

**MBMSCountingResponse**

The `MBMSCountingResponse` message is used by the UE to respond to an `MBMSCountingRequest` message.

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

**MBMSCountingResponse message**

```asn1
-- ASN1START
MBMSCountingResponse-r10 ::=   SEQUENCE {
  criticalExtensions     CHOICE {
    c1         CHOICE {
      countingResponse-r10    MBMSCountingResponse-r10-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}
MBMSCountingResponse-r10-IEs ::= SEQUENCE {
  mbsfn-AreaIndex-r10    INTEGER (0..maxMBSFN-Area-1)       OPTIONAL,
  countingResponseList-r10 CountingResponseList-r10-IEs,        OPTIONAL,
  lateNonCriticalExtension  OCTET STRING      OPTIONAL,
  nonCriticalExtension   SEQUENCE {}       OPTIONAL
}
CountingResponseList-r10 ::=   SEQUENCE (SIZE (1..maxServiceCount)) OF CountingResponseInfo-r10
CountingResponseInfo-r10 ::=   SEQUENCE {
  countingResponseService-r10 INTEGER (0..maxServiceCount-1),
  ...
}  
-- ASN1STOP
```
MBMSCountingResponse field descriptions

countingResponseList  
List of MBMS services which the UE is receiving or interested to receive. Value 0 for field countingResponseService corresponds to the first entry in countingRequestList within MBMSCountingRequest, value 1 corresponds to the second entry in this list and so on.

mbsfn-AreaIndex  
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.

— MBMSInterestIndication  
The MBMSInterestIndication message is used to inform E-UTRAN that the UE is receiving/interested to receive or no longer receiving/interested to receive MBMS via an MRB.

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

MBMSInterestIndication message

-- ASN1START
MBMSInterestIndication-r11 ::= SEQUENCE {
criticalExtensions     CHOICE {
c1         CHOICE {
           interestIndication-r11    MBMSInterestIndication-r11-IEs,
spare3 NULL, spare2 NULL, spare1 NULL
},
criticalExtensionsFuture   SEQUENCE {}
}
}

MBMSInterestIndication-r11-IEs ::= SEQUENCE {
mbms-FreqList-r11     CarrierFreqListMBMS-r11   OPTIONAL,
mbms-Priority-r11     ENUMERATED {true}    OPTIONAL,
lateNonCriticalExtension   OCTET STRING     OPTIONAL,
nonCriticalExtension    SEQUENCE {}      OPTIONAL
}

-- ASN1STOP

MBMSInterestIndication field descriptions

mbms-FreqList  
List of MBMS frequencies on which the UE is receiving or interested to receive MBMS via an MRB.

mbms-Priority  
Indicates whether the UE prioritises MBMS reception above unicast reception. The field is present (i.e. value true), if the UE prioritises reception of all listed MBMS frequencies above reception of any of the unicast bearers. Otherwise the field is absent.

— MBSFNAreaConfiguration  
The MBSFNAreaConfiguration message contains the MBMS control information applicable for an MBSFN area. For each MBSFN area included in SystemInformationBlockType13 E-UTRAN configures an MCCH (i.e. the MCCH identifies the MBSFN area) and signals the MBSFNAreaConfiguration message.

Signalling radio bearer: N/A  
RLC-SAP: UM  
Logical channel: MCCH
MBSFNAreaConfiguration message

-- ASN1START
MBSFNAreaConfiguration-r9 ::= SEQUENCE {
  commonSF-Alloc-r9     CommonSF-AllocPatternList-r9,
  commonSF-AllocPeriod-r9    ENUMERATED {
    rf4, rf8, rf16, rf32, rf64, rf128, rf256,
  },
  pmch-InfoList-r9     PMCH-InfoList-r9,
  nonCriticalExtension   MBSFNAreaConfiguration-v930-IEs OPTIONAL
}
MBSFNAreaConfiguration-v930-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    MBSFNAreaConfiguration-v1250-IEs  OPTIONAL
}
MBSFNAreaConfiguration-v1250-IEs ::= SEQUENCE {
  pmch-InfoListExt-r12    PMCH-InfoListExt-r12     OPTIONAL,  -- Need OR
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
CommonSF-AllocPatternList-r9 ::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig
-- ASN1STOP

MBSFNAreaConfiguration field descriptions

commonSF-Alloc
Indicates the subframes allocated to the MBSFN area. E-UTRAN always sets this field to cover at least the subframes configured by SystemInformationBlockType13 for this MCCH, regardless of whether any MBMS sessions are ongoing.

commonSF-AllocPeriod
Indicates the period during which resources corresponding with field commonSF-Alloc are divided between the (P)MCH that are configured for this MBSFN area. The subframe allocation patterns, as defined by commonSF-Alloc, repeat continuously during this period. Value rf4 corresponds to 4 radio frames, rf8 corresponds to 8 radio frames and so on. The commonSF-AllocPeriod starts in the radio frames for which: SFN mod commonSF-AllocPeriod = 0.

pmch-InfoList
EUTRAN may include pmch-InfoListExt even if pmch-InfoList does not include maxPMCH-PerMBSFN entries. EUTRAN configures at most maxPMCH-PerMBSFN entries i.e. across pmch-InfoList and pmch-InfoListExt.

MeasurementReport

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

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

MeasurementReport message

-- ASN1START
MeasurementReport ::=    SEQUENCE {
  criticalExtensions     CHOICE {
    c1         CHOICE{
      measurementReport-r8    MeasurementReport-r8-IEs,
      spare7 NULL, spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}       -- Need OR
  }
}
-- ASN1STOP
MeasurementReport-r8-IEs ::= SEQUENCE {
    measResults               MeasResults,
    nonCriticalExtension     MeasurementReport-v8a0-IEs OPTIONAL
}
MeasurementReport-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    nonCriticalExtension    SEQUENCE {} OPTIONAL
}

-- ASN1STOP

–

MobilityFromEUTRACommand

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 message

-- ASN1START

MobilityFromEUTRACommand ::= SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier,
    criticalExtensions     CHOICE {
        c1         CHOICE{
            mobilityFromEUTRACommand-r8  MobilityFromEUTRACommand-r8-IEs,
            mobilityFromEUTRACommand-r9   MobilityFromEUTRACommand-r9-IEs,
            spare2 NULL, spare1  NULL
        },
        criticalExtensionsFuture   SEQUENCE {}
    },
    nonCriticalExtension    MobilityFromEUTRACommand-v8a0-IEs OPTIONAL
}

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

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-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    nonCriticalExtension    MobilityFromEUTRACommand-v960-IEs OPTIONAL
}

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

MobilityFromEUTRACommand-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    nonCriticalExtension    MobilityFromEUTRACommand-v960-IEs OPTIONAL
}
MobilityFromEUTRACommand-v960-IEs ::= SEQUENCE {
    bandIndicator           BandIndicatorGERAN              OPTIONAL, -- Cond GERAN
    nonCriticalExtension   SEQUENCE ()                      OPTIONAL
}

Handover ::= SEQUENCE {
    targetRAT-Type     ENUMERATED {utra, geran, cdma2000-1XRTT, cdma2000-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
**MobilityFromEUTRACCommand** field descriptions

- **bandIndicator**
  Indicates how to interpret the ARFCN of the BCCH carrier.

- **carrierFreq**
  contains the carrier frequency of the target GERAN cell.

- **cs-FallbackIndicator**
  Value true indicates that the CS Fallback procedure to UTRAN or GERAN is triggered.

- **messageContCDMA2000-1XRTT**
  This field contains a message specified in CDMA2000 1XRTT standard that either tells the UE to move to specific 1XRTT target cell(s) or indicates a failure to allocate resources for the enhanced CS fallback to CDMA2000 1XRTT.

- **messageContCDMA2000-HRPD**
  This field contains a message specified in CDMA2000 HRPD standard that either tells the UE to move to specific HRPD target cell(s) or indicates a failure to allocate resources for the handover to CDMA2000 HRPD.

- **mobilityCDMA2000-HRPD**
  This field indicates whether or not mobility to CDMA2000 HRPD is to be performed by the UE and it also indicates the type of mobility to CDMA2000 HRPD that is to be performed; If this field is not present the UE shall perform only the enhanced CS fallback to CDMA2000 1XRTT.

- **nas-SecurityParamFromEUTRA**
  Used to deliver the key synchronisation and Key freshness for the E-UTRAN to UTRAN handovers as specified in TS 33.401. The content of the parameter is defined in TS24.301.

- **networkControlOrder**
  Parameter NETWORK_CONTROL_ORDER in TS 44.060 [36].

- **purpose**
  Indicates which type of mobility procedure the UE is requested to perform. EUTRAN always applies value e-CSFB in case of enhanced CS fallback to CDMA2000 (e.g. also when that procedure results in handover to CDMA2000 1XRTT only, in handover to CDMA2000 HRPD only or in redirection to CDMA2000 HRPD only).

- **redirectCarrierCDMA2000-HRPD**
  The redirectCarrierCDMA2000-HRPD indicates a CDMA2000 carrier frequency and is used to redirect the UE to a HRPD carrier frequency.

- **SystemInfoListGERAN**
  If purpose = CellChangeOrder and if the field is not present, the UE has to acquire SI/PSI from the GERAN cell.

- **t304**
  Timer T304 as described in section 7.3. Value ms100 corresponds with 100 ms, ms200 corresponds with 200 ms and so on.

- **targetRAT-Type**
  Indicates the target RAT type.

- **targetRAT-MessageContainer**
  The field contains a message specified in another standard, as indicated by the targetRAT-Type, and carries information about the target cell identifier(s) and radio parameters relevant for the target radio access technology. NOTE 1.

A complete message is included, as specified in the other standard.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>concHO</td>
<td>The field is mandatory present if the mobilityCDMA2000-HRPD is set to “handover”; otherwise the field is optional present, need ON.</td>
</tr>
<tr>
<td>concRedir</td>
<td>The field is mandatory present if the mobilityCDMA2000-HRPD is set to “redirection”; otherwise the field is not present.</td>
</tr>
<tr>
<td>GERAN</td>
<td>The field should be present if the purpose is set to “handover” and the targetRAT-Type is set to “geran”; otherwise the field is not present</td>
</tr>
<tr>
<td>PSHO</td>
<td>The field is mandatory present in case of PS handover toward GERAN; otherwise the field is optionally present, but not used by the UE</td>
</tr>
<tr>
<td>UTRAGERAN</td>
<td>The field is mandatory present if the targetRAT-Type is set to “utra” or “geran”; otherwise the field is not present</td>
</tr>
</tbody>
</table>

NOTE 1: The correspondence between the value of the targetRAT-Type, the standard to apply and the message contained within the targetRAT-MessageContainer is shown in the table below:
Paging

The Paging message is used for the notification of one or more UEs.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: PCCH

Direction: E-UTRAN to UE

---

**Paging message**

```asn1
Paging ::= 
  SEQUENCE { 
    pagingRecordList PagingRecordList OPTIONAL, -- Need ON
    systemInfoModification ENUMERATED {true} OPTIONAL, -- Need ON
    etws-Indication ENUMERATED {true} OPTIONAL, -- Need ON
    nonCriticalExtension Paging-v890-IEs OPTIONAL
  }

Paging-v890-IEs ::= 
  SEQUENCE { 
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    nonCriticalExtension Paging-v920-IEs OPTIONAL
  }

Paging-v920-IEs ::= 
  SEQUENCE { 
    cmas-Indication-r9 ENUMERATED {true} OPTIONAL, -- Need ON
    nonCriticalExtension Paging-v1130-IEs OPTIONAL
  }

Paging-v1130-IEs ::= 
  SEQUENCE { 
    eab-ParamModification-r11 ENUMERATED {true} OPTIONAL, -- Need ON
    nonCriticalExtension SEQUENCE {} OPTIONAL
  }

PagingRecordList ::= 
  SEQUENCE {isEmpty (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 {isEmpty (6..21}) OF IMSI-Digit

IMSI-Digit ::= 
  INTEGER (0..9)
```
---
**Paging field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmas-Indication</td>
<td>If present: indication of a CMAS notification.</td>
</tr>
<tr>
<td>cn-Domain</td>
<td>Indicates the origin of paging.</td>
</tr>
<tr>
<td>eab-ParamModification</td>
<td>If present: indication of an EAB parameters (SIB14) modification.</td>
</tr>
<tr>
<td>etws-Indication</td>
<td>If present: indication of an ETWS primary notification and/or ETWS secondary notification.</td>
</tr>
<tr>
<td>imsi</td>
<td>The International Mobile Subscriber Identity, a globally unique permanent subscriber identity, see TS 23.003 [27]. The first element contains the first IMSI digit, the second element contains the second IMSI digit and so on.</td>
</tr>
<tr>
<td>systemInfoModification</td>
<td>If present: indication of a BCCH modification other than SIB10, SIB11, SIB12 and SIB14.</td>
</tr>
<tr>
<td>ue-Identity</td>
<td>Provides the NAS identity of the UE that is being paged.</td>
</tr>
</tbody>
</table>

—

**ProximityIndication**

The **ProximityIndication** message is used to indicate that the UE is entering or leaving the proximity of one or more CSG member cell(s).

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

**ProximityIndication message**

```asn1
ProximityIndication-r9 ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE {
      proximityIndication-r9 ProximityIndication-r9-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    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>carrierFreq</th>
</tr>
</thead>
<tbody>
<tr>
<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>type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used to indicate whether the UE is entering or leaving the proximity of CSG member cell(s).</td>
</tr>
</tbody>
</table>

---

**RNReconfiguration**

The **RNReconfiguration** is a command to modify the RN subframe configuration and/or to convey changed system information.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to RN

**RNReconfiguration message**

```asn1
RNReconfiguration-r10 ::= SEQUENCE {
  rrc-TransactionIdentifier  RRC-TransactionIdentifier,
  criticalExtensions    CHOICE {
    c1        CHOICE {
      rnReconfiguration-r10  RNReconfiguration-r10-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture  SEQUENCE {}
  }
}
RNReconfiguration-r10-IEs ::=  SEQUENCE {
  rn-SystemInfo-r10     RN-SystemInfo-r10   OPTIONAL, -- Need ON
  rn-SubframeConfig-r10    RN-SubframeConfig-r10   OPTIONAL, -- Need ON
  lateNonCriticalExtension   OCTET STRING     OPTIONAL,
  nonCriticalExtension    SEQUENCE {}      OPTIONAL
}
RN-SystemInfo-r10 ::=   SEQUENCE {
  systemInformationBlockType1-r10  OCTET STRING (CONTAINING SystemInformationBlockType1)
  OPTIONAL, -- Need ON
  systemInformationBlockType2-r10  SystemInformationBlockType2  OPTIONAL, -- Need ON
  ...
}
```

---

**RNReconfigurationComplete**

The **RNReconfigurationComplete** message is used to confirm the successful completion of an RN reconfiguration.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: RN to E-UTRAN

**RNReconfigurationComplete message**

```asn1
```
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**
RRCConnectionReconfiguration-v1010-IEs ::= SEQUENCE {
  antennaInfoDedicatedPCell-v1010  AntennaInfoDedicated-v1010 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, -- Need ON
  nonCriticalExtension  RRCConnectionReconfiguration-v1020-IEs OPTIONAL
}

RRCConnectionReconfiguration-v1020-IEs ::= SEQUENCE {
  sCellToReleaseList-r10  SCel1ToReleaseList-r10 OPTIONAL, -- Need ON
  sCellToAddModList-r10  SCel1ToAddModList-r10 OPTIONAL, -- Need ON
  nonCriticalExtension  RRCConnectionReconfiguration-v1130-IEs OPTIONAL
}

RRCConnectionReconfiguration-v1130-IEs ::= SEQUENCE {
  systemInformationBlockType1Dedicated-r11  OCTET STRING (CONTAINING SystemInformationBlockType1) OPTIONAL, -- Need ON
  nonCriticalExtension  RRCConnectionReconfiguration-v1250-IEs OPTIONAL
}

RRCConnectionReconfiguration-v1250-IEs ::= SEQUENCE {
  wlan-OffloadInfo-r12  WLAN-OffloadInfo-r12 OPTIONAL, -- Need ON
  release  NULL,
  setup  SEQUENCE {
    wlan-OffloadConfigDedicated-r12  WLAN-OffloadConfig-r12,
    t350-r12  ENUMERATED {min5, min10, min20, min30, min60, min120, min180, spare1} OPTIONAL -- Need OR
  } OPTIONAL, -- Need ON
  scg-Configuration-r12  SCG-Configuration-r12 OPTIONAL, -- Need ON
  nonFullConfig
  s1-SyncTxControl-r12  SL-SyncTxControl-r12 OPTIONAL, -- Need ON
  s1-DiscConfig-r12  SL-DiscConfig-r12 OPTIONAL, -- Need ON
  s1-CommConfig-r12  SL-CommConfig-r12 OPTIONAL, -- Need ON
  nonCriticalExtension  SEQUENCE () OPTIONAL
}

SL-SyncTxControl-r12 ::=   SEQUENCE {
  networkControlledSyncTx-r12  ENUMERATED {on, off} OPTIONAL -- Need OP
}

PSCellToAddMod-r12 ::=    SEQUENCE {
  sCellIndex-r12  SCellIndex-r10,
  cellIdentification-r12  SEQUENCE {
    physCellId-r12  PhysCellId,
    dl-CarrierFreq-r12  ARFCN-ValueEUTRA-r9
  } OPTIONAL, -- Cond SCellAdd
  radioResourceConfigCommonPSCell-r12  RadioResourceConfigCommonPSCell-r12 OPTIONAL, -- Cond SCellAdd
  radioResourceConfigDedicatedPSCell-r12  RadioResourceConfigDedicatedPSCell-r12 OPTIONAL, -- Cond SCellAdd2
  ... OPTIONS {
    antennaInfoDedicatedPCell-v1280  AntennaInfoDedicated-v1010 OPTIONAL -- Need ON
  }
}

PowerCoordinationInfo-r12 ::= SEQUENCE {
  p-MeNB-r12  INTEGER (1..16),
  p-SeNB-r12  INTEGER (1..16),
  powerControlMode-r12  INTEGER (1..2)
}

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

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
  ...  OPTIONS {
    antennaInfoDedicatedSCell-v1300  AntennaInfoDedicated-v1010 OPTIONAL -- Need ON
  }
}
radioResourceConfigDedicatedSCell-r10  RadioResourceConfigDedicatedSCell-r10  OPTIONAL, -- Need ON

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

SCG-Configuration-r12 ::=  CHOICE  {
  release       NULL,
  setup         SEQUENCE  {
    scg-ConfigPartMCG-r12  SEQUENCE  {
      scg-Counter-r12      INTEGER (0.. 65535)  OPTIONAL, -- Need ON
      powerCoordinationInfo-r12  PowerCoordinationInfo-r12  OPTIONAL, -- Need ON
      ...
    }  OPTIONAL, -- Need ON
    scg-ConfigPartSCG-r12  SCG-ConfigPartSCG-r12  OPTIONAL -- Need ON
  }  OPTIONAL, -- Need ON
}

SCG-ConfigPartSCG-r12 ::=  SEQUENCE  {
  radioResourceConfigDedicatedSCG-r12  RadioResourceConfigDedicatedSCG-r12  OPTIONAL, -- Need ON
  sCellToReleaseListSCG-r12  SCellToReleaseList-r10  OPTIONAL, -- Need ON
  pSCellToAddMod-r12     PSCellToAddMod-r12  OPTIONAL, -- Need ON
  sCellToAddModListSCG-r12  SCellToAddModList-r10  OPTIONAL, -- Need ON
  mobilityControlInfoSCG-r12  MobilityControlInfoSCG-r12  OPTIONAL, -- Need ON
  ...
}

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

-- ASN1STOP
<table>
<thead>
<tr>
<th><strong>RRCConnectionReconfiguration field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>dedicatedInfoNASList</strong></td>
</tr>
<tr>
<td>This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for each PDU in the list.</td>
</tr>
<tr>
<td><strong>fullConfig</strong></td>
</tr>
<tr>
<td>Indicates the full configuration option is applicable for the RRC Connection Reconfiguration message.</td>
</tr>
<tr>
<td><strong>keyChangeIndicator</strong></td>
</tr>
<tr>
<td>true is used only in an intra-cell handover when a K_{N_{eNB}} key is derived from a K_{ASME} key taken into use through the latest successful NAS SMC procedure, as described in TS 33.401 [32] for K_{N_{eNB}} re-keying. false is used in an intra-LTE handover when the new K_{N_{eNB}} key is obtained from the current K_{N_{eNB}} key or from the NH as described in TS 33.401 [32].</td>
</tr>
<tr>
<td><strong>nas-securityParamToEUTRA</strong></td>
</tr>
<tr>
<td>This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for this field, although it affects activation of AS- security after inter-RAT handover to E-UTRA. The content is defined in TS 24.301.</td>
</tr>
<tr>
<td><strong>networkControlledSyncTx</strong></td>
</tr>
<tr>
<td>This field indicates whether the UE shall transmit synchronisation information (i.e. become synchronisation source). Value On indicates the UE to transmit synchronisation information while value Off indicates the UE to not transmit such information.</td>
</tr>
<tr>
<td><strong>nextHopChainingCount</strong></td>
</tr>
<tr>
<td>Parameter NCC: See TS 33.401 [32]</td>
</tr>
<tr>
<td><strong>p-MeNB</strong></td>
</tr>
<tr>
<td>Indicates the guaranteed power for the MeNB, as specified in 36.213 [23]. The value N corresponds to N-1 in TS 36.213 [23].</td>
</tr>
<tr>
<td><strong>powerControlMode</strong></td>
</tr>
<tr>
<td>Indicates the power control mode used in DC. Value 1 corresponds to DC power control mode 1 and value 2 indicates DC power control mode 2, as specified in 36.213 [23].</td>
</tr>
<tr>
<td><strong>p-SeNB</strong></td>
</tr>
<tr>
<td>Indicates the guaranteed power for the SeNB as specified in 36.213 [23, Table 5.1.4.2-1]. The value N corresponds to N-1 in TS 36.213 [23].</td>
</tr>
<tr>
<td><strong>sCellIndex</strong></td>
</tr>
<tr>
<td>In case of DC, the SCellIndex is unique within the scope of the UE i.e. an SCG cell can not use the same value as used for an MCG cell.</td>
</tr>
<tr>
<td><strong>sCellToAddModListSCG</strong></td>
</tr>
<tr>
<td>Indicates the SCG cell to be added or modified. The field is used for SCG cells other than the PSCell (which is added/modified by field pSCellToAddMod).</td>
</tr>
<tr>
<td><strong>sCellToReleaseListSCG</strong></td>
</tr>
<tr>
<td>Indicates the SCG cell to be released. The field is also used to release the PSCell e.g. upon change of PSCell, upon system information change for the PSCell.</td>
</tr>
<tr>
<td><strong>scg-Counter</strong></td>
</tr>
<tr>
<td>A counter used upon initial configuration of SCG security as well as upon refresh of S-K_{N_{eNB}}, E-UTRAN includes the field upon SCG change when one or more SCG DRBs are configured. Otherwise E-UTRAN does not include the field.</td>
</tr>
<tr>
<td><strong>T350</strong></td>
</tr>
<tr>
<td>Timer T350 as described in section 7.3. Value minN corresponds to N minutes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Conditional presence</strong></th>
<th><strong>Explanation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EARFCN-max</strong></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><strong>fullConfig</strong></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><strong>HO</strong></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><strong>HO-Reestab</strong></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><strong>HO-toEUTRA</strong></td>
<td>The field is mandatory present in case of handover to E-UTRA or for recomconfigurations when fullConfig is included; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td><strong>nonFullConfig</strong></td>
<td>The field is not present when the fullConfig is included or in case of handover to E-UTRA; otherwise it is optional present, need ON.</td>
</tr>
<tr>
<td><strong>nonHO</strong></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><strong>SCellAdd</strong></td>
<td>The field is mandatory present upon SCell addition; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>SCellAdd2</strong></td>
<td>The field is mandatory present upon SCell addition; otherwise it is optionally present, need ON.</td>
</tr>
</tbody>
</table>
The **RRCConnectionReconfigurationComplete** message is used to confirm the successful completion of an RRC connection reconfiguration.

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

---

**RRCConnectionReconfigurationComplete message**

```plaintext
RRCConnectionReconfigurationComplete ::= SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier,  
    criticalExtensions     CHOICE {
        rrcConnectionReconfigurationComplete-r8    SEQUENCE {
            rrcConnectionReconfigurationComplete-r8-IEs,  
            criticalExtensionsFuture   SEQUENCE {}  
        }  
    }  
}
RRCConnectionReconfigurationComplete-r8-IEs ::= SEQUENCE {
    nonCriticalExtension    RRCConnectionReconfigurationComplete-v8a0-IEs OPTIONAL
}
RRCConnectionReconfigurationComplete-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension   OCTET STRING      OPTIONAL,  
    nonCriticalExtension    RRCConnectionReconfigurationComplete-v1020-IEs OPTIONAL
}
RRCConnectionReconfigurationComplete-v1020-IEs ::= SEQUENCE {
    rlf-InfoAvailable-r10    ENUMERATED {true}    OPTIONAL,  
    logMeasAvailable-r10    ENUMERATED {true}    OPTIONAL,  
    nonCriticalExtension    RRCConnectionReconfigurationComplete-v1130-IEs OPTIONAL
}
RRCConnectionReconfigurationComplete-v1130-IEs ::= SEQUENCE {
    connEstFailInfoAvailable-r11  ENUMERATED {true}    OPTIONAL,  
    nonCriticalExtension    RRCConnectionReconfigurationComplete-v1250-IEs OPTIONAL
}
RRCConnectionReconfigurationComplete-v1250-IEs ::= SEQUENCE {
    logMeasAvailableMBSFN-r12   ENUMERATED {true}    OPTIONAL,  
    nonCriticalExtension    SEQUENCE {}      OPTIONAL
}
```

---

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**

```plaintext
RRCConnectionReestablishment ::= SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier,
    criticalExtensions     CHOICE {
        rrcConnectionReestablishment-r8    SEQUENCE {
            rrcConnectionReestablishment-r8-IEs,  
            criticalExtensionsFuture   SEQUENCE {}  
        }  
    }  
}
RRCConnectionReestablishment-r8-IEs ::= SEQUENCE {
    nonCriticalExtension    RRCConnectionReestablishment-v8a0-IEs OPTIONAL
}
RRCConnectionReestablishment-v8a0-IEs ::= SEQUENCE {
    nonCriticalExtension    RRCConnectionReestablishment-v1020-IEs OPTIONAL
}
RRCConnectionReestablishment-v1020-IEs ::= SEQUENCE {
    logMeasAvailable-r10    ENUMERATED {true}    OPTIONAL,  
    nonCriticalExtension    RRCConnectionReestablishment-v1130-IEs OPTIONAL
}
RRCConnectionReestablishment-v1130-IEs ::= SEQUENCE {
    connEstFailInfoAvailable-r11  ENUMERATED {true}    OPTIONAL,  
    nonCriticalExtension    RRCConnectionReestablishment-v1250-IEs OPTIONAL
}
RRCConnectionReestablishment-v1250-IEs ::= SEQUENCE {
    logMeasAvailableMBSFN-r12   ENUMERATED {true}    OPTIONAL,  
    nonCriticalExtension    SEQUENCE {}      OPTIONAL
}
```
criticalExtensions CHOICE {
  c1 CHOICE {
    rrcConnectionReestablishment-r8 RRCConnectionReestablishment-r8-IEs,
    spare7 NULL, spare6 NULL, spare5 NULL, spare4 NULL,
    spare3 NULL, spare2 NULL, spare1 NULL
  },
  criticalExtensionsFuture SEQUENCE {}
}

RRCConnectionReestablishment-r8-IEs ::= SEQUENCE {
  radioResourceConfigDedicated RadioResourceConfigDedicated,
  nextHopChainingCount NextHopChainingCount,
  nonCriticalExtension RRCConnectionReestablishment-v8a0-IEs OPTIONAL
}

RRCConnectionReestablishment-v8a0-IEs ::= SEQUENCE {
  nonCriticalExtension RRCConnectionReestablishment-v8a0-IEs OPTIONAL
}

-- ASN1STOP

-- RRCConnectionReestablishmentComplete

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 {
    rrcConnectionReestablishmentComplete-r8 RRCConnectionReestablishmentComplete-r8-IEs,
    criticalExtensionsFuture SEQUENCE {}
  }
}

RRCConnectionReestablishmentComplete-r8-IEs ::= SEQUENCE {
  nonCriticalExtension RRCConnectionReestablishmentComplete-v920-IEs OPTIONAL
}

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

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

RRCConnectionReestablishmentComplete-v1020-IEs ::= SEQUENCE {
  logMeasAvailable-r10 ENUMERATED {true} OPTIONAL,
  nonCriticalExtension RRCConnectionReestablishmentComplete-v1130-IEs OPTIONAL
}

RRCConnectionReestablishmentComplete-v1130-IEs ::= SEQUENCE {
  connEstFailInfoAvailable-r11 ENUMERATED {true} OPTIONAL,
  nonCriticalExtension RRCConnectionReestablishmentComplete-v1250-IEs OPTIONAL
}
---

**RRCConnectionReestablishmentComplete field descriptions**

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

---

**RRCConnectionReestablishmentReject**
The **RRCConnectionReestablishmentReject** 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

**RRCConnectionReestablishmentReject message**

```asn1
RRCConnectionReestablishmentReject ::= SEQUENCE {
    criticalExtensions     CHOICE {
        rrcConnectionReestablishmentReject-r8     RRCConnectionReestablishmentReject-r8-IEs,
        criticalExtensionsFuture   SEQUENCE {}
    }
}
```

```asn1
RRCConnectionReestablishmentReject-r8-IEs ::= SEQUENCE {
    nonCriticalExtension    RRCConnectionReestablishmentReject-v8a0-IEs OPTIONAL
}
```

```asn1
RRCConnectionReestablishmentReject-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension   OCTET STRING      OPTIONAL,
    nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
```

---

**RRCConnectionReestablishmentRequest**
The **RRCConnectionReestablishmentRequest** message is used to request the reestablishment of an RRC connection.

- Signalling radio bearer: SRB0
- RLC-SAP: TM
- Logical channel: CCCH
- Direction: UE to E-UTRAN

**RRCConnectionReestablishmentRequest message**

```asn1
RRCConnectionReestablishmentRequest ::= SEQUENCE {
    criticalExtensions     CHOICE {
        rrcConnectionReestablishmentRequest-r8     RRCConnectionReestablishmentRequest-r8-IEs,
        criticalExtensionsFuture   SEQUENCE {}
    }
}
```

```asn1
RRCConnectionReestablishmentRequest-r8-IEs ::= SEQUENCE {
    nonCriticalExtension    RRCConnectionReestablishmentRequest-v8a0-IEs OPTIONAL
}
```

```asn1
RRCConnectionReestablishmentRequest-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension   OCTET STRING      OPTIONAL,
    nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
```
RRCConnectionReestablishmentRequest-r8-IEs ::= SEQUENCE {
  ue-Identity            ReestabUE-Identity,
  reestablishmentCause   ReestablishmentCause,
  spare                  BIT STRING (SIZE (2))
}
ReestabUE-Identity ::= SEQUENCE {
  c-RNTI                  C-RNTI,
  physCellId             PhysCellId,
  shortMAC-I             ShortMAC-I
}
ReestablishmentCause ::= ENUMERATED {
  reconfigurationFailure, handoverFailure,
  otherFailure, spare1
}

---

### RRCConnectionReestablishmentRequest field descriptions

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

---

**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

---

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,
  nonCriticalExtension    RRCConnectionReject-v1020-IEs  OPTIONAL
}
RRCConnectionReject-v1020-IEs ::= SEQUENCE {
  extendedWaitTime-r10    INTEGER (1..1800)  OPTIONAL,  -- Need ON
  nonCriticalExtension    RRCConnectionReject-v1130-IEs  OPTIONAL
}
RRCConnectionReject-v1130-IEs ::= SEQUENCE {
  ---
}
\textbf{RRConnectionReject field descriptions}

\textit{deprioritisationReq} 
Indicates whether the current frequency or RAT is to be de-prioritised. The UE shall be able to store a deprioritisation request for up to 8 frequencies (applicable when receiving another frequency specific deprioritisation request before T325 expiry).

\textit{deprioritisationTimer} 
Indicates the period for which either the current carrier frequency or E-UTRA is deprioritised. Value $\text{minN}$ corresponds to N minutes.

\textit{extendedWaitTime} 
Value in seconds for the wait time for Delay Tolerant access requests.

\textit{waitTime} 
Wait time value in seconds.

---

\textbf{RRConnectionRelease}

The \textit{RRConnectionRelease} 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

\textbf{RRConnectionRelease message}

```
-- ASN1START
RRConnectionRelease ::=   SEQUENCE {
   rrc-TransactionIdentifier   RRC-TransactionIdentifier,
   criticalExtensions     CHOICE {
      c1         CHOICE {
         rrcConnectionRelease-r8    RRCConnectionRelease-r8-IEs,
         spare3 NULL, spare2 NULL, spare1 NULL
      },
      criticalExtensionsFuture   SEQUENCE {}       OPTIONAL
   },
   rrc-TransactionIdentifier   RRC-TransactionIdentifier
   releaseCause      ReleaseCause,
   redirectedCarrierInfo     RedirectedCarrierInfo     OPTIONAL, -- Need ON
   idleModeMobilityControlInfo   IdleModeMobilityControlInfo   OPTIONAL, -- Need OP
   lateNonCriticalExtension   OCTET STRING (CONTAINING RRCConnectionRelease-v9e0-IEs)
   OPTIONAL, -- Late non crit ext
   nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
RRConnectionRelease-v890-IEs ::= SEQUENCE {
   lateNonCriticalExtension   OCTET STRING (CONTAINING RRCConnectionRelease-v9e0-IEs)
   OPTIONAL, -- Late non crit ext
   nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
```

---

Late non critical extensions

---

\textbf{RRConnectionRelease-v9e0-IEs ::= SEQUENCE { 
   redirectedCarrierInfo-v9e0     RedirectedCarrierInfo-v9e0
   OPTIONAL, -- Cond
   IdleInfoEUTRA
   IdleModeMobilityControlInfo-v9e0
   IdleModeMobilityControlInfo-v9e0
   OPTIONAL, -- Cond
   nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
-- Regular non critical extensions

RRCConnectionRelease-v920-IEs ::= SEQUENCE {
  cellInfoList-r9
    CHOICE {
      geran-r9    CellInfoListGERAN-r9,
      utra-FDD-r9 CellInfoListUTRA-FDD-r9,
      utra-TDD-r9 CellInfoListUTRA-TDD-r9,
      ...
      utra-TDD-r10 CellInfoListUTRA-TDD-r10
    } OPTIONAL, -- Cond Redirection
  nonCriticalExtension
    RRCConnectionRelease-v1020-IEs OPTIONAL
}

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

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

RedirectedCarrierInfo ::=   CHOICE {
  eutra        ARFCN-ValueEUTRA,
  geran        CarrierFreqsGERAN,
  utra-FDD       ARFCN-ValueUTRA,
  utra-TDD       ARFCN-ValueUTRA,
  cdma2000-1xRTT CarrierFreqCDMA2000,
  ...
  utra-TDD-r10      CarrierFreqListUTRA-TDD-r10
}

RedirectedCarrierInfo-v9e0 ::=   SEQUENCE {
  eutra-v9e0        ARFCN-ValueEUTRA-v9e0
}

CarrierFreqListUTRA-TDD-r10 ::=   SEQUENCE (SIZE (1..maxFreqUTRA-TDD-r10)) OF ARFCN-ValueUTRA

IdleModeMobilityControlInfo ::=  SEQUENCE {
  freqPriorityListEUTRA    FreqPriorityListEUTRA   OPTIONAL,  -- Need ON
  freqPriorityListGERAN    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
  ...
  [ [ freqPriorityListExtEUTRA-r12  FreqPriorityListExtEUTRA-r12  OPTIONAL  -- Need ON
    ] ]
}

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

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

FreqPriorityListExtEUTRA-r12 ::=  SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-r12

FreqPriorityEUTRA ::=    SEQUENCE {
  carrierFreq       ARFCN-ValueEUTRA,
  cellReselectionPriority    CellReselectionPriority
}

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

FreqPriorityEUTRA-r12 ::=    SEQUENCE {
  carrierFreq-r12       ARFCN-ValueEUTRA-r9,
  cellReselectionPriority-r12    CellReselectionPriority
}

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

FreqPriorityGERAN ::=   SEQUENCE {
carrierFreqsCarrierFreqsGERAN,
cellReselectionPriorityCellReselectionPriority
}
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 value utra-TDD-r10 in case redirectedCarrierInfo is set to utra-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). The UE shall be able to store at least 3 occurrences of FreqsPriorityGERAN. 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). Field freqPriorityListExt includes additional neighbouring inter-frequencies, i.e. extending the size of the inter-frequency carrier list using the general principles specified in 5.1.2. EUTRAN only includes freqPriorityListExtEUTRA if freqPriorityListEUTRA (i.e without suffix) includes maxFreq entries.

**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 to utra-FDD, utra-TDD or utra-TDD-r10. E-UTRAN should not set the releaseCause to loadBalancingTAURequired or to cs-FallbackHighPriority if the extendedWaitTime is present.

**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 25.331 [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 or utra-TDD-r10; otherwise the field is not present.</td>
</tr>
</tbody>
</table>

**RRConnectionRequest**
The RRConnectionRequest message is used to request the establishment of an RRC connection.
Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to E-UTRAN

**RRCConnectionRequest message**

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

RRCConnectionRequest-r8-IEs ::= SEQUENCE {
  ue-Identity       InitialUE-Identity,
  establishmentCause     EstablishmentCause,
  spare        BIT STRING (SIZE (1))
}

InitialUE-Identity ::= CHOICE {
  s-TMSI        S-TMSI,
  randomValue       BIT STRING (SIZE (40))
}

EstablishmentCause ::= ENUMERATED {
  emergency, highPriorityAccess, mt-Access, mo-Signalling,
  mo-Data, delayTolerantAccess-v1020, mo-VoiceCall-v1280,
  spare1
}
```

**RRCConnectionRequest field descriptions**

- **establishmentCause**
  Provides the establishment cause for the RRC connection request as provided by the upper layers. W.r.t. the cause value names: highPriorityAccess concerns AC11..AC15, ‘mt’ stands for ‘Mobile Terminating’ and ‘mo’ for ‘Mobile Originating.

- **randomValue**
  Integer value in the range 0 to $2^{40} - 1$.

- **ue-Identity**
  UE identity included to facilitate contention resolution by lower layers.

---

**RRCConnectionSetup**

The **RRCConnectionSetup** message is used to establish SRB1.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: E-UTRAN to UE

**RRCConnectionSetup message**

```asn1
RRCConnectionSetup ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1         CHOICE {
      rrcConnectionSetup-r8    RRCConnectionSetup-r8-IEs,
      spare7 NULL,
    }
  }
}
```

**ASN1START**

**ASN1STOP**
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

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

```
RRCConnectionSetupComplete-r8-IEs ::= SEQUENCE {
    selectedPLMN-Identity    INTEGER (1..maxPLMN-r11),
    registeredMME      RegisteredMME      OPTIONAL,
    dedicatedInfoNAS     DedicatedInfoNAS,
    nonCriticalExtension    RRCConnectionSetupComplete-v8a0-IEs OPTIONAL
}
```

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

```
RRCConnectionSetupComplete-v1020-IEs ::= SEQUENCE {
    gummei-Type-r10      ENUMERATED {native, mapped}   OPTIONAL,
    rlf-InfoAvailable-r10    ENUMERATED {true}     OPTIONAL,
    logMeasAvailable-r10     ENUMERATED {true}     OPTIONAL,
    rn-SubframeConfigReq-r10   ENUMERATED {required, notRequired} OPTIONAL,
    nonCriticalExtension    RRCConnectionSetupComplete-v1130-IEs OPTIONAL
}
```

```
RRCConnectionSetupComplete-v1130-IEs ::= SEQUENCE {
    connEstFailInfoAvailable-r11  ENUMERATED {true}    OPTIONAL,
    nonCriticalExtension    RRCConnectionSetupComplete-v1250-IEs  OPTIONAL
}
```

```
RRCConnectionSetupComplete-v1250-IEs ::= SEQUENCE {
    mobilityState-r12     ENUMERATED {normal, medium, high, spare} OPTIONAL,
}
```
RRConnectionSetupComplete field descriptions

gummei-Type
This field is used to indicate whether the GUMMEI included is native (assigned by EPC) or mapped (from 2G/3G identifiers).

mmegi
Provides the Group Identity of the registered MME within the PLMN, as provided by upper layers, see TS 23.003 [27].

mobilityState
This field indicates the UE mobility state (as defined in TS 36.304 [4, 5.2.4.3]) just prior to UE going into RRC_CONNECTED state. The UE indicates the value of medium and high when being in Medium-mobility and High-mobility states respectively. Otherwise the UE indicates the value normal.

registeredMME
This field is used to transfer the GUMMEI of the MME where the UE is registered, as provided by upper layers.

rn-SubframeConfigReq
If present, this field indicates that the connection establishment is for an RN and whether a subframe configuration is requested or not.

selectedPLMN-Identity
Index of the PLMN selected by the UE from the plmn-IdentityList included in SIB1. 1 if the 1st PLMN is selected from the plmn-IdentityList included in SIB1, 2 if the 2nd PLMN is selected from the plmn-IdentityList included in SIB1 and so on.

— SCGFailureInformation

The SCGFailureInformation message is used to provide information regarding failures detected by the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

SCGFailureInformation message

-- ASN1START

SCGFailureInformation-r12 ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1         CHOICE {
      scgFailureInformation-r12   SCGFailureInformation-r12-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE ()
  }
}

SCGFailureInformation-r12-IEs ::= SEQUENCE {
  failureReportSCG-r12    FailureReportSCG-r12    OPTIONAL,
  nonCriticalExtension    SCGFailureInformation-v1310-IEs      OPTIONAL
}

SCGFailureInformation-v1310-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING (CONTAINING SCGFailureInformation-v12d0-IEs)
}

-- Backported from REL-13

-- ASN1STOP
-- Late non-critical extensions:
SCGFailureInformation-v12d0-IEs ::= SEQUENCE {
  failureReportSCG-v12d0  FailureReportSCG-v12d0    OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

-- Regular non-critical extensions:
FailureReportSCG-r12 ::= SEQUENCE {
  failureType-r12      ENUMERATED {t313-Expiry, randomAccessProblem,
                             rlc-MaxNumRetx, scg-ChangeFailure },
  measResultServFreqList-r12  MeasResultServFreqList-r10  OPTIONAL,
  measResultNeighCells-r12  MeasResultList2EUTRA-r9   OPTIONAL,
...,
  [ failureType-v1290    ENUMERATED {maxUL-TimingDiff-v1290} OPTIONAL
  ]
}
FailureReportSCG-v12d0 ::= SEQUENCE {
  measResultNeighCells-v12d0   MeasResultList2EUTRA-v9e0   OPTIONAL
}

-- ASN1STOP

-- 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

-- 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,
  nonCriticalExtension    SEQUENCE ()       OPTIONAL
}
SecurityConfigSMC ::=     SEQUENCE {
  securityAlgorithmConfig     SecurityAlgorithmConfig,
...}

-- ASN1STOP

-- SecurityModeComplete

The SecurityModeComplete message is used to confirm the successful completion of a security mode command.
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
}

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

-- ASN1STOP

SecurityModeFailure

The SecurityModeFailure message is used to indicate an unsuccessful completion of a security mode command.

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

SecurityModeFailure message

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

SecurityModeFailure-r8-IEs ::= SEQUENCE {
  nonCriticalExtension    SecurityModeFailure-v8a0-IEs
}

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

-- ASN1STOP
-- SidelinkUEInformation

The SidelinkUEInformation message is used for the indication of sidelink information to the eNB.

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

**SidelinkUEInformation message**

```asn1
SidelinkUEInformation-r12 ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1        CHOICE {
      sidelinkUEInformation-r12 SidelinkUEInformation-r12-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {}
  }
}

SidelinkUEInformation-r12-IEs ::= SEQUENCE {
  commRxInterestedFreq-r12 ARFCN-ValueEUTRA-r9 OPTIONAL,
  commTxResourceReq-r12 SL-CommTxResourceReq-r12 OPTIONAL,
  discRxInterest-r12 ENUMERATED {true} OPTIONAL,
  discTxResourceReq-r12 INTEGER {1..63} OPTIONAL,
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

SL-CommTxResourceReq-r12 ::= SEQUENCE {
  carrierFreq-r12 ARFCN-ValueEUTRA-r9 OPTIONAL,
  destinationInfoList-r12 SL-DestinationInfoList-r12
}

SL-DestinationInfoList-r12 ::= SEQUENCE (SIZE (1..maxSL-Dest-r12)) OF SL-DestinationIdentity-r12

SL-DestinationIdentity-r12 ::= BIT STRING (SIZE (24))
```

---

**SidelinkUEInformation field descriptions**

- **commRxInterestedFreq**
  Indicates the frequency on which the UE is interested to receive sidelink communication.

- **commTxResourceReq**
  Indicates the frequency on which the UE is interested to transmit sidelink communication as well as the sidelink communication transmission destination(s) for which the UE requests E-UTRAN to assign dedicated resources.

- **destinationInfoList**
  Indicates the destination which is identified by the ProSe Layer-2 Group ID as specified in TS 23.303 [68].

- **discRxInterest**
  Indicates that the UE is interested to monitor sidelink discovery announcements.

- **discTxResourceReq**
  Indicates the number of separate discovery message(s) the UE wants to transmit every discovery period. This field concerns the resources the UE requires every discovery period for transmitting sidelink discovery announcement(s).

-- 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,
sib14-v1130      SystemInformationBlockType14-r11,
sib15-v1130      SystemInformationBlockType15-r11,
sib16-v1130      SystemInformationBlockType16-r11,
sib17-v1250      SystemInformationBlockType17-r12,
sib18-v1250      SystemInformationBlockType18-r12,
sib19-v1250      SystemInformationBlockType19-r12
},
nonCriticalExtension    SystemInformation-v8a0-IEs   OPTIONAL
}
SystemInformation-v8a0-IEs ::= SEQUENCE {
lateNonCriticalExtension   OCTET STRING      OPTIONAL,
nonCriticalExtension    SEQUENCE ()       OPTIONAL
}
-- ASN1STOP

SystemInformationBlockType1

SystemInformationBlockType1 contains information relevant when evaluating if a UE is allowed to access a cell and defines the scheduling of other system information.

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

SystemInformationBlockType1 message

-- ASN1START

SystemInformationBlockType1 ::= SEQUENCE {
cellAccessRelatedInfo    SEQUENCE {
plmn-IdentityList     PLMN-IdentityList,
trackingAreaCode     TrackingAreaCode,
cellIdentity      CellIdentity,

}}
cellBarred ENUMERATED {barred, notBarred},
cellularBarred ENUMERATED {allowed, notAllowed},
csg-Indicator BOOLEAN,
csg-Identity CSG-Identity OPTIONAL -- Need OR
},
cellSelectionInfo SEQUENCE {
  q-RxLevMin Q-RxLevMin,
  q-RxLevMinOffset INTEGER (1..8) OPTIONAL -- Need OP
},
p-Max P-Max OPTIONAL, -- Need OP
freqBandIndicator FreqBandIndicator,
schedulingInfoList SchedulingInfoList,
tdd-Config TDD-Config OPTIONAL, -- Cond TDD
si-WindowLength ENUMERATED {ms1, ms2, ms5, ms10, ms15, ms20, ms40},
systemInfoValueTag INTEGER (0..31),
nonCriticalExtension SystemInformationBlockType1-v890-IEs OPTIONAL
}
SystemInformationBlockType1-v890-IEs ::= SEQUENCE {
lateNonCriticalExtension OCTET STRING (CONTAINING SystemInformationBlockType1-v8h0-IEs) OPTIONAL,
nonCriticalExtension SystemInformationBlockType1-v920-IEs OPTIONAL
} -- Late non critical extensions
SystemInformationBlockType1-v8h0-IEs ::= SEQUENCE {
multiBandInfoList MultiBandInfoList OPTIONAL, -- Need OR
nonCriticalExtension SystemInformationBlockType1-v9e0-IEs OPTIONAL
}
SystemInformationBlockType1-v9e0-IEs ::= SEQUENCE {
freqBandIndicator-v9e0 FreqBandIndicator-v9e0 OPTIONAL, -- Cond FBI-max
multiBandInfoList-v9e0 MultiBandInfoList-v9e0 OPTIONAL, -- Cond mFBI-max
nonCriticalExtension SystemInformationBlockType1-v10j0-IEs OPTIONAL
}
SystemInformationBlockType1-v10j0-IEs ::= SEQUENCE {
freqBandInfo-v10j0 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
nonCriticalExtension SystemInformationBlockType1-v1130-IEs OPTIONAL
}
SystemInformationBlockType1-v1130-IEs ::= SEQUENCE {
tdd-Config-v1130 TDD-Config-v1130 OPTIONAL, -- Cond TDD-OR
cellSelectionInfo-v1130 CellSelectionInfo-v1130 OPTIONAL, -- Cond WB-RSRQ
nonCriticalExtension SystemInformationBlockType1-v1250-IEs OPTIONAL
}
SystemInformationBlockType1-v1250-IEs ::= SEQUENCE {
cellAccessRelatedInfo-v1250 SEQUENCE {
category0Allowed-r12 ENUMERATED {true} OPTIONAL -- Need OP
},
cellSelectionInfo-v1250 CellSelectionInfo-v1250 OPTIONAL, -- Cond RSRQ2
freqBandIndicatorPriority-r12 ENUMERATED {true} OPTIONAL, -- Cond mFBI2
nonCriticalExtension SEQUENCE () OPTIONAL
}
PLMN-IdentityList ::= SEQUENCE (SIZE (1..maxPLMN-r11)) OF PLMN-IdentityInfo
PLMN-IdentityInfo ::= SEQUENCE {
  plmn-Identity PLMN-Identity,
cellReservedForOperatorUse ENUMERATED {reserved, notReserved}
}
SchedulingInfoList ::= SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo
SchedulingInfo ::= SEQUENCE {
si-Periodicity ENUMERATED {
  rf8, rf16, rf32, rf64, rf128, rf256, rf512},
plmn-Identity
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,
  sibType14-v1130, sibType15-v1130,
  sibType16-v1130, sibType17-v1250, sibType18-v1250,
  ..., sibType19-v1250
}

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

CellSelectionInfo-v1130 ::= SEQUENCE {
  q-QualMinWB-r11 Q-QualMin-r9
}

CellSelectionInfo-v1250 ::= SEQUENCE {
  q-QualMinRSRQ-OnAllSymbols-r12 Q-QualMin-r9
}

-- ASN1STOP
SystemInformationBlockType1 field descriptions

category0Allowed
The presence of this field indicates category 0 UEs are allowed to access the cell.
cellBarred
barred means the cell is barred, as defined in TS 36.304 [4].
cellReservedForOperatorUse
As defined in TS 36.304 [4].
csg-Identity
Identity of the Closed Subscriber Group the cell belongs to.
csg-Indication
If set to TRUE the UE is only allowed to access the cell if it is a CSG member cell, if selected during manual CSG
selection or to obtain limited service, see TS 36.304 [4].
freqBandIndicatorPriority
If the field is present and supported by the UE, the UE shall prioritize the frequency bands in the multiBandInfoList IE
in decreasing priority order. Only if the UE does not support any of the frequency band in multiBandInfoList, the UE
shall use the value in freqBandIndicator IE. Otherwise, the UE applies frequency band according to the rules defined
in multiBandInfoList.
freqBandInfo
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.
ims-EmergencySupport
Indicates whether the cell supports IMS emergency bearer services for UEs in limited service mode. If absent, IMS
emergency call is not supported by the network in the cell for UEs in limited service mode.
intraFreqReselection
Used to control cell reselection to intra-frequency cells when the highest ranked cell is barred, or treated as barred by
the UE, as specified in TS 36.304 [4].
multiBandInfoList
A list of additional frequency band indicators, 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. The UE shall ignore the rule defined in this field description if
freqBandIndicatorPriority is present and supported by the UE.
multiBandInfoList-v10j0
A list of additional Pmax 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).
plmn-IdentityList
List of PLMN identities. The first listed PLMN-Identity is the primary PLMN.
p-Max
Value applicable for the cell. If absent the UE applies the maximum power according to the UE capability.
q-QualMin
Parameter “Qqualmin” in TS 36.304 [4]. If cellSelectionInfo-v920 is not present, the UE applies the (default) value of
negative infinity for Qqualmin, NOTE 1.
q-QualMinRSRQ-OnAllSymbols
If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, perform RSRQ
measurement on all OFDM symbols in accordance with TS 36.214 [48]. NOTE 1.
q-QualMinOffset
Parameter “Qqualminoffset” in TS 36.304 [4]. Actual value Qqualminoffset = 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 Qqualminoffset. Affects the minimum
required quality level in the cell.
q-QualMinWB
If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, use a wider
bandwidth in accordance with TS 36.133 [16]. NOTE 1.
q-RxLevMinOffset
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.
sib-MappingInfo
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.
si-Periodicity
Periodicity of the SI-message in radio frames, such that rf8 denotes 8 radio frames, rf16 denotes 16 radio frames, and
so on.
si-WindowLength
Common SI scheduling window for all SIs. Unit in milliseconds, where ms1 denotes 1 millisecond, ms2 denotes 2
milliseconds and so on.
SystemInformationBlockType1 field descriptions

category0Allowed
The presence of this field indicates category 0 UEs are allowed to access the cell.

systemInfoValueTag
Common for all SIBs other than MIB, SIB1, SIB10, SIB11, SIB12 and SIB14. Change of MIB and SIB1 is detected by acquisition of the corresponding message.

trackingAreaCode
A trackingAreaCode that is common for all the PLMNs listed.

NOTE 1: The value the UE applies for parameter “Qqualmin” in TS 36.304 [4] depends on the q-QualMin fields signalled by E-UTRAN and supported by the UE. In case multiple candidate options are available, the UE shall select the highest priority candidate option according to the priority order indicated by the following table (top row is highest priority).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Included</td>
<td>Included</td>
<td>q-QualMinRSRQ-OnAllSymbols – (q-QualMin – q-QualMinWB)</td>
</tr>
<tr>
<td>Included</td>
<td>Not included</td>
<td>q-QualMinRSRQ-OnAllSymbols</td>
</tr>
<tr>
<td>Not included</td>
<td>Included</td>
<td>q-QualMinWB</td>
</tr>
<tr>
<td>Not included</td>
<td>Not included</td>
<td>q-QualMin</td>
</tr>
</tbody>
</table>

Conditional presence | Explanation
FBI-max             | The field is mandatory present if freqBandIndicator (i.e. without suffix) is set to maxFBI. Otherwise the field is not present.
mFBI                | The field is optional present, Need OR, if multiBandInfoList is present. Otherwise the field is not present.
mFBI-max             | 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.
RSRQ                | The field is mandatory present if SIB3 is being broadcast and threshServingLowQ is present in SIB3; otherwise optionally present, Need OP.
RSRQ2               | The field is mandatory present if q-QualMinRSRQ-OnAllSymbols is present in SIB3; otherwise it is not present.
TDD                 | This field is mandatory present for TDD; it is not present for FDD and the UE shall delete any existing value for this field.
TDD-OR              | The field is optional present for TDD, need OR; it is not present for FDD.
WB-RSRQ             | The field is optionally present, need OP if the measurement bandwidth indicated by allowedMeasBandwidth in systemInformationBlockType3 is 50 resource blocks or larger; otherwise it is not present.

– UEAssistanceInformation

The UEAssistanceInformation message is used for the indication of UE assistance information to the eNB.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

UEAssistanceInformation message

```asn1
-- ASN1START
UEAssistanceInformation-r11 ::= SEQUENCE {
    criticalExtensions     CHOICE {
        c1         CHOICE {
            ueAssistanceInformation-r11   UEAssistanceInformation-r11-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
    criticalExtensionsFuture   SEQUENCE {}
}
```
**UEAssistanceInformation field descriptions**

`powerPrefIndication`  
Value `lowPowerConsumption` indicates the UE prefers a configuration that is primarily optimised for power saving. Otherwise the value is set to `normal`.

**UECapabilityEnquiry**

The `UECapabilityEnquiry` message is used to request the transfer of UE radio access capabilities for E-UTRA as well as for other RATs.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

**UECapabilityEnquiry message**

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

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

```
UECapabilityEnquiry-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension   OCTET STRING      OPTIONAL,
    nonCriticalExtension    UECapabilityEnquiry-v1180-IEs
}
```

```
UECapabilityEnquiry-v1180-IEs ::= SEQUENCE {
    requestedFrequencyBands-r11   SEQUENCE (SIZE (1..16)) OF FreqBandIndicator-r11
    OPTIONAL,
    nonCriticalExtension    SEQUENCE []
    OPTIONAL
}
```

`UE-CapabilityRequest`  
List of the RATs for which the UE is requested to transfer the UE radio access capabilities i.e. E-UTRA, UTRA, GERAN-CS, GERAN-PS, CDMA2000.

`requestedFrequencyBands`  
List of frequency bands for which the UE is requested to provide supported CA band combinations and non CA bands.
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 message**

---

**UECapabilityInformation**

---

**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**

---
UEInformationRequest-r9 ::= SEQUENCE {
  rach-ReportReq-r9     BOOLEAN,
  rlf-ReportReq-r9     BOOLEAN,
  nonCriticalExtension    UEInformationRequest-v930-IEs  OPTIONAL
}

UEInformationRequest-v930-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    UEInformationRequest-v1020-IEs  OPTIONAL
}

UEInformationRequest-v1020-IEs ::= SEQUENCE {
  logMeasReportReq-r10    ENUMERATED {true}     OPTIONAL, -- Need ON
  nonCriticalExtension    UEInformationRequest-v1130-IEs  OPTIONAL
}

UEInformationRequest-v1130-IEs ::= SEQUENCE {
  connEstFailReportReq-r11   ENUMERATED {true}     OPTIONAL, -- Need ON
  nonCriticalExtension    UEInformationRequest-v1250-IEs  OPTIONAL
}

UEInformationRequest-v1250-IEs ::= SEQUENCE {
  mobilityHistoryReportReq-r12  ENUMERATED {true}     OPTIONAL, -- Need ON
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

-- ASN1STOP

UEInformationRequest field descriptions

rach-ReportReq
This field is used to indicate whether the UE shall report information about the random access procedure.

UEInformationResponse

The UEInformationResponse message is used by the UE to transfer the information requested by the E-UTRAN.

Signalling radio bearer: SRB1 or SRB2 (when logged measurement information is included)

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

UEInformationResponse message

-- ASN1START

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

UEInformationRequest-r9-IEs ::= SEQUENCE {
  rach-ReportReq-r9     BOOLEAN,
  rlf-ReportReq-r9     BOOLEAN,
  nonCriticalExtension    UEInformationRequest-v930-IEs  OPTIONAL
}

UEInformationRequest-v930-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    UEInformationRequest-v1020-IEs  OPTIONAL
}

UEInformationRequest-v1020-IEs ::= SEQUENCE {
  logMeasReportReq-r10    ENUMERATED {true}     OPTIONAL, -- Need ON
  nonCriticalExtension    UEInformationRequest-v1130-IEs  OPTIONAL
}

UEInformationRequest-v1130-IEs ::= SEQUENCE {
  connEstFailReportReq-r11   ENUMERATED {true}     OPTIONAL, -- Need ON
  nonCriticalExtension    UEInformationRequest-v1250-IEs  OPTIONAL
}

UEInformationRequest-v1250-IEs ::= SEQUENCE {
  mobilityHistoryReportReq-r12  ENUMERATED {true}     OPTIONAL, -- Need ON
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

-- ASN1STOP
nonCriticalExtension  UEInformationResponse-v930-IEs  OPTIONAL

-- Late non critical extensions
UEInformationResponse-v9e0-IEs ::= SEQUENCE {
    rlfi-Report-v9e0  RLF-Report-v9e0  OPTIONAL,
    nonCriticalExtension  SEQUENCE {}  OPTIONAL
}

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

UEInformationResponse-v1020-IEs ::= SEQUENCE {
    logMeasReport-r10  LogMeasReport-r10  OPTIONAL,
    nonCriticalExtension  UEInformationResponse-v1130-IEs  OPTIONAL
}

UEInformationResponse-v1130-IEs ::= SEQUENCE {
    connEstFailReport-r11  ConnEstFailReport-r11  OPTIONAL,
    nonCriticalExtension  UEInformationResponse-v1250-IEs  OPTIONAL
}

UEInformationResponse-v1250-IEs ::= SEQUENCE {
    mobilityHistoryReport-r12  MobilityHistoryReport-r12  OPTIONAL,
    nonCriticalExtension  SEQUENCE {}  OPTIONAL
}

RLF-Report-r9 ::= SEQUENCE {
    measResultLastServCell-r9  SEQUENCE {
        rSRPResult-r9  RSRP-Range,
        rSRQResult-r9  RSRQ-Range  OPTIONAL
    },
    measResultNeighCells-r9  SEQUENCE {
        measResultListEUTRA-r9  MeasResultList2EUTRA-r9  OPTIONAL,
        measResultListUTRA-r9  MeasResultList2UTRA-r9  OPTIONAL,
        measResultListGERAN-r9  MeasResultList2GERAN  OPTIONAL,
        measResultsCDMA2000-r9  MeasResultList2CDMA2000-r9  OPTIONAL
    }  OPTIONAL,
    ...,
    locationInfo-r10  LocationInfo-r10  OPTIONAL,
    failedPCellId-r10  CellGlobalIdEUTRA  OPTIONAL,
    pci-arfcn-r10  SEQUENCE {
        physCellId-r10  PhysCellId,
        carrierFreq-r10  ARFCN-ValueEUTRA
    }  OPTIONAL,
    reestablishmentCellId-r10  CellGlobalIdEUTRA  OPTIONAL,
    timeConnFailure-r10  INTEGER (0..1023)  OPTIONAL,
    connectionFailureType-r10  ENUMERATED {rlf, hof}  OPTIONAL,
    previousPCellId-r10  CellGlobalIdEUTRA  OPTIONAL
},
failedPCellId-v1090  SEQUENCE {
    carrierFreq-v1090  ARFCN-ValueEUTRA-v9e0  OPTIONAL
},
basicFields-r11  SEQUENCE {
    c-RNTI-r11  C-RNTI,
    rlfi-Cause-r11  ENUMERATED {
        t310-Expire, randomAccessProblem, rlc-MaxNumRetx, t312-Expire-r12},
    timeSinceFailure-r11  TimeSinceFailure-r11  OPTIONAL,
    previousUTRA-CellId-r11  ARFCN-ValueUTRA, PhysCellId-r11  PhysCellIdUTRA-FDD, PhysCellIdUTRA-TDD
},
selectedUTRA-CellId-r11  CellGlobalIdUTRA  OPTIONAL,
fdd-r11
| tdd-r11
| PhysCellIdUTRA-FDD,
| PhysCellIdUTRA-TDD
| }
| OPTIONAL

[failedCellId-v1250 =]
| tdc-FailedPCell-r12
| TrackingAreaCode
|
| measResultLastServCell-v1250
| RSRQ-Range-v1250
| OPTIONAL,
| lastServCellRsrq-Type-r12
| RSRQ-Type-r12
| OPTIONAL,
| measResultListEUTRA-v1250
| MeasResultList2EUTRA-v1250
| OPTIONAL

RLF-Report-v9e0 ::= SEQUENCE {
| measResultListEUTRA-v9e0
| MeasResultList2EUTRA-v9e0
}

MeasResultList2EUTRA-r9 ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-r9
MeasResultList2EUTRA-v9e0 ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-v9e0
MeasResultList2EUTRA-v1250 ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-v1250

MeasResult2EUTRA-r9 ::= SEQUENCE {
| carrierFreq-r9
| ARFCN-ValueEUTRA,
| measResultList-r9
| MeasResultListEUTRA
}

MeasResult2EUTRA-v9e0 ::= SEQUENCE {
| carrierFreq-v9e0
| ARFCN-ValueEUTRA-v9e0
| OPTIONAL
}

MeasResult2EUTRA-v1250 ::= SEQUENCE {
| rsrq-Type-r12
| RSRQ-Type-r12
| OPTIONAL
}

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

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),
| servCellId-r10
| CellGlobalIdEUTRA,
| measResultServCell-r10
| SEQUENCE {
| rsrpResult-r10
| RSRP-Range,
| rsrqResult-r10
| RSRQ-Range
| },
| measResultNearCells-r10
| SEQUENCE {
| measResultListEUTRA-r10
| MeasResultList2EUTRA-r9
| OPTIONAL,
| measResultListUTRA-r10
| MeasResultList2UTRA-r9
| OPTIONAL,
| measResultListGERAN-r10
| MeasResultList2GERAN-r10
| OPTIONAL,
| measResultListCDMA2000-r10
| MeasResultList2CDMA2000-r9
| OPTIONAL
| }
| OPTIONAL,
MeasResultListMBSFN-r12 ::= SEQUENCE (SIZE (1..maxMBSFN-Area)) OF MeasResultMBSFN-r12

MeasResultMBSFN-r12 ::= SEQUENCE {
  mbsfn-Area-r12       SEQUENCE {
    mbsfn-AreaId-r12      MBSFN-AreaId-r12,
    carrierFreq-r12       ARFCN-ValueEUTRA-r9
  },
  rsrpResultMBSFN-r12      RSRP-Range,
  rsrqResultMBSFN-r12      MBSFN-RSRQ-Range-r12,
  signallingBLER-Result-r12  BLER-Result-r12  OPTIONAL,
  dataBLER-MCH-ResultList-r12  DataBLER-MCH-ResultList-r12  OPTIONAL,
  ...
}

DataBLER-MCH-ResultList-r12 ::= SEQUENCE (SIZE (1..maxPMCH-PerMBSFN)) OF DataBLER-MCH-Result-r12

DataBLER-MCH-Result-r12 ::= SEQUENCE {
  mch-Index-r12       INTEGER (1..maxPMCH-PerMBSFN),
  dataBLER-Result-r12      BLER-Result-r12
}

BLER-Result-r12 ::= SEQUENCE {
  bler-r12         BLER-Range-r12,
  blocksReceived-r12      SEQUENCE {
    n-r12         BIT STRING (SIZE (3)),
    m-r12         BIT STRING (SIZE (8))
  }
}

BLER-Range-r12 ::= INTEGER (0..31)

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

ConnEstFailReport-r11 ::= SEQUENCE {
  failedCellId-r11     CellGlobalIdEUTRA,
  locationInfo-r10     LocationInfo-r10  OPTIONAL,
  measResultFailedCell-r11  SEQUENCE {
    rsrpResult-r11       RSRP-Range,
    rsrqResult-r11       RSRQ-Range  OPTIONAL
  },
  measResultNeighCells-r11  SEQUENCE {
    measResultListEUTRA-r11  MeasResultList2EUTRA-r9  OPTIONAL,
    measResultListUTRA-r11  MeasResultList2UTRA-r9  OPTIONAL,
    measResultListGERAN-r11  MeasResultListGERAN  OPTIONAL,
    measResultsCDMA2000-r11  MeasResultList2CDMA2000-r9  OPTIONAL
  },
  numberOfPreamblesSent-r11   NumberOfPreamblesSent-r11,
  contentionDetected-r11    BOOLEAN,
  maxTxPowerReached-r11    BOOLEAN,
  timeSinceFailure-r11     TimeSinceFailure-r11,
  measResultListEUTRA-v1130  MeasResultList2EUTRA-v9e0  OPTIONAL,
  ...
}
**UEInformationResponse field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>absoluteTimeStamp</td>
<td>Indicates the absolute time when the logged measurement configuration logging is provided, as indicated by E-UTRAN within absoluteTimeStamp.</td>
</tr>
<tr>
<td>bler</td>
<td>Indicates the measured BLER value. The coding of BLER value is defined in TS 36.133 [16].</td>
</tr>
<tr>
<td>blocksReceived</td>
<td>Indicates total number of MCH blocks, which were received by the UE and used for the corresponding BLER calculation, within the measurement period as defined in TS 36.133 [16].</td>
</tr>
<tr>
<td>carrierFreq</td>
<td>In case the UE includes carrierFreq-v9e0 and/or carrierFreq-v1090, the UE shall set the corresponding entry of carrierFreq-r9 and/or carrierFreq-r10 respectively to maxEARFCN. For E-UTRAN and UTRA frequencies, the UE sets the ARFCN according to the band used when obtaining the concerned measurement results.</td>
</tr>
<tr>
<td>connectionFailureType</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>contentionDetected</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>c-RNTI</td>
<td>This field indicates the C-RNTI used in the PCell upon detecting radio link failure or the C-RNTI used in the source PCell upon handover failure.</td>
</tr>
<tr>
<td>dataBLER-MCH-ResultList</td>
<td>Includes a BLER result per MCH on subframes using dataMCS, with the applicable MCH(s) listed in the same order as in pmch-InfoList within MBSFNAreaConfiguration.</td>
</tr>
<tr>
<td>failedCellId</td>
<td>This field is used to indicate the cell in which connection establishment failed.</td>
</tr>
<tr>
<td>failedPCellId</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>maxTxPowerReached</td>
<td>This field is used to indicate whether or not the maximum power level was used for the last transmitted preamble, see TS 36.321 [6].</td>
</tr>
<tr>
<td>mch-Index</td>
<td>Indicates the MCH by referring to the entry as listed in pmch-InfoList within MBSFNAreaConfiguration.</td>
</tr>
<tr>
<td>measResultFailedCell</td>
<td>This field refers to the last measurement results taken in the cell, where connection establishment failure happened.</td>
</tr>
<tr>
<td>measResultLastServCell</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>measResultListEUTRA</td>
<td>If measResultListEUTRA-v9e0, measResultListEUTRA-v1090 or measResultListEUTRA-v1130 is included, the UE shall include the same number of entries, and listed in the same order, as in measResultListEUTRA-r9, measResultListEUTRA-r10 and/or measResultListEUTRA-r11 respectively.</td>
</tr>
<tr>
<td>mobilityHistoryReport</td>
<td>This field is used to indicate the time of stay in 16 most recently visited E-UTRA cells or of stay out of E-UTRA.</td>
</tr>
<tr>
<td>numberOfPreamblesSent</td>
<td>This field is used to indicate the number of RACH preambles that were transmitted. Corresponds to parameter PREAMBLE_TRANSMISSION_COUNTER in TS 36.321 [6].</td>
</tr>
<tr>
<td>previousPCellId</td>
<td>This field is used to indicate the PCell of the last handover (source PCell when the last RRC-Connection-Reconfiguration message including mobilityControlInform was received).</td>
</tr>
<tr>
<td>previousUTRA-CellId</td>
<td>This field is used to indicate the source UTRA cell of the last successful handover to E-UTRAN, when RLF occurred at the target PCell. The UE sets the ARFCN according to the band used for transmission/reception on the concerned cell.</td>
</tr>
<tr>
<td>reestablishmentCellId</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>relativeTimeStamp</td>
<td>Indicates the time of logging measurement results, measured relative to the absoluteTimeStamp. Value in seconds.</td>
</tr>
</tbody>
</table>
**UEInformationResponse field descriptions**

**rlf-Cause**
This field is used to indicate the cause of the last radio link failure that was detected. In case of handover failure information reporting (i.e., the connectionFailureType is set to ‘hof’), the UE is allowed to set this field to any value.

**selectedUTRA-CellId**
This field is used to indicate the UTRA cell that the UE selects after RLF is detected, while T311 is running. The UE sets the ARFCN according to the band selected for transmission/reception on the concerned cell.

**signallingBLER-Result**
Includes a BLER result of MBSFN subframes using signallingMCS.

**tac-FailedPCell**
This field is used to indicate the Tracking Area Code of the PCell in which RLF is detected.

**tce-Id**
Parameter Trace Collection Entity Id: See TS 32.422 [58].

**timeConnFailure**
This field is used to indicate the time elapsed since the last HO initialization until connection failure. Actual value = IE value * 100ms. The maximum value 1023 means 102.3s or longer.

**timeSinceFailure**
This field is used to indicate the time that elapsed since the connection (establishment) failure. Value in seconds. The maximum value 172800 means 172800s or longer.

**traceRecordingSessionRef**
Parameter Trace Recording Session Reference: See TS 32.422 [58].

---

**ULHandoverPreparationTransfer (CDMA2000)**

The **ULHandoverPreparationTransfer** message is used for the uplink transfer of handover related CDMA2000 information when requested by the higher layers.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

**ULHandoverPreparationTransfer message**

--- ASN1START

ULHandoverPreparationTransfer ::= SEQUENCE {
criticalExtensions CHOICE {
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**

**meid**
The 56 bit mobile identification number provided by the CDMA2000 Upper layers.
The **ULInformationTransfer** message is used for the uplink transfer of NAS or non-3GPP dedicated information.

Signalling radio bearer: SRB2 or SRB1 (only if SRB2 not established yet). If SRB2 is suspended, the UE does not send this message until SRB2 is resumed.

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

---

### ULInformationTransfer message

```asn1
ULInformationTransfer ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1         CHOICE {
      ulInformationTransfer-r8   ULInformationTransfer-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}

ULInformationTransfer-r8-IEs ::= SEQUENCE {
  dedicatedInfoType   CHOICE {
    dedicatedInfoNAS     DedicatedInfoNAS,
    dedicatedInfoCDMA2000-1XRTT   DedicatedInfoCDMA2000,
    dedicatedInfoCDMA2000-HRPD   DedicatedInfoCDMA2000
  },
  nonCriticalExtension    ULInformationTransfer-v8a0-IEs OPTIONAL
}

ULInformationTransfer-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING OPTIONAL,
  nonCriticalExtension    SEQUENCE () OPTIONAL
}
-- ASN1STOP
```

### 6.3 RRC information elements

#### 6.3.1 System information blocks

---

### SystemInformationBlockType2

The **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

```asn1
SystemInformationBlockType2 ::= SEQUENCE {
  ac-BarringInfo      SEQUENCE {
    ac-BarringForEmergency    BOOLEAN, -- Need OP
    ac-BarringForMO-Signalling   AC-BarringConfig OPTIONAL, -- Need OP
    ac-BarringForMO-Data      AC-BarringConfig OPTIONAL, -- Need OP
  },
  radioResourceConfigCommon   RadioResourceConfigCommonSIB, -- Need OP
  ue-TimersAndConstants    UE-TimersAndConstants, -- Need OP
  freqInfo     SEQUENCE {
    }\n}
-- ASN1STOP
```
SystemInformationBlockType2-v8h0-IEs ::= SEQUENCE {
  multiBandInfoList    SEQUENCE (SIZE (1..maxMultiBands)) OF AdditionalSpectrumEmission
    OPTIONAL, -- Need OR
  nonCriticalExtension   SystemInformationBlockType2-v9e0-IEs OPTIONAL
}

SystemInformationBlockType2-v9e0-IEs ::= SEQUENCE {
  ul-CarrierFreq-v9e0     ARFCN-ValueEUTRA-v9e0  OPTIONAL, -- Cond ul-FreqMax
  nonCriticalExtension    SEQUENCE {}     OPTIONAL
}

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

AC-BarringPerPLMN-List-r12 ::= SEQUENCE (SIZE (1.. maxPLMN-r11)) OF AC-BarringPerPLMN-r12

AC-BarringPerPLMN-r12 ::=   SEQUENCE {
  plmn-IdentityIndex-r12     INTEGER (1..maxPLMN-r11),
  ac-BarringInfo-r12     SEQUENCE (  
    ac-BarringForEmergency-r12 BOOLEAN,
    ac-BarringForMO-Signalling-r12 AC-BarringConfig OPTIONAL, -- Need OP
    ac-BarringForMO-Data-r12 AC-BarringConfig OPTIONAL, -- Need OP
  )
  ac-BarringSkipForMMTELVoice-r12 ENUMERATED {true} OPTIONAL, -- Need OP
  ac-BarringSkipForMMTELVideo-r12 ENUMERATED {true} OPTIONAL, -- Need OP
  ac-BarringSkipForSMS-r12 ENUMERATED {true} OPTIONAL, -- Need OP
  ssac-BarringMMTEL-Voice-r9 AC-BarringConfig OPTIONAL, -- Need OP
  ssac-BarringMMTEL-Video-r9 AC-BarringConfig OPTIONAL, -- Need OP
  voiceServiceCauseIndication-r12 ENUMERATED {true} OPTIONAL -- Need OP
}

-- ASN1STOP
**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 \([0,1)\): \(p00 = 0, p05 = 0.05, p10 = 0.10, \ldots, p95 = 0.95\). 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].

**mbmsn-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.

**plmn-IdentityIndex**  
Index of the PLMN in **plmn-IdentityList** included in SIB1. Value 1 indicates the PLMN listed 1st in **plmn-IdentityList** included in SIB1. Value 2 indicates the PLMN listed 2nd in **plmn-IdentityList** included in SIB1 and so on.

**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, \(N_{RB}\), 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.

**voiceServiceCauseIndication**  
Indicates whether UE is requested to use the establishment cause **mo-VoiceCall** for mobile originating MMTEL voice calls.

---

### 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

```asn
SystemInformationBlockType3 ::= SEQUENCE {
    cellReselectionInfoCommon  SEQUENCE {
        q-Hyst        ENUMERATED {
            dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10, dB12, dB14, dB16, dB18, dB20, dB22, dB241,
        }
    speedStateReselectionPars SEQUENCE {
        mobilityStateParameters MobilityStateParameters,
        q-HystSF
    }
}
```
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,  -- Need OP
      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,
      cellReselectionPriority
        CellReselectionPriority
      intraFreqCellReselectionInfo
        SEQUENCE {
            q-QualMin-r9
              Q-QualMin-r9  OPTIONAL,  -- Need OP
            s-IntraSearchQ-r9
              ReselectionThresholdQ-r9
        },
    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,
          cellReselectionPriority
            CellReselectionPriority
          intraFreqCellReselectionInfo
            SEQUENCE {
                q-QualMin-r9
                  Q-QualMin-r9  OPTIONAL,  -- Need OP
                s-IntraSearchQ-r9
                  ReselectionThresholdQ-r9
            },
        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,
              cellReselectionPriority
                CellReselectionPriority
              intraFreqCellReselectionInfo
                SEQUENCE {
                    q-QualMin-r9
                      Q-QualMin-r9  OPTIONAL,  -- Need OP
                    s-IntraSearchQ-r9
                      ReselectionThresholdQ-r9
                },
            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,
                  cellReselectionPriority
                    CellReselectionPriority
                  intraFreqCellReselectionInfo
                    SEQUENCE {
                        q-QualMin-r9
                          Q-QualMin-r9  OPTIONAL,  -- Need OP
                        s-IntraSearchQ-r9
                          ReselectionThresholdQ-r9
                    },
                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,
                      cellReselectionPriority
                        CellReselectionPriority
                      intraFreqCellReselectionInfo
                        SEQUENCE {
                            q-QualMin-r9
                              Q-QualMin-r9  OPTIONAL,  -- Need OP
                            s-IntraSearchQ-r9
                              ReselectionThresholdQ-r9
                        },
                    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,
                          cellReselectionPriority
                            CellReselectionPriority
                          intraFreqCellReselectionInfo
                            SEQUENCE {
                                q-QualMin-r9
                                  Q-QualMin-r9  OPTIONAL,  -- Need OP
                                s-IntraSearchQ-r9
                                  ReselectionThresholdQ-r9
                            },
                        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,
                              cellReselectionPriority
                                CellReselectionPriority
                              intraFreqCellReselectionInfo
                                SEQUENCE {
                                    q-QualMin-r9
                                      Q-QualMin-r9  OPTIONAL,  -- Need OP
                                    s-IntraSearchQ-r9
                                      ReselectionThresholdQ-r9
                                },
                            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,
                                  cellReselectionPriority
                                    CellReselectionPriority
                                  intraFreqCellReselectionInfo
                                    SEQUENCE {
                                        q-QualMin-r9
                                          Q-QualMin-r9  OPTIONAL,  -- Need OP
                                        s-IntraSearchQ-r9
                                          ReselectionThresholdQ-r9
                                    },
                                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,
                                      cellReselectionPriority
                                        CellReselectionPriority
                                      intraFreqCellReselectionInfo
                                        SEQUENCE {
                                            q-QualMin-r9
                                              Q-QualMin-r9  OPTIONAL,  -- Need OP
                                            s-IntraSearchQ-r9
                                              ReselectionThresholdQ-r9
                                        },
                                    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,
                                          cellReselectionPriority
                                            CellReselectionPriority
                                          intraFreqCellReselectionInfo
                                            SEQUENCE {
                                                q-QualMin-r9
                                                  Q-QualMin-r9  OPTIONAL,  -- Need OP
                                                s-IntraSearchQ-r9
                                                  ReselectionThresholdQ-r9
                                            },
                                        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,
                                              cellReselectionPriority
                                                CellReselectionPriority
                                              intraFreqCellReselectionInfo
                                                SEQUENCE {
                                                    q-QualMin-r9
                                                      Q-QualMin-r9  OPTIONAL,  -- Need OP
                                                    s-IntraSearchQ-r9
                                                      ReselectionThresholdQ-r9
                                                },
                                            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,
                                                  cellReselectionPriority
                                                    CellReselectionPriority
                                                  intraFreqCellReselectionInfo
                                                    SEQUENCE {
                                                        q-QualMin-r9
                                                          Q-QualMin-r9  OPTIONAL,  -- Need OP
                                                        s-IntraSearchQ-r9
                                                          ReselectionThresholdQ-r9
                                                    },
                                                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,
                                                      cellReselectionPriority
                                                        CellReselectionPriority
                                                      intraFreqCellReselectionInfo
                                                        SEQUENCE {
                                                            q-QualMin-r9
                                                              Q-QualMin-r9  OPTIONAL,  -- Need OP
                                                            s-IntraSearchQ-r9
                                                              ReselectionThresholdQ-r9
                                                        },
                                                    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,
                                                          cellReselectionPriority
                                                            CellReselectionPriority
                                                          intraFreqCellReselectionInfo
                                                            SEQUENCE {
                                                                q-QualMin-r9
                                                                  Q-QualMin-r9  OPTIONAL,  -- Need OP
                                                                s-IntraSearchQ-r9
                                                                  ReselectionThresholdQ-r9
                                                            },
                                                        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,
                                                              cellReselectionPriority
                                                                CellReselectionPriority
                                                              intraFreqCellReselectionInfo
                                                                SEQUENCE {
                                                                    q-QualMin-r9
                                                                      Q-QualMin-r9  OPTIONAL,  -- Need OP
                                                                    s-IntraSearchQ-r9
                                                                      ReselectionThresholdQ-r9
                                                                },
                                                            intraFreqCellReselectionInfo
                                                              SEQUENCE {
                                                                  q-RxLevMin
                                                                    Q-RxLevMin,
                                                                  p-Max
                                                                    P-Max  OPTIONAL,  -- Need O
**SystemInformationBlockType3 field descriptions**

*allowedMeasBandwidth*
If absent, the value corresponding to the downlink bandwidth indicated by the *dl-Bandwidth* included in *MasterInformationBlock* applies.

*cellReselectionInfoCommon*
Cell re-selection information common for cells.

*cellReselectionServingFreqInfo*
Information common for cell re-selection to inter-frequency and inter-RAT cells.

*freqBandInfo*
A list of *additionalPmax* and *additionalSpectrumEmission* values as defined in TS 36.101 [42, table 6.2.4-1] applicable for the intra-frequency neighbouring E-UTRA cells if the UE selects the frequency band from *FreqBandIndicator* in *SystemInformationBlockType1*.

*intraFREQcellReselectionInfo*
Cell re-selection information common for intra-frequency cells.

*multiBandInfoList-v10j0*
A list of *additionalPmax* and *additionalSpectrumEmission* 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 *multiBandInfoList* (i.e. without suffix) or *multiBandInfoList-v9e0*. If E-UTRAN includes *multiBandInfoList-v10j0*, it includes the same number of entries, and listed in the same order, as in *multiBandInfoList* (i.e. without suffix).

*p-Max*
Value applicable for the intra-frequency neighbouring E-UTRA cells. If absent the UE applies the maximum power according to the UE capability.

*q-Hyst*
Parameter *Qhyst* in TS 36.304 [4]. Value in dB. Value dB1 corresponds to 1 dB, dB2 corresponds to 2 dB and so on.

*q-HystSF*
Parameter “Speed dependent ScalingFactor for *Qhyst*” in TS 36.304 [4]. The s-Medium and s-High concern the additional hysteresis to be applied, in Medium and High Mobility state respectively, to *Qhyst* as defined in TS 36.304 [4]. In dB. Value dB-6 corresponds to -6dB, dB-4 corresponds to -4dB and so on.

*q-QualMin*
Parameter “*Qqualmin*” in TS 36.304 [4], applicable for intra-frequency neighbour cells. If the field is not present, the UE applies the (default) value of negative infinity for *Qqualmin*. NOTE 1.

*q-QualMinRSRQ-OnAllSymbols*
If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. NOTE 1.

*q-QualMinWB*
If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16]. NOTE 1.

*q-RxLevMin*
Parameter “*Qrxlevmin*” in TS 36.304 [4], applicable for intra-frequency neighbour cells.

*s-IntraSearch*
Parameter “*SIntraSearchP*” in TS 36.304 [4]. If the field *s-IntraSearchP* is present, the UE applies the value of *s-IntraSearchP* instead. Otherwise if neither *s-IntraSearch* nor *s-IntraSearchP* is present, the UE applies the (default) value of infinity for *SIntraSearchP*.

*s-IntraSearchP*
Parameter “*SIntraSearchP*” in TS 36.304 [4]. See descriptions under *s-IntraSearch*.

*s-IntraSearchQ*
Parameter “*SIntraSearchQ*” in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of 0 dB for *SIntraSearchQ*.

*s-NonIntraSearch*
Parameter “*SnonIntraSearchP*” in TS 36.304 [4]. If the field *s-NonIntraSearchP* is present, the UE applies the value of *s-NonIntraSearchP* instead. Otherwise if neither *s-NonIntraSearch* nor *s-NonIntraSearchP* is present, the UE applies the (default) value of infinity for *SnonIntraSearchP*.

*s-NonIntraSearchP*
Parameter “*SnonIntraSearchP*” in TS 36.304 [4]. See descriptions under *s-NonIntraSearch*.

*s-NonIntraSearchQ*
Parameter “*SnonIntraSearchQ*” in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of 0 dB for *SnonIntraSearchQ*.

*speedStateReselectionPars*
Speed dependent reselection parameters, see TS 36.304 [4]. If this field is absent, i.e, *mobilityStateParameters* is also not present, UE behaviour is specified in TS 36.304 [4].

*threshServingLow*
Parameter “*ThreshServing, LowP*” in TS 36.304 [4].

*threshServingLowQ*
Parameter “*ThreshServing, LowQ*” in TS 36.304 [4].

*s-ReselectionEUTRA*
Parameter “*TreselectionEUTRA*” in TS 36.304 [4].
SystemInformationBlockType3 field descriptions

| t-ReselectionEUTRA-SF | Parameter “Speed dependent ScalingFactor for TreselectionEUTRA” in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4]. |

NOTE 1: The value the UE applies for parameter “Q\textsubscript{qualmin}” in TS 36.304 [4] depends on the q-QualMin fields signalled by E-UTRAN and supported by the UE. In case multiple candidate options are available, the UE shall select the highest priority candidate option according to the priority order indicated by the following table (top row is highest priority).

<table>
<thead>
<tr>
<th>q-QualMinRSRQ-OnAllSymbols</th>
<th>q-QualMinWB</th>
<th>Value of parameter “Q\textsubscript{qualmin}” in TS 36.304 [4]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Included</td>
<td>Included</td>
<td>q-QualMinRSRQ-OnAllSymbols – (q-QualMin – q-QualMinWB)</td>
</tr>
<tr>
<td>Included</td>
<td>Not included</td>
<td>q-QualMinRSRQ-OnAllSymbols</td>
</tr>
<tr>
<td>Not included</td>
<td>Included</td>
<td>q-QualMinWB</td>
</tr>
<tr>
<td>Not included</td>
<td>Not included</td>
<td>q-QualMin</td>
</tr>
</tbody>
</table>

Conditional presence

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

SystemInformationBlockType4

The IE SystemInformationBlockType4 contains neighbouring cell related information relevant only for intra-frequency cell re-selection. The IE includes cells with specific re-selection parameters as well as blacklisted cells.

SystemInformationBlockType4 information element

```
-- ASN1START

SystemInformationBlockType4 ::= SEQUENCE {
    intraFreqNeighCellList [0]  IntraFreqNeighCellList  OPTIONAL, -- Need OR
    intraFreqBlackCellList    [1]  IntraFreqBlackCellList  OPTIONAL, -- Need OR
    csg-PhysCellIdRange       [2]  PhysCellIdRange    OPTIONAL, -- Cond CSG
    ...,                     -- lateNonCriticalExtension  OCTET STRING    OPTIONAL
}

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

IntraFreqNeighCellInfo ::= SEQUENCE {
    physCellId,             -- Cell ID
    q-OffsetCell,           -- Frequency offset
    ...                     -- Other fields
}

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

-- ASN1STOP
```
SystemInformationBlockType4 field descriptions

csg-PhysCellIdRange
Set of physical cell identities reserved for CSG cells on the frequency on which this field was received. The received csg-PhysCellIdRange applies if less than 24 hours has elapsed since it was received and the UE is camped on a cell of the same primary PLMN where this field was received. The 3 hour validity restriction (section 5.2.1.3) does not apply to this field. The UE shall not apply any stored csg-PhysCellIdRange when it is in any cell selection state defined in TS 36.304 [4].

intraFreqBlackCellList
List of blacklisted intra-frequency neighbouring cells.

intraFreqNeighCellList
List of intra-frequency neighbouring cells with specific cell re-selection parameters.

g-OffsetCell
Parameter “Qoffset,c,” in TS 36.304 [4].

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSG</td>
<td>This field is optional, need OP, for non-CSG cells, and mandatory for CSG cells.</td>
</tr>
</tbody>
</table>

—

SystemInformationBlockType5

The IE SystemInformationBlockType5 contains information relevant only for inter-frequency cell re-selection i.e. information about other E-UTRA frequencies and inter-frequency neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.

SystemInformationBlockType5 information element

```asn1
SystemInformationBlockType5 ::= SEQUENCE {
    interFreqCarrierFreqList  InterFreqCarrierFreqList,  
    ...,
    lateNonCriticalExtension  OCTET STRING  (CONTAINING SystemInformationBlockType5-v8h0-IES) OPTIONAL,  
    [[ interFreqCarrierFreqList-v1250  InterFreqCarrierFreqList-v1250  OPTIONAL, -- Need OR  
      interFreqCarrierFreqListExt-r12  InterFreqCarrierFreqListExt-r12  OPTIONAL -- Need OR ]],  
    [[ interFreqCarrierFreqListExt-v1280  InterFreqCarrierFreqListExt-v1280  OPTIONAL -- Need OR ]]
}
SystemInformationBlockType5-v8h0-IES ::= SEQUENCE {
    interFreqCarrierFreqList-v8h0  SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v8h0 OPTIONAL, -- Need OP  
    nonCriticalExtension  SystemInformationBlockType5-v9e0-IEs OPTIONAL
}
SystemInformationBlockType5-v9e0-IEs ::= SEQUENCE {
    interFreqCarrierFreqList-v9e0  SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v9e0 OPTIONAL, -- Need OR  
    nonCriticalExtension  SystemInformationBlockType5-v10j0-IEs OPTIONAL
}
SystemInformationBlockType5-v10j0-IEs ::= SEQUENCE {
    interFreqCarrierFreqList-v10j0  SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v10j0 OPTIONAL, -- Need OR  
    nonCriticalExtension  SystemInformationBlockType5-v10j0-IEs OPTIONAL
}
InterFreqCarrierFreqList ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo  
InterFreqCarrierFreqList-v1250 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1250  
InterFreqCarrierFreqListExt-r12 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-r12  
InterFreqCarrierFreqListExt-v1280 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1280  
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

SEQUENCE {

threshX-HighQ-r9

ReselectionThresholdQ-r9,

threshX-LowQ-r9

ReselectionThresholdQ-r9

}

OPTIONAL -- Cond RSRQ

[[

q-QualMin-r9

Q-QualMin-r9

OPTIONAL -- Cond WB-RSRQ

]]

}]

InterFreqCarrierFreqInfo-v8h0 ::= SEQUENCE {

multiBandInfoList

MultiBandInfoList

OPTIONAL -- Need OR

}

InterFreqCarrierFreqInfo-v9e0 ::= SEQUENCE {

d1-CarrierFreq-v9e0

ARFCN-ValueEUTRA-v9e0

OPTIONAL, -- Cond d1-FreqMax

multiBandInfoList-v9e0

MultiBandInfoList-v9e0

OPTIONAL -- Need OR

}

InterFreqCarrierFreqInfo-v10j0 ::= SEQUENCE {

freqBandInfo-r10

NS-PmaxList-r10

OPTIONAL, -- Need OR

multiBandInfoList-v10j0

MultiBandInfoList-v10j0

OPTIONAL -- Need OR

}

InterFreqCarrierFreqInfo-v1250 ::= SEQUENCE {

reducedMeasPerformance-r12

ENUMERATED {true} OPTIONAL, -- Cond RSRQ2

q-QualMin-r12

Q-QualMin-r9

OPTIONAL, -- Cond RSRQ2

threshX-Q-r12

SEQUENCE {

threshX-HighQ-r12

ReselectionThresholdQ-r9,

threshX-LowQ-r12

ReselectionThresholdQ-r9

}

OPTIONAL -- Cond RSRQ

q-QualMinWB-r12

Q-QualMin-r9

OPTIONAL, -- Cond WB-RSRQ

multiBandInfoList-r12

MultiBandInfoList-r11

OPTIONAL, -- Need OR

reducedMeasPerformance-r12

ENUMERATED {true} OPTIONAL, -- Need OR

q-QualMinRSRQ-OnAllSymbols-r12

Q-QualMin-r9

OPTIONAL, -- Cond RSRQ2

}]

InterFreqCarrierFreqInfo-r12 ::= SEQUENCE {

d1-CarrierFreq-r12

ARFCN-ValueEUTRA-r9,

q-RxLevMin-r12

Q-RxLevMin,

p-Max-r12

P-Max

OPTIONAL, -- Need OP

t-ReselectionEUTRA-r12

T-Reselection,

t-ReselectionEUTRA-SF-r12

SpeedStateScaleFactors

OPTIONAL, -- Need OP

threshX-High-r12

ReselectionThreshold,

threshX-Low-r12

ReselectionThreshold,

allowedMeasBandwidth-r12

AllowedMeasBandwidth,

presenceAntennaPort1-r12

PresenceAntennaPort1,

cellReselectionPriority-r12

CellReselectionPriority

OPTIONAL, -- Need OP

neighCellConfig-r12

NeighCellConfig-r12,

q-OffsetFreq-r12

Q-OffsetRange

DEFAULT dB0,

interFreqNeighborCellList-r12

InterFreqNeighborCellList-r12

OPTIONAL, -- Need OR

interFreqBlackCellList-r12

InterFreqBlackCellList

OPTIONAL, -- Need OR

q-QualMin-r12

Q-QualMin-r9

OPTIONAL, -- Need OP

threshX-Q-r12

SEQUENCE {

threshX-HighQ-r12

ReselectionThresholdQ-r9,

threshX-LowQ-r12

ReselectionThresholdQ-r9

}

OPTIONAL -- Cond RSRQ

q-QualMinWB-r12

Q-QualMin-r9

OPTIONAL, -- Cond WB-RSRQ

multiBandInfoList-r12

MultiBandInfoList-r11

OPTIONAL, -- Need OR

reducedMeasPerformance-r12

ENUMERATED {true} OPTIONAL, -- Need OR

q-QualMinRSRQ-OnAllSymbols-r12

Q-QualMin-r9

OPTIONAL, -- Cond RSRQ2

}]

InterFreqNeighborCellList ::= SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighborCellInfo

InterFreqNeighborCellInfo ::= SEQUENCE {

physCellId

PhysCellId,

q-OffsetCell

Q-OffsetRange

}

InterFreqBlackCellList ::= SEQUENCE (SIZE (1..maxCellBlack)) OF PhysCellIdRange
### SystemInformationBlockType5 field descriptions

**FreqBandInfo**  
A list of additionalPmax and additionalSpectrumEmission values as defined in TS 36.101 [42, table 6.2.4-1] for the frequency band represented by dl-CarrierFreq for which cell reselection parameters are common.

**interFreqBlackCellList**  
List of blacklisted inter-frequency neighbouring cells.

**interFreqCarrierFreqList**  
List of neighbouring inter-frequencies. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the E-ARFCN used to indicate this. If E-UTRAN includes interFreqCarrierFreqList-v8h0, interFreqCarrierFreqList-v9e0 and/or InterFreqCarrierFreqList-v1250, it includes the same number of entries, and listed in the same order, as in interFreqCarrierFreqList (i.e. without suffix). See Annex D for more descriptions.

**InterFreqCarrierFreqListExt**  
List of additional neighbouring inter-frequencies, i.e. extending the size of the inter-frequency carrier list using the general principles specified in 5.1.2. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the E-ARFCN used to indicate this. E-UTRAN may include interFreqCarrierFreqListExt even if interFreqCarrierFreqList (i.e without suffix) does not include maxFreq entries.

**interFreqNeighCellList**  
List of inter-frequency neighbouring cells with specific cell re-selection parameters.

**multiBandInfoList**  
Indicates the list of frequency bands in addition to the band represented by dl-CarrierFreq for which cell reselection parameters are common. E-UTRAN indicates at most maxMultiBands frequency bands (i.e. the total number of entries across both multiBandInfoList and multiBandInfoList-v9e0 is below this limit).

**multiBandInfoList-v10j0**  
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).

**p-Max**  
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.

**q-OffsetCell**  
Parameter “Qoffsets,n” in TS 36.304 [4].

**q-OffsetFreq**  
Parameter “Qoffsetfrequency” in TS 36.304 [4].

**q-QualMin**  
Parameter “Qqualmin” in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of negative infinity for Qqualmin. NOTE 1.

**q-QualMinRSRQ-OnAllSymbols**  
If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. NOTE 1.

**q-QualMinWB**  
If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16]. NOTE 1.

**reducedMeasPerformance**  
Value TRUE indicates that the neighbouring inter-frequency is configured for reduced measurement performance, see TS 36.133 [16]. If the field is not included, the neighbouring inter-frequency is configured for normal measurement performance, see TS 36.133 [16].

**threshX-High**  
Parameter “Threshx,HighP” in TS 36.304 [4].

**threshX-HighQ**  
Parameter “Threshx,HighQ” in TS 36.304 [4].

**threshX-Low**  
Parameter “Threshx,LowP” in TS 36.304 [4].

**threshX-LowQ**  
Parameter “Threshx,LowQ” in TS 36.304 [4].

**t-ReselectionEUTRA**  
Parameter “TreselectionEUTRA” in TS 36.304 [4].

**t-ReselectionEUTRA-SF**  
Parameter “Speed dependent ScalingFactor for TreselectionEUTRA” in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].
NOTE 1: The value the UE applies for parameter “Q\textsubscript{qualmin}” in TS 36.304 [4] depends on the $q$-$\text{QualMin}$ fields signalled by E-UTRAN and supported by the UE. In case multiple candidate options are available, the UE shall select the highest priority candidate option according to the priority order indicated by the following table (top row is highest priority).

<table>
<thead>
<tr>
<th>$q$-$\text{QualMinRSRQ}$-$\text{OnAllSymbols}$</th>
<th>$q$-$\text{QualMinWB}$</th>
<th>Value of parameter “Q\textsubscript{qualmin}” in TS 36.304 [4]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Included</td>
<td>Included</td>
<td>$q$-$\text{QualMinRSRQ}$-$\text{OnAllSymbols} - (q$-$\text{QualMin} - q$-$\text{QualMinWB})$</td>
</tr>
<tr>
<td>Included</td>
<td>Not included</td>
<td>$q$-$\text{QualMinRSRQ}$-$\text{OnAllSymbols}$</td>
</tr>
<tr>
<td>Not included</td>
<td>Included</td>
<td>$q$-$\text{QualMinWB}$</td>
</tr>
<tr>
<td>Not included</td>
<td>Not included</td>
<td>$q$-$\text{QualMin}$</td>
</tr>
</tbody>
</table>

**Conditional presence**

<table>
<thead>
<tr>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>dl-$\text{FreqMax}$</td>
</tr>
<tr>
<td>RSRQ</td>
</tr>
<tr>
<td>RSRQ2</td>
</tr>
<tr>
<td>WB-RSRQ</td>
</tr>
</tbody>
</table>

**SystemInformationBlockType6**

The IE SystemInformationBlockType6 contains information relevant only for inter-RAT cell re-selection i.e. information about UTRA frequencies and UTRA neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency.

**SystemInformationBlockType6 information element**

```asn1
-- 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,
[[
    carrierFreqListUTRA-FDD-v1250  SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqInfoUTRA-FDD-v1250 OPTIONAL, -- Cond UTRA-FDD
    carrierFreqListUTRA-TDD-v1250  SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF CarrierFreqInfoUTRA-TDD-v1250 OPTIONAL, -- Cond UTRA-TDD
    carrierFreqListUTRA-FDD-Ext-r12  CarrierFreqListUTRA-FDD-Ext-r12 OPTIONAL, -- Cond UTRA-FDD
    carrierFreqListUTRA-TDD-Ext-r12  CarrierFreqListUTRA-TDD-Ext-r12 OPTIONAL, -- Cond UTRA-FDD
    UTRA-TDD                      ]]
}
SystemInformationBlockType6-v8h0-IEs ::= SEQUENCE {
    carrierFreqInfoUTRA-v1250      SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqInfoUTRA-FDD-v8h0 OPTIONAL, -- Cond UTRA-FDD
    nonCriticalExtension          SEQUENCE {} OPTIONAL
}
CarrierFreqInfoUTRA-v1250 ::= SEQUENCE {
    reducedMeasPerformance-r12    ENUMERATED (true) OPTIONAL -- Need OP
}
CarrierFreqListUTRA-FDD ::= SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqUTRA-FDD
CarrierFreqUTRA-FDD ::= SEQUENCE {
    carrierFreq       ARFCN-ValueUTRA,
    cellReselectionPriority    CellReselectionPriority OPTIONAL, -- Need OP
    threshX-High     ReselectionThreshold,
}```
threshX-Low       ReselectionThreshold,
q-RxLevMin       INTEGER (-60..-13),
p-MaxUTRA       INTEGER (-50..33),
q-QualMin       INTEGER (-24..0),
...
[[ threshX-Q-r9       SEQUENCE {
    threshX-HighQ-r9    ReselectionThresholdQ-r9,
    threshX-LowQ-r9     ReselectionThresholdQ-r9
} OPTIONAL -- Cond RSRQ
]]

CarrierFreqInfoUTRA-FDD-v8h0 ::=   SEQUENCE {
    multiBandInfoList     SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-UTRA-FDD    OPTIONAL -- Need OR
}

CarrierFreqListUTRA-FDD-Ext-r12 ::= SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqUTRA-FDD-Ext-r12

CarrierFreqUTRA-FDD-Ext-r12 ::=   SEQUENCE {
    carrierFreq-r12      ARFCN-ValueUTRA,
    cellReselectionPriority-r12   CellReselectionPriority OPTIONAL, -- Need OP
    threshX-High-r12    ReselectionThresholdQ-r9,
    threshX-Low-r12     ReselectionThresholdQ-r9
} OPTIONAL, -- Cond RSRQ

multiBandInfoList-r12     SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-UTRA-FDD    OPTIONAL, -- Need OR
reducedMeasPerformance-r12   ENUMERATED {true}    OPTIONAL, -- Need OP
...

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),
    ... 
}

CarrierFreqListUTRA-TDD-Ext-r12 ::= SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF CarrierFreqUTRA-TDD-Ext-r12

CarrierFreqUTRA-TDD-r12 ::= SEQUENCE {
    carrierFreq-r12      ARFCN-ValueUTRA,
    cellReselectionPriority-r12   CellReselectionPriority OPTIONAL, -- Need OP
    threshX-High-r12    ReselectionThreshold, 
    threshX-Low-r12     ReselectionThreshold, 
    p-MaxUTRA-r12      INTEGER (-50..33),
    reducedMeasPerformance-r12   ENUMERATED {true}    OPTIONAL, -- Need OP
    ... 
}

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

-- ASN1STOP
### SystemInformationBlockType6 field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>carrierFreqListUTRA-FDD</td>
<td>List of carrier frequencies of UTRA FDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. If E-UTRAN includes carrierFreqListUTRA-FDD-v8h0 and/or carrierFreqListUTRA-FDD-v1250, it includes the same number of entries, and listed in the same order, as in carrierFreqListUTRA-FDD (i.e. without suffix). See Annex D for more descriptions.</td>
</tr>
<tr>
<td>carrierFreqListUTRA-FDD-Ext</td>
<td>List of additional carrier frequencies of UTRA FDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. EUTRAN may include carrierFreqListUTRA-FDD-Ext even if carrierFreqListUTRA-FDD (i.e without suffix) does not include maxUTRA-FDD-Carrier entries.</td>
</tr>
<tr>
<td>carrierFreqListUTRA-TDD</td>
<td>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. If E-UTRAN includes carrierFreqListUTRA-TDD-v1250, it includes the same number of entries, and listed in the same order, as in carrierFreqListUTRA-TDD (i.e. without suffix).</td>
</tr>
<tr>
<td>carrierFreqListUTRA-TDD-Ext</td>
<td>List of additional carrier frequencies of UTRA TDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. EUTRAN may include carrierFreqListUTRA-TDD-Ext even if carrierFreqListUTRA-TDD (i.e without suffix) does not include maxUTRA-TDD-Carrier entries.</td>
</tr>
<tr>
<td>multiBandInfoList</td>
<td>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.</td>
</tr>
<tr>
<td>p-MaxUTRA</td>
<td>The maximum allowed transmission power on the (uplink) carrier frequency, see TS 25.304 [40]. In dBm</td>
</tr>
<tr>
<td>q-QualMin</td>
<td>Parameter “Qqualmin” in TS 25.304 [40]. Actual value = IE value [dB].</td>
</tr>
<tr>
<td>q-RxLevMin</td>
<td>Parameter “Qrxlevmin” in TS 25.304 [40]. Actual value = IE value * 2+1 [dBm].</td>
</tr>
<tr>
<td>reducedMeasPerformance</td>
<td>Value TRUE indicates that the UTRA carrier frequency is configured for reduced measurement performance, see TS 36.133 [16]. If the field is not included, the UTRA carrier frequency is configured for normal measurement performance, see TS 36.133 [16].</td>
</tr>
<tr>
<td>t-ReselectionUTRA</td>
<td>Parameter “TreselectionULTRA” in TS 36.304 [4].</td>
</tr>
<tr>
<td>t-ReselectionUTRA-SF</td>
<td>Parameter “Speed dependent ScalingFactor for TreselectionULTRA” in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].</td>
</tr>
<tr>
<td>threshX-LowQ</td>
<td>Parameter “ThreshX, LowQ” in TS 36.304 [4].</td>
</tr>
</tbody>
</table>

### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSRQ</td>
<td>The field is mandatory present if the threshServingLowQ is present in systemInformationBlockType3; otherwise it is not present.</td>
</tr>
<tr>
<td>UTRA-FDD</td>
<td>The field is optionally present, need OR, if the carrierFreqListUTRA-FDD is present. Otherwise it is not present.</td>
</tr>
<tr>
<td>UTRA-TDD</td>
<td>The field is optionally present, need OR, if the carrierFreqListUTRA-TDD is present. Otherwise it is not present.</td>
</tr>
</tbody>
</table>

---

### SystemInformationBlockType7

The IE SystemInformationBlockType7 contains information relevant only for inter-RAT cell re-selection i.e. information about GERAN frequencies relevant for cell re-selection. The IE includes cell re-selection parameters for each frequency.

#### SystemInformationBlockType7 information element

```
-- ASN1START
SystemInformationBlockType7 ::= SEQUENCE {
  t-ReselectionGERAN             T-Reselection,
}
-- ASN1END
```
SystemInformationBlockType7 field descriptions

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

carrierFreqsInfoList
Provides a list of neighbouring GERAN carrier frequencies, which may be monitored for neighbouring GERAN cells. The GERAN carrier frequencies are organised in groups and the cell reselection parameters are provided per group of GERAN carrier frequencies.

commonInfo
Defines the set of cell reselection parameters for the group of GERAN carrier frequencies.

ncc-Permitted
Field encoded as a bit map, where bit N is set to "0" if a BCCH carrier with NCC = N-1 is not permitted for monitoring and set to "1" if the BCCH carrier with NCC = N-1 is permitted for monitoring; N = 1 to 8; bit 1 of the bitmap is the leading bit of the bit string.

p-MaxGERAN
Maximum allowed transmission power for GERAN on an uplink carrier frequency, see TS 45.008 [28]. Value in dBm. Applicable for the neighbouring GERAN cells on this carrier frequency. If pmaxGERAN is absent, the maximum power according to the UE capability is used.

q-RxLevMin
Parameter "Qrxlevmin" in TS 36.304 [1], minimum required RX level in the GSM cell. The actual value of Qrxlevmin in dBm = (IE value * 2) – 115.

threshX-High
Parameter "Threshx_Highp" in TS 36.304 [4].

threshX-Low
Parameter "Threshx_Lowp" in TS 36.304 [4].

t-ReselectionGERAN
Parameter "TreselectionGERAN" in TS 36.304 [4].

t-ReselectionGERAN-SF
Parameter "Speed dependent ScalingFactor for TreselectionGERAN" in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].

SystemInformationBlockType8
The IE SystemInformationBlockType8 contains information relevant only for inter-RAT cell re-selection i.e. information about CDMA2000 frequencies and CDMA2000 neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.

SystemInformationBlockType8 information element

-- ASN1START
SystemInformationBlockType8 ::=  SEQUENCE {
    systemTimeInfo      SystemTimeInfoCDMA2000    OPTIONAL, -- Need OR
    searchWindowSize     INTEGER (0..15)      OPTIONAL, -- Need OR
    parametersHRPD      INTEGER (0..15)      OPTIONAL, -- Need OR
    preRegistrationInfoHRPD    PreRegistrationInfoHRPD,
-- ASN1STOP
cellReselectionParametersHRPD ::= CellReselectionParametersCDMA2000 OPTIONAL -- Need OR
parameters1XRTT ::= SEQUENCE {
    csfb-RegistrationParam1XRTT ::= CSFB-RegistrationParam1XRTT OPTIONAL, -- Need OP
    longCodeState1XRTT ::= BIT STRING (SIZE (42)) OPTIONAL, -- Need OR
    cellReselectionParameters1XRTT ::= CellReselectionParametersCDMA2000 OPTIONAL -- Need OR
    }
lateNonCriticalExtension ::= OCTET STRING OPTIONAL, -- Need OR

CellReselectionParametersCDMA2000 ::= SEQUENCE {
    bandClassList ::= BandClassListCDMA2000,
    neighCellList ::= NeighCellListCDMA2000,
    t-ReselectionCDMA2000 ::= T-Reselection,
    t-ReselectionCDMA2000-SF ::= SpeedStateScaleFactors OPTIONAL -- Need OP
}

CellReselectionParametersCDMA2000-r11 ::= SEQUENCE {
    bandClassList ::= BandClassListCDMA2000,
    neighCellList-r11 ::= SEQUENCE (SIZE (1..16)) OF NeighCellCDMA2000-r11,
    t-ReselectionCDMA2000 ::= T-Reselection,
    t-ReselectionCDMA2000-SF ::= SpeedStateScaleFactors OPTIONAL -- Need OP
}

CellReselectionParametersCDMA2000-v920 ::= SEQUENCE {
    neighCellList-v920 ::= NeighCellListCDMA2000
}

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

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

NeighCellCDMA2000-r11 ::= SEQUENCE {
    bandClass ::= BandclassCDMA2000,
    neighFreqInfoList-r11 ::= SEQUENCE (SIZE (1..16)) OF NeighCellsPerBandclassCDMA2000-r11
}

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

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

NeighCellsPerBandclassCDMA2000-r11 ::= SEQUENCE {
    arfcn ::= ARFCN-ValueCDMA2000,
    physCellIdList-r11 ::= SEQUENCE (SIZE (1..40)) OF PhysCellIdCDMA2000
}

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)
}

SIB8-PerPLMN-List-r11 ::= SEQUENCE (SIZE (1..maxPLMN-r11)) OF SIB8-PerPLMN-r11

SIB8-PerPLMN-r11 ::= SEQUENCE {
    plmn-Identity-r11 INTEGER (1..maxPLMN-r11),
    parametersCDMA2000-r11 CHOICE {
        explicitValue ParametersCDMA2000-r11,
        defaultValue NULL
    }
}

ParametersCDMA2000-r11 ::= SEQUENCE {
    systemTimeInfo-r11 CHOICE {
        explicitValue SystemTimeInfoCDMA2000,
        defaultValue NULL
    } OPTIONAL, -- Need OR
    searchWindowSize-r11 INTEGER (0..15),
    parametersHRPD-r11 SEQUENCE {
        preRegistrationInfoHRPD-r11  PreRegistrationInfoHRPD,
        cellReselectionParametersHRPD-r11 CellReselectionParametersCDMA2000-r11 OPTIONAL -- Need OR
    } OPTIONAL, -- Need OR
    parameters1XRTT-r11 SEQUENCE {
        csfb-RegistrationParam1XRTT-r11 CSFB-RegistrationParam1XRTT OPTIONAL, -- Need OP
        csfb-RegistrationParam1XRTT-Ext-r11 CSFB-RegistrationParam1XRTT-v920 OPTIONAL, -- Cond
    }
}

REG-1XRTT-PerPLMN ::= SEQUENCE {
    longCodeState1XRTT-r11 BIT STRING (SIZE (42)) OPTIONAL, -- Cond PerPLMN-LC
    cellReselectionParameters1XRTT-r11 CellReselectionParametersCDMA2000-r11 OPTIONAL, -- Cond
    Need OR
    ac-BarringConfig1XRTT-r11 AC-BarringConfig1XRTT-r9 OPTIONAL, -- Cond
    REG-1XRTT-PerPLMN
    csfb-SupportForDualRxUEs-r11 BOOLEAN OPTIONAL, -- Need OR
    csfb-DualRxTxSupport-r11 ENUMERATED {true} OPTIONAL -- Cond REG-1XRTT-PerPLMN
}

-- ASN1STOP
### SystemInformationBlockType8 field descriptions

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ac-BarringConfig1XRTT</strong></td>
<td>Contains the access class barring parameters the UE uses to calculate the access class barring factor, see C.S0097 [53].</td>
</tr>
<tr>
<td><strong>ac-Barring0to9</strong></td>
<td>Parameter used for calculating the access class barring factor for access overload classes 0 through 9. It is the parameter “PSIST” in C.S0004 [34] for access overload classes 0 through 9.</td>
</tr>
<tr>
<td><strong>ac-BarringEmg</strong></td>
<td>Parameter used for calculating the access class barring factor for emergency calls and emergency message transmissions for access overload classes 0 through 9. It is the parameter “PSIST_EMG” in C.S0004 [34].</td>
</tr>
<tr>
<td><strong>ac-Barring0to9</strong></td>
<td>Parameter used for calculating the access class barring factor for access overload classes 0 through 9.</td>
</tr>
<tr>
<td><strong>ac-BarringN</strong></td>
<td>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 [34] for access overload class N.</td>
</tr>
<tr>
<td><strong>ac-BarringReg</strong></td>
<td>Parameter used for modifying the access class barring factor for autonomous registrations. It is the parameter “REG_PSIST” in C.S0004 [34].</td>
</tr>
<tr>
<td><strong>bandClass</strong></td>
<td>Identifies the Frequency Band in which the Carrier can be found. Details can be found in C.S0057 [24, Table 1.5].</td>
</tr>
<tr>
<td><strong>bandClassList</strong></td>
<td>List of CDMA2000 frequency bands.</td>
</tr>
<tr>
<td><strong>cellReselectionParameters1XRTT</strong></td>
<td>Cell reselection parameters applicable only to CDMA2000 1xRTT system.</td>
</tr>
<tr>
<td><strong>cellReselectionParameters1XRTT-Ext</strong></td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 1XRTT system.</td>
</tr>
<tr>
<td><strong>cellReselectionParameters1XRTT-v920</strong></td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 1XRTT system. The field is not present if cellReselectionParameters1XRTT is not present; otherwise it is optionally present.</td>
</tr>
<tr>
<td><strong>cellReselectionParametersHRPD</strong></td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system.</td>
</tr>
<tr>
<td><strong>cellReselectionParametersHRPD-Ext</strong></td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system.</td>
</tr>
<tr>
<td><strong>cellReselectionParametersHRPD-v920</strong></td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system. The field is not present if cellReselectionParametersHRPD is not present; otherwise it is optionally present.</td>
</tr>
<tr>
<td><strong>csfb-DualRxTxSupport</strong></td>
<td>Value TRUE indicates that the network supports dual Rx/Tx enhanced 1xCSFB, which enables UEs capable of dual Rx/Tx enhanced 1xCSFB to switch off their 1xRTT receiver/transmitter while camped in E-UTRAN [51].</td>
</tr>
<tr>
<td><strong>csfb-RegistrationParam1XRTT</strong></td>
<td>Contains the parameters the UE will use to determine if it should perform a CDMA2000 1xRTT Registration/Re-Registration. This field is included if either CSFB or enhanced CS fallback to CDMA2000 1xRTT is supported.</td>
</tr>
<tr>
<td><strong>csfb-SupportForDualRxUEs</strong></td>
<td>Value TRUE indicates that the network supports dual Rx CSFB [51].</td>
</tr>
<tr>
<td><strong>longCodeState1XRTT</strong></td>
<td>The state of long code generation registers in CDMA2000 1XRTT system as defined in C.S0002 [12, Section 1.3] at [\frac{t}{10}\times10 + 320\text{ ms}, \text{where} t \text{equals to the cdma-SystemTime}]. This field is required for reporting CGI for 1xRTT, SRVCC handover and enhanced CS fallback to CDMA2000 1xRTT operation. Otherwise this IE is not needed. This field is excluded when estimating changes in system information, i.e. changes of longCodeState1XRTT should neither result in system information change notifications nor in a modification of systemInfoValueTag in SIB1.</td>
</tr>
<tr>
<td><strong>neighCellList</strong></td>
<td>List of CDMA2000 neighbouring cells. The total number of neighbouring cells in neighCellList for each RAT (1XRTT or HRPD) is limited to 32.</td>
</tr>
<tr>
<td><strong>neighCellList-v920</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>
**SystemInformationBlockType8 field descriptions**

**neighCellsPerFreqList**
List of carrier frequencies and neighbour cell ids in each frequency within a CDMA2000 Band, see C.S0002 [12] or C.S0024 [26].

**neighCellsPerFreqList-v920**
Extended list of neighbour cell ids, in the same CDMA2000 Frequency Band as the corresponding instance in “NeighCellListCDMA2000”.

**parameters1XRTT**
Parameters applicable for interworking with CDMA2000 1XRTT system.

**parametersCDMA2000**
Provides the corresponding SIB8 parameters for the CDMA2000 network associated with the PLMN indicated in plmn-Identity. A choice is used to indicate whether for this PLMN the parameters are signalled explicitly or set to the (default) values common for all PLMNs i.e. the values not included in sib8-PerPLMN-List.

**parametersHRPD**
Parameters applicable only for interworking with CDMA2000 HRPD systems.

**physCellIdList**
Identifies the list of CDMA2000 cell ids, see C.S0002 [12] or C.S0024 [26].

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

**plmn-Identity**
Indicates the PLMN associated with this CDMA2000 network. Value 1 indicates the PLMN listed 1st in plmn-IdentityList included in SIB1, value 2 indicates the PLMN listed 2nd in plmn-IdentityList included in SIB1 and so on. A PLMN which identity is not indicated in the sib8-PerPLMN-List, does not support inter-working with CDMA2000.

**preRegistrationInfoHRPD**
The CDMA2000 HRPD Pre-Registration Information tells the UE if it should pre-register with the CDMA2000 HRPD network and identifies the Pre-registration zone to the UE.

**searchWindowSize**
The search window size is a CDMA2000 parameter to be used to assist in searching for the neighbouring pilots. For values see C.S0005 [25, Table 2.6.6.2.1-1] and C.S0024 [26, Table 8.7.6.2-4]. This field is required for a UE with rx-ConfigHRPD= single and/ or rx-Config1XRTT= single to perform handover, cell re-selection, UE measurement based redirection and enhanced 1XRTT CS fallback from E-UTRAN to CDMA2000 according to this specification and TS 36.304 [4].

**sib8-PerPLMN-List**
This field provides the values for the interworking CDMA2000 networks corresponding, if any, to the UE’s RPLMN.

**systemTimeInfo**
Information on CDMA2000 system time. This field is required for a UE with rx-ConfigHRPD= single and/ or rx-Config1XRTT= single to perform handover, cell re-selection, UE measurement based redirection and enhanced 1XRTT CS fallback from E-UTRAN to CDMA2000 according to this specification and TS 36.304 [4]. This field is excluded when estimating changes in system information, i.e. changes of systemTimeInfo should neither result in system information change notifications nor in a modification of systemInfoValueTag in SIB1. For the field included in ParametersCDMA2000, a choice is used to indicate whether for this PLMN the parameters are signalled explicitly or set to the (default) value common for all PLMNs i.e. the value not included in sib8-PerPLMN-List.

**threshX-High**
Parameter “ThreshX, HighP” in TS 36.304 [4]. This specifies the high threshold used in reselection towards this CDMA2000 band class expressed as an unsigned binary number equal to FLOOR (-2 x 10 x log10 Ec/Io) in units of 0.5 dB, as defined in C.S0005 [25].

**threshX-Low**
Parameter “ThreshX, LowP” in TS 36.304 [4]. This specifies the low threshold used in reselection towards this CDMA2000 band class expressed as an unsigned binary number equal to FLOOR (-2 x 10 x log10 Ec/Io) in units of 0.5 dB, as defined in C.S0005 [25].

**t-ReselectionCDMA2000**
Parameter “TreselectionCDMA_HRPD” or “TreselectionCDMA_1xRTT” in TS 36.304 [4].

**t-ReselectionCDMA2000-SF**
Parameter “Speed dependent ScalingFactor for TreselectionCDMA_HRPD” or TreselectionCDMA_1xRTT” in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].
<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCL-1XRTT</td>
<td>The field is optional present, need OR, if <code>cellReselectionParameters1xRTT</code> is present; otherwise it is not present.</td>
</tr>
<tr>
<td>NCL-HRPD</td>
<td>The field is optional present, need OR, if <code>cellReselectionParametersHRPD</code> is present; otherwise it is not present.</td>
</tr>
<tr>
<td>PerPLMN-LC</td>
<td>The field is optional present, need OR, if <code>cellReselectionParametersHRPD</code> is present; otherwise it is not present.</td>
</tr>
<tr>
<td>REG-1XRTT</td>
<td>The field is optional present, need OR, if <code>csfb-RegistrationParam1XRTT</code> is present; otherwise it is not present.</td>
</tr>
<tr>
<td>REG-1XRTT-PerPLMN</td>
<td>The field is optional present, need OR, if <code>csfb-RegistrationParam1XRTT</code> is included in <code>SIB8PerPLMN</code> for this CDMA2000 network; otherwise it is not present.</td>
</tr>
</tbody>
</table>

SystemInformationBlockType9

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

SystemInformationBlockType9 information element

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

SystemInformationBlockType9 field descriptions

`hnb-Name`

Carries the name of the home eNB, coded in UTF-8 with variable number of bytes per character, see TS 22.011 [10].

SystemInformationBlockType10

The IE `SystemInformationBlockType10` contains an ETWS primary notification.

SystemInformationBlockType10 information element

```
SystemInformationBlockType10 ::= SEQUENCE {
  messageIdentifier     BIT STRING (SIZE (16)),
  serialNumber      BIT STRING (SIZE (16)),
  warningType       OCTET STRING (SIZE (2)),
  dummy        OCTET STRING (SIZE (50)) OPTIONAL,  -- Need OP
  ...,
  lateNonCriticalExtension   OCTET STRING    OPTIONAL
}
```
**SystemInformationBlockType10 field descriptions**

**messageIdentifier**
Identifies the source and type of ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.44]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.1], while the trailing bit contains bit 0 of the second octet of the same equivalent IE.

**serialNumber**
Identifies variations of an ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.45]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.2], while the trailing bit contains bit 0 of the second octet of the same equivalent IE.

**dummy**
This field is not used in the specification. If received it shall be ignored by the UE.

**warningType**
Identifies the warning type of the ETWS primary notification and provides information on emergency user alert and UE popup. The first octet (which is equivalent to the first octet of the equivalent IE defined in TS 36.413 [39, 9.2.1.50]) contains the first octet of the equivalent IE defined in and encoded according to TS 23.041 [37, 9.3.24], and so on.

---

**SystemInformationBlockType11**
The IE **SystemInformationBlockType11** contains an ETWS secondary notification.

**SystemInformationBlockType11 information element**

```
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
}
```

**SystemInformationBlockType11 field descriptions**

**dataCodingScheme**
Identifies the alphabet/coding and the language applied variations of an ETWS notification. The octet (which is equivalent to the octet of the equivalent IE defined in TS 36.413 [39, 9.2.1.52]) contains the octet of the equivalent IE defined in TS 23.041 [37, 9.4.3.2.3] and encoded according to TS 23.038 [38].

**messageIdentifier**
Identifies the source and type of ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.44]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.1], while the trailing bit contains bit 0 of second octet of the same equivalent IE.

**serialNumber**
Identifies variations of an ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.45]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.2], while the trailing bit contains bit 0 of second octet of the same equivalent IE.

**warningMessageSegment**
Carries a segment of the **Warning Message Contents** IE defined in TS 36.413 [39, 9.2.1.53]. The first octet of the **Warning Message Contents** IE is equivalent to the first octet of the **CB data** IE defined in and encoded according to TS 23.041 [37, 9.4.2.2.5] and so on.

**warningMessageSegmentNumber**
Segment number of the ETWS warning message segment contained in the SIB. A segment number of zero corresponds to the first segment, one corresponds to the second segment, and so on.

**warningMessageSegmentType**
Indicates whether the included ETWS warning message segment is the last segment or not.
The field is mandatory present in the first segment of SIB11, otherwise it is not present.

---

**SystemInformationBlockType12**

The IE SystemInformationBlockType12 contains a CMAS notification.

**SystemInformationBlockType12 information element**

```
-- ASN1START
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,
  ...
}
-- ASN1STOP
```

**SystemInformationBlockType12 field descriptions**

- **dataCodingScheme**: 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 36.413 [39, 9.2.1.52]) contains the octet of the equivalent IE defined in TS 23.041 [37, 9.4.3.2.3] and encoded according to TS 23.038 [38].

- **messageIdentifier**: Identifies the source and type of CMAS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.44]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.1], while the trailing bit contains bit 0 of second octet of the same equivalent IE.

- **serialNumber**: Identifies variations of a CMAS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.45]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.2], while the trailing bit contains bit 0 of second octet of the same equivalent IE.

- **warningMessageSegment**: Carries a segment of the Warning Message Contents IE defined in TS 36.413 [39]. 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 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.

- **warningMessageSegmentType**: Indicates whether the included CMAS warning message segment is the last segment or not.

---

**SystemInformationBlockType13**

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

**SystemInformationBlockType13 information element**

```
-- ASN1START
SystemInformationBlockType13-r9 ::= SEQUENCE {
  mbsfn-AreaInfoList-r9    MBSFN-AreaInfoList-r9,
  notificationConfig-r9    MBMS-NotificationConfig-r9,
  lateNonCriticalExtension   OCTET STRING     OPTIONAL,
  ...
}
-- ASN1STOP
```
– SystemInformationBlockType14

The **SystemInformationBlockType14** contains the EAB parameters.

**SystemInformationBlockType14** information element

```plaintext
SystemInformationBlockType14-r11 ::= SEQUENCE {
eab-Param-r11                     CHOICE {
eab-Common-r11       EAB-Config-r11,  
eab-PerPLMN-List-r11     SEQUENCE (SIZE (1..maxPLMN-r11)) OF EAB-ConfigPLMN-r11
}            OPTIONAL, -- Need OR
lateNonCriticalExtension    OCTET STRING   OPTIONAL, ...
}
```

**SystemInformationBlockType14 field descriptions**

- **eab-BarringBitmap**
  
  Extended access class barring for AC 0-9. The first/ leftmost bit is for AC 0, the second bit is for AC 1, and so on.

- **eab-Category**
  
  Indicates the category of UEs for which EAB applies. Value a corresponds to all UEs, value b corresponds to the UEs that are neither in their HPLMN nor in a PLMN that is equivalent to it, and value c corresponds to the UEs that are neither in the PLMN listed as most preferred PLMN of the country where the UEs are roaming in the operator-defined PLMN selector list on the USIM, nor in their HPLMN nor in a PLMN that is equivalent to their HPLMN, see TS 22.011 [10].

- **eab-Common**
  
  The EAB parameters applicable for all PLMN(s).

- **eab-PerPLMN-List**
  
  The EAB parameters per PLMN, listed in the same order as the PLMN(s) occur in `plmn-IdentityList` in `SystemInformationBlockType1`.

– SystemInformationBlockType15

The **SystemInformationBlockType15** contains the MBMS Service Area Identities (SAI) of the current and/or neighbouring carrier frequencies.

**SystemInformationBlockType15** information element

```plaintext
SystemInformationBlockType15-r11 ::= SEQUENCE {
mmb-MSAI-IntraFreq-r11       MBMS-MSAI-List-r11 OPTIONAL, -- Need OR
mmb-MSAI-InterFreqList-r11   MBMS-MSAI-InterFreqList-r11 OPTIONAL, -- Need OR
lateNonCriticalExtension    OCTET STRING   OPTIONAL,
...               
}  

MBMS-MSAI-List-r11 ::= SEQUENCE (SIZE (1..maxSAI-MBMS-r11)) OF MBMS-MSAI-r11
```
SystemInformationBlockType15 field descriptions

**mbms-SAI-InterFreqList**
Contains a list of neighboring frequencies including additional bands, if any, that provide MBMS services and the corresponding MBMS SAI.

**mbms-SAI-IntraFreq**
Contains the list of MBMS SAI for the current frequency. A duplicate MBMS SAI indicates that this and all following SAI's are not offered by this cell but only by neighbour cells on the current frequency. For MBMS service continuity, the UE shall use all MBMS SAI's listed in **mbms-SAI-IntraFreq** to derive the MBMS frequencies of interest.

**mbms-SAI-List**
Contains a list of MBMS SAI's for a specific frequency.

**multiBandInfoList**
A list of additional frequency bands applicable for the cells participating in the MBSFN transmission.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>InterFreq</td>
<td>The field is optionally present, need OR, if the mbms-SAI-InterFreqList-r11 is present. Otherwise it is not present.</td>
</tr>
</tbody>
</table>

---

**SystemInformationBlockType16**

The IE **SystemInformationBlockType16** contains information related to GPS time and Coordinated Universal Time (UTC). The UE may use the parameters provided in this system information block to obtain the UTC, the GPS and the local time.

**NOTE:** The UE may use the time information for numerous purposes, possibly involving upper layers e.g. to assist GPS initialisation, to synchronise the UE clock (a.o. to determine MBMS session start/stop).

SystemInformationBlockType16 information element

```asn1
SystemInformationBlockType16-r11 ::=  SEQUENCE {
  timeInfo-r11       SEQUENCE {
    timeInfoUTC-r11      INTEGER (0..549755813887),
    dayLightSavingTime-r11    BIT STRING (SIZE (2))  OPTIONAL, -- Need OR
    leapSeconds-r11      INTEGER (-127..128)   OPTIONAL, -- Need OR
    localTimeOffset-r11     INTEGER (-63..64)   OPTIONAL -- Need OR
  },
  lateNonCriticalExtension   OCTET STRING    OPTIONAL, -- Need OR
  ...}
```

-- ASN1STOP
**SystemInformationBlockType16 field descriptions**

*dayLightSavingTime*
It indicates if and how daylight saving time (DST) is applied to obtain the local time. The semantics is the same as the semantics of the *Daylight Saving Time* IE in TS 24.301 [35] and TS 24.008 [49]. The first/least bit of the bit string contains the b2 of octet 3, i.e. the value part of the *Daylight Saving Time* IE, and the second bit of the bit string contains b1 of octet 3.

*leapSeconds*
Number of leap seconds offset between GPS Time and UTC. UTC and GPS time are related i.e. GPS time - leapSeconds = UTC time.

*localTimeOffset*
Offset between UTC and local time in units of 15 minutes. Actual value = IE value * 15 minutes. Local time of the day is calculated as UTC time + localTimeOffset.

*timeInfoUTC*
Coordinated Universal Time corresponding to the SFN boundary at or immediately after the ending boundary of the SI-window in which *SystemInformationBlockType16* is transmitted. The field counts the number of UTC seconds in 10 ms units since 00:00:00 on Gregorian calendar date 1 January, 1900 (midnight between Sunday, December 31, 1899 and Monday, January 1, 1900). NOTE 1.
This field is excluded when estimating changes in system information, i.e. changes of timeInfoUTC should neither result in system information change notifications nor in a modification of systemInfoValueTag in SIB1.

NOTE 1: The UE may use this field together with the leapSeconds field to obtain GPS time as follows: GPS Time (in seconds) = timeInfoUTC (in seconds) - 2,524,953,600 (seconds) + leapSeconds, where 2,524,953,600 is the number of seconds between 00:00:00 on Gregorian calendar date 1 January, 1900 and 00:00:00 on Gregorian calendar date 6 January, 1980 (start of GPS time).

### SystemInformationBlockType17

The IE *SystemInformationBlockType17* contains information relevant for traffic steering between E-UTRAN and WLAN.

**SystemInformationBlockType17 information element**

```asn1
SystemInformationBlockType17-r12 ::= SEQUENCE {
  wlan-OffloadInfoPerPLMN-List-r12  SEQUENCE (SIZE (1..maxPLMN-r11)) OF WLAN-OffloadInfoPerPLMN-r12  OPTIONAL, -- Need OR
  lateNonCriticalExtension    OCTET STRING    OPTIONAL,
...}

WLAN-OffloadInfoPerPLMN-r12 ::= SEQUENCE {
  wlan-OffloadConfigCommon-r12  WLAN-OffloadConfig-r12  OPTIONAL, -- Need OR
  wlan-Id-List-r12     WLAN-Id-List-r12   OPTIONAL, -- Need OR
...}

WLAN-Id-List-r12 ::= SEQUENCE (SIZE (1..maxWLAN-Id-r12)) OF WLAN-Identifiers-r12

WLAN-Identifiers-r12 ::=   SEQUENCE {
  ssid-r12      OCTET STRING (SIZE (1..32))  OPTIONAL, -- Need OR
  bssid-r12      OCTET STRING (SIZE (6))    OPTIONAL, -- Need OR
  hessid-r12      OCTET STRING (SIZE (6))    OPTIONAL, -- Need OR
...}
```

**SystemInformationBlockType17 field descriptions**

*bssid*
Basic Service Set Identifier (BSSID) defined in IEEE 802.11-2012 [67].

*hessid*
Homogenous Extended Service Set Identifier (HESSID) defined in IEEE 802.11-2012 [67].

*ssid*
Service Set Identifier (SSID) defined in IEEE 802.11-2012 [67].
**SystemInformationBlockType17 field descriptions**

* wlan-OffloadInfoPerPLMN-List

The WLAN offload configuration per PLMN includes the same number of entries, listed in the same order as the PLMN(s) in plmn-IdentityList in SystemInformationBlockType1.

---

**SystemInformationBlockType18**

The IE SystemInformationBlockType18 indicates E-UTRAN supports the Sidelink UE information procedure and may contain sidelink communication related resource configuration information.

**SystemInformationBlockType18 information element**

---

**SystemInformationBlockType18 field descriptions**

* commRxPool

Indicates the resources by which the UE is allowed to receive sidelink communication while in RRC_IDLE and while in RRC_CONNECTED.

* commSyncConfig

Indicates the configuration by which the UE is allowed to receive and transmit synchronisation information. E-UTRAN configures commSyncConfig including txParameters when configuring UEs by dedicated signalling to transmit synchronisation information.

* commTxPoolExceptional

Indicates the resources by which the UE is allowed to transmit sidelink communication in exceptional conditions, as specified in 5.10.4.

* commTxPoolNormalCommon

Indicates the resources by which the UE is allowed to transmit sidelink communication while in RRC_IDLE or when in RRC_CONNECTED while transmitting sidelink via a frequency other than the primary.

---

**SystemInformationBlockType19**

The IE SystemInformationBlockType19 indicates E-UTRAN supports the sidelink UE information procedure and may contain sidelink discovery related resource configuration information.

**SystemInformationBlockType19 information element**

---

**SystemInformationBlockType19 field descriptions**

* discRxPool

Indicates the carrier frequency information by which the UE is allowed to receive sidelink communication.

* lateNonCriticalExtension

OCTET STRING indicating extension of late non-critical information.
SystemInformationBlockType19 field descriptions

discInterFreqList
Indicates the neighbouring frequencies on which sidelink discovery announcement is supported.

discRxPool
Indicates the resources by which the UE is allowed to receive sidelink discovery announcements while in RRC_IDLE and while in RRC_CONNECTED.

discSyncConfig
Indicates the configuration by which the UE is allowed to receive and transmit synchronisation information. E-UTRAN configures discSyncConfig including txParameters when configuring UEs by dedicated signalling to transmit synchronisation information.

discTxPoolCommon
Indicates the resources by which the UE is allowed to transmit sidelink discovery announcements while in RRC_IDLE.

plmn-IdentityList
List of PLMN identities for the neighbouring frequency indicated by carrierFreq. Absence of the field indicates the same PLMN identities as listed in plmn-IdentityList (without suffix) in SystemInformationBlockType1.

plmn-Index
Index of the corresponding entry in field plmn-IdentityList (without suffix) within SystemInformationBlockType1.

---

Conditional presence | Explanation
---|---
Tx | The field is mandatory present if discTxPoolCommon is included. Otherwise the field is optional present, need OR.

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

---

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}
    }
}
### AntennaInfo field descriptions

**alternativeCodebookEnabledFor4TX**
Indicates whether code book in TS 36.213 [23] Table 7.2.4-0A to Table 7.2.4-0D is being used for deriving CSI feedback and reporting. E-UTRAN only configures the field if the UE is configured with a) `tm8` with 4 CRS ports, `tm9` or `tm10` with 4 CSI-RS ports and b) PMI/RI reporting.

**antennaPortsCount**
Parameter represents the number of cell specific antenna ports where an1 corresponds to 1, an2 to 2 antenna ports etc. see TS 36.211 [21, 6.2.1].

**codebookSubsetRestriction**
Parameter: `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`.

**maxLayersMIMO**
Indicates the maximum number of layers for spatial multiplexing used to determine the rank indication bit width and Kc determination of the soft buffer size for the corresponding serving cell according to TS 36.212 [22]. EUTRAN configures this field only when `transmissionMode` is set to `tm3`, `tm4`, `tm9` or `tm10` for the corresponding serving cell. When configuring the field for a serving cell which `transmissionMode` is set to `tm3` or `tm4`, EUTRAN only configures value fourLayers: For a serving cell which `transmissionMode` is set to `tm9` or `tm10`, EUTRAN only configures the field only if intraBandContiguousCC-InfoList is indicated for the band and the band combination of the corresponding serving cell or the UE supports maxLayersMIMO-Indication.

**transmissionMode**
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.

**ue-TransmitAntennaSelection**
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.
### Conditional presence

<table>
<thead>
<tr>
<th></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.</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

```asn1
AntennaInfoUL := SEQUENCE {
    transmissionModeUL ENUMERATED {tm1, tm2, spare6, spare5, spare4, spare3, spare2, spare1} OPTIONAL, -- Need OR
    fourAntennaPortActivated 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

```asn1
CQI-ReportConfig ::= SEQUENCE {
    cqi-ReportModeAperiodic CQI-ReportModeAperiodic OPTIONAL, -- Need OR
    nomPDSCH-RS-EPRE-Offset INTEGER (-1..6),
    cqi-ReportPeriodic    CQI-ReportPeriodic OPTIONAL, -- Need ON
}
```

```asn1
CQI-ReportConfig-v920 ::= SEQUENCE {
    cqi-Mask-r9      ENUMERATED {setup}  OPTIONAL,  -- Cond cqi-Setup
    pmi-RI-Report-r9 ENUMERATED {setup}  OPTIONAL  -- Cond PMIRI
}
```

```asn1
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
    csi-SubframePatternConfig-r10 CHOICE {
        release NULL,
        setup SEQUENCE {
            csi-MeasSubframeSet1-r10 MeasSubframePattern-r10,
            csi-MeasSubframeSet2-r10 MeasSubframePattern-r10
        }
    }
}
```
CQI-ReportConfig-v1130 ::= SEQUENCE {
  cqi-ReportPeriodic-v1130  CQI-ReportPeriodic-v1130,
  cqi-ReportBoth-v1130     CQI-ReportBoth-v1130
}

CQI-ReportConfig-v250 ::= SEQUENCE {
  csi-SubframePatternConfig-r250 CHOICE {
    release NULL,
    setup   SEQUENCE {
      csi-MeasSubframeSets-r250 BIT STRING (SIZE (10))
    } OPTIONAL, -- Need ON
  }
  cqi-ReportPeriodic-v250 CQI-ReportPeriodic-v250 OPTIONAL, -- Need ON
  cqi-ReportAperiodic-v250 CQI-ReportAperiodic-v250 OPTIONAL, -- Need ON
  altCQI-Table-r250 ALTERNATIVE {
    csi-SubframePattern-r250 CHOICE {
      release NULL,
      setup   SEQUENCE {
        csi-MeasSubframeSets-r250 BIT STRING (SIZE (10))
      } OPTIONAL, -- Need ON
    }
    ri-ConfigIndex INTEGER (0..1023) OPTIONAL, -- Need OR
    simultaneousAckNackAndCQI BOOLEAN
  }
}

CQI-ReportPeriodic ::= CHOICE {
  release NULL,
  setup   SEQUENCE {
    cqi-PUCCH-ResourceIndex INTEGER (0..1185),
    cqi-pmi-ConfigIndex INTEGER (0..1023),
    cqi-FormatIndicatorPeriodic CHOICE {
      widebandCQI NULL,
      subbandCQI   SEQUENCE {
        k INTEGER (1..4)
      }
    },
    ri-ConfigIndex INTEGER (0..1023) OPTIONAL, -- Need OR
    simultaneousAckNackAndCQI BOOLEAN
  }
}

CQI-ReportPeriodic-v1130 ::= SEQUENCE {
  simultaneousAckNackAndCQI-Format3-r11 ENUMERATED {setup} OPTIONAL, -- Need OR
  cqi-ReportPeriodicProcExtToReleaseList-r11 CQI-ReportPeriodicProcExtToReleaseList-r11 OPTIONAL, -- Need ON
}
cqi-ReportPeriodicProcExtToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF CQI-ReportPeriodicProcExtId-r11
 -- Need ON
}
CQI-ReportPeriodicProcExtToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF CQI-ReportPeriodicProcExtId-r11

CQI-ReportPeriodicProcExt-r11 ::= SEQUENCE {
cqi-ReportPeriodicProcExtId-r11 CQI-ReportPeriodicProcExtId-r11,
cqi-pmi-ConfigIndex-r11 INTEGER (0..1023),
FormatIndicatorPeriodic-r11 CHOICE {
widebandCQI-r11 SEQUENCE {
  csi-ReportMode-r11 ENUMERATED {submode1, submode2} OPTIONAL -- Need OR
},
subbandCQI-r11 SEQUENCE {
  k INTEGER (1..4),
  periodicityFactor-r11 ENUMERATED {n2, n4}
}
},
ri-ConfigIndex-r11 INTEGER (0..1023) OPTIONAL, -- Need OR
csi-ConfigIndex-r11 CHOICE {
release NULL,
setup SEQUENCE {
cqi-pmi-ConfigIndex2-r11 INTEGER (0..1023),
ri-ConfigIndex2-r11 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-ReportAperiodic-v1250 ::= CHOICE {
release NULL,
setup SEQUENCE {
aperiodicCSI-Trigger-v1250 SEQUENCE {
  trigger-SubframeSetIndicator-r12 ENUMERATED {s1, s2},
  trigger1-SubframeSetIndicator-r12 BIT STRING (SIZE (8)),
  trigger2-SubframeSetIndicator-r12 BIT STRING (SIZE (8))
}
}
CQI-ReportAperiodicProc-r11 ::= SEQUENCE {
cqi-ReportModeAperiodic-r11 CQI-ReportModeAperiodic,
trigger01-r11 BOOLEAN,
trigger10-r11 BOOLEAN,
trigger11-r11 BOOLEAN
}
CQI-ReportModeAperiodic ::= ENUMERATED {
rm12, rm20, rm22, rm30, rm31,
rm32-v1250, spare2, spare1
}
CQI-ReportBoth-r11 ::= SEQUENCE {
csi-IM-ConfigToListRelease-r11 CSI-IM-ConfigToListRelease-r11 OPTIONAL, -- Need ON
csi-IM-ConfigToListAddModList-r11 CSI-IM-ConfigToListAddModList-r11 OPTIONAL, -- Need ON
csi-ProcessToListRelease-r11 CSI-ProcessToListRelease-r11 OPTIONAL, -- Need ON
csi-ProcessToListAddModList-r11 CSI-ProcessToListAddModList-r11 OPTIONAL -- Need ON
}
CQI-ReportBoth-v1250 ::= SEQUENCE {
csi-IM-ConfigToListExt-r12 CSI-IM-ConfigToListExt-r12 OPTIONAL, -- Need ON
csi-IM-ConfigToListExt-r12 CSI-IM-ConfigToListExt-r12 OPTIONAL -- Need ON
}
CSI-IM-ConfigToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF CSI-IM-Config-r11
CSI-IM-ConfigToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF CSI-IM-ConfigId-r11
CSI-ProcessToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF CSI-Process-r11
CSI-ProcessToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF CSI-ProcessId-r11
CQI-ReportBothProc-r11 ::= SEQUENCE {
  ri-Ref-CSI-ProcessId-r11  CSI-ProcessId-r11  OPTIONAL,  -- Need OR
  pmi-RI-Report-r11     ENUMERATED {setup}     OPTIONAL  -- Need OR
}

-- ASN1STOP

CQI-ReportConfig field descriptions

altCQI-Table
Indicates the applicability of the alternative CQI table (i.e. Table 7.2.3-2 in TS 36.213 [23]) for both aperiodic and periodic CSI reporting for the concerned serving cell. Value allSubframes means the alternative CQI table applies to all the subframes and CSI processes, if configured, and value csi-SubframeSet1 means the alternative CQI table applies to CSI subframe set 1, and value csi-SubframeSet2 means the alternative CQI table applies to CSI subframe set 2. EUTRAN sets the value to csi-SubframeSet1 or csi-SubframeSet2 only if transmissionMode is set in range tm1 to tm9 and csi-SubframePatternConfig-r10 is configured for the concerned serving cell and different CQI tables apply to the two CSI subframes; otherwise EUTRAN sets the value to allSubframes. If this field is not present, the UE shall use Table 7.2.3-1 in TS 36.213 [23] for all subframes and CSI processes, if configured.

aperiodicCSI-Trigger
Indicates for which serving cell(s) the aperiodic CSI report is triggered when one or more SCells are configured. trigger1 corresponds to the CSI request field 10 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. E-UTRAN configures value 1 only for cells configured with transmissionMode set in range tm1 to tm9. One value applies for all serving cells configured with transmissionMode set in range tm1 to tm9 (the associated functionality is common i.e. not performed independently for each cell).

cqi-Mask
Limits CQI/PMI/PTI/RI reports to the on-duration period of the DRX cycle, see TS 36.321 [6]. One value applies for all CSI processes and all serving cells (the associated functionality is common i.e. not performed independently for each cell).

cqi-FormatIndicatorPeriodic
Parameter: PUCCH CQI Feedback Type, see TS 36.213 [23, table 7.2.2-1]. Depending on transmissionMode, reporting mode is implicitly given from the table.

cqi-pmi-ConfigIndex
Parameter: CQI/PMI Periodicity and Offset Configuration Index lCQI/PMI, see TS 36.213 [23, tables 7.2.2-1A and 7.2.2-1C]. If subframe patterns for CSI (CQI/PMI/PTI/RI) reporting are configured (i.e. csi-SubframePatternConfig is configured), the parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet1 or corresponding to the CSI subframe set 1 indicated by csi-MeasSubframeSets-r12.

cqi-pmi-ConfigIndex2
Parameter: CQI/PMI Periodicity and Offset Configuration Index lCQI/PMI, see TS 36.213 [23, tables 7.2.2-1A and 7.2.2-1C]. The parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet2 or corresponding to the CSI subframe set 2 indicated by csi-MeasSubframeSets-r12.

cqi-PUCCH-ResourceIndex, cqi-PUCCH-ResourceIndexP1
Parameter \( r_{PUCCH}^{(2, p)} \) for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 7.2]. E-UTRAN does not apply value 1185. One value applies for all CSI processes.

cqi-ReportAperiodic
E-UTRAN does not configure CQI-ReportAperiodic when transmission mode 10 is configured for all serving cells. E-UTRAN configures cqi-ReportAperiodic-v1250 only if cqi-ReportAperiodic-r10 and csi-MeasSubframeSets-r12 are configured.

cqi-ReportModeAperiodic
Parameter: reporting mode. Value rm12 corresponds to Mode 1-2, rm20 corresponds to Mode 2-0, rm22 corresponds to Mode 2-2 etc. PUSCH reporting modes are described in TS 36.213 [23, 7.2.1]. The UE shall ignore cqi-ReportModeAperiodic-r10 when transmission mode 10 is configured for the serving cell on this carrier frequency. The UE shall ignore cqi-ReportModeAperiodic-r10 configured for the PCell/ PSCell when the transmission bandwidth of the PCell/PSCell in downlink is 6 resource blocks.

CQI-ReportPeriodicProcExt
A set of periodic CQI related parameters for which E-UTRAN may configure different values for each CSI process. For a serving frequency E-UTRAN configures one or more CQI-ReportPeriodicProcExt only when transmission mode 10 is configured for the serving cell on this carrier frequency.

csi-ConfigIndex
E-UTRAN configures csi-ConfigIndex only for PCell and only if csi-SubframePatternConfig is configured. The UE shall release csi-ConfigIndex if csi-SubframePatternConfig is released.

csi-IM-ConfigToAddModList
For a serving frequency E-UTRAN configures one or more CSI-IM-Config only when transmission mode 10 is configured for the serving cell on this carrier frequency.

csi-MeasSubframeSets
Indicates the two CSI subframe sets. Value 0 means the subframe belongs to CSI subframe set 1 and value 1 means the subframe belongs to CSI subframe set 2. CSI subframe set 1 refers to CCSI,0 in TS 36.213 [23, 7.2] and CSI subframe set 2 refers to CCSI,1 in TS 36.213 [23, 7.2]. EUTRAN does not configure csi-MeasSubframeSet1-r10 and csi-MeasSubframeSet2-r10 if either csi-MeasSubframeSets-r12 for PCell or eimta-MainConfigPCell-r12 is configured.

csi-MeasSubframeSet1, csi-MeasSubframeSet2
Indicates the CSI measurement subframe sets. csi-MeasSubframeSet1 refers to CCSI,0 in TS 36.213 [23, 7.2] and csi-MeasSubframeSet2 refers to CCSI,1 in TS 36.213 [23, 7.2]. E-UTRAN only configures the two CSI measurement subframe sets for the PCell.
**CQI-ReportConfig field descriptions**

**csi-ProcessToAddModList**
For a serving frequency E-UTRAN configures one or more CQI-Process only when transmission mode 10 is configured for the serving cell on this carrier frequency.

**csi-ReportMode**
Parameter: PUCCH_format1-1 CQI_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 report is not configured. EUTRAN configures this field only when transmissionMode is set to tm8, tm9 or tm10. The UE shall ignore pmi-RI-Report-r9/ pmi-RI-Report-r10 when transmission mode 10 is configured for the serving cell on this carrier frequency.

**ri-ConfigIndex**
Parameter: RI Config Index I=0, 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 I=0, see TS 36.213 [23, 7.2.2-1B]. The parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet2 or corresponding to the CSI subframe set 2 indicated by csi-MeasSubframeSets-r12. E-UTRAN configures ri-ConfigIndex2 only if ri-ConfigIndex is configured.

**ri-Ref-CQI-ProcessId**
CSI process whose RI value the UE inherits when reporting RI in the same subframe, for CSI reporting. E-UTRAN ensures that the CSI process that inherits the RI value is configured in accordance with the conditions specified in 36.213 [23, 7.2.2].

**simultaneousAckNackAndCQI**
Parameter: Simultaneous-AN-and-CQI, see TS 36.213 [23, 10.1]. TRUE indicates that simultaneous transmission of ACK/NACK and CQI is allowed. One value applies for all CSI processes. For SCells except for the PScell this field is not applicable and the UE shall ignore the value.

**simultaneousAckNackAndCQI-Format3**
Indicates that the UE shall perform simultaneous transmission of HARQ A/N and periodic CQI report multiplexing on PUCCH format 3, see TS 36.213 [23, 7.2.10.1.1]. E-UTRAN configures this information only when pucch-Format is set to format3. One value applies for all CSI processes. For SCells except for the PScell this field is not applicable and the UE shall ignore the value.

**trigger01**
Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 01, for a CSI request applicable for the serving cell on the same frequency as the CSI process, see TS 36.213 [23, table 7.2.1-1B].

**trigger10, trigger11**
Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 10 or 11, see TS 36.213 [23, table 7.2.1-1B]. EUTRAN configures at most 5 CSI processes, across all serving frequencies within each CG, to be triggered by a CSI request field set to value 10. The same restriction applies for value 11. In case E-UTRAN simultaneously triggers CSI requests for more than 5 CSI processes some limitations apply, see TS 36.213 [23].

**trigger-SubframeSetIndicator**
For a serving cell configured with csi-MeasSubframeSets-r12, indicates for which CSI subframe set the aperiodic CSI report is triggered for the serving cell if the aperiodic CSI is triggered by the CSI request field 01, see TS 36.213 [23, table 7.2.1-1C]. Value s1 corresponds to CSI subframe set 1 and value s2 corresponds to CSI subframe set 2.

**trigger1-SubframeSetIndicator**
Indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 10, see TS 36.213 [23, table 7.2.1-1C]. 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 that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).

**trigger2-SubframeSetIndicator**
Indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 11, see TS 36.213 [23, table 7.2.1-1C]. 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 that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).
### Conditional presence

<table>
<thead>
<tr>
<th>Presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cqi-Setup</strong></td>
<td>This field is not present for an Scell except for the PSCell, while it is conditionally present for the PCell and the PSCell according to the following. The field is optional present, need OR, if the cqi-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.</td>
</tr>
<tr>
<td><strong>PMIRI</strong></td>
<td>The field is optional present, need OR, if cqi-ReportPeriodic is included and set to setup, or cqi-ReportModeAperiodic is included. If the field cqi-ReportPeriodic is present and set to release and cqi-ReportModeAperiodic is absent, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>PMIRiPCell</strong></td>
<td>The field is optional present, need OR, if cqi-ReportPeriodic is included in the CQI-ReportConfig-r10 and set to setup, or cqi-ReportModeAperiodic is included in the CQI-ReportConfig-r10 and set to release. If the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>PMIRiSCell</strong></td>
<td>The field is optional present, need OR, if cqi-ReportPeriodicSCell is included and set to setup, or cqi-ReportModeAperiodic-r10 is included in the CQI-ReportConfigSCell. If the field cqi-ReportPeriodicSCell is present and set to release and cqi-ReportModeAperiodic-r10 is absent in the CQI-ReportConfigSCell, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

### CQI-ReportPeriodicProcExtId

The IE **CQI-ReportPeriodicProcExtId** is used to identify a periodic CQI reporting configuration that E-UTRAN may configure in addition to the configuration specified by the IE **CQI-ReportPeriodic-r10**. These additional configurations are specified by the IE **CQI-ReportPeriodicProcExt-r11**. The identity is unique within the scope of a carrier frequency.

**CQI-ReportPeriodicProcExtId** information elements

```
-- ASN1START
CQI-ReportPeriodicProcExtId-r11 ::= INTEGER (1..maxCQI-ProcExt-r11)
-- ASN1STOP
```

### CrossCarrierSchedulingConfig

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

**CrossCarrierSchedulingConfig** information elements

```
-- ASN1START
CrossCarrierSchedulingConfig-r10 ::= SEQUENCE {  
schedulingCellInfo-r10    CHOICE {  
    own-r10        SEQUENCE {     -- No cross carrier  
        cif-Presence-r10      BOOLEAN  
    },  
    other-r10        SEQUENCE {     -- Cross carrier  
        schedulingCellId-r10    ServCellIndex-r10,  
        pdsch-Start-r10      INTEGER (1..4)  
    }  
}  
}  
-- ASN1STOP
```
---

**CSI-IM-Config**

The IE *CSI-IM-Config* is the CSI Interference Measurement (IM) configuration that E-UTRAN may configure on a serving frequency, see TS 36.213 [23, 7.2.6].

---

**CSI-IM-Config** information elements

---

---

**CSI-Process**

The IE *CSI-Process* is the CSI process configuration that E-UTRAN may configure on a serving frequency.
CSI-Process information elements

```asn1
CSI-Process-r11 ::= SEQUENCE {
  csi-ProcessId-r11                  CSI-ProcessId-r11,
  csi-RS-ConfigNZPId-r11             CSI-RS-ConfigNZPId-r11,
  csi-IM-ConfigId-r11               CSI-IM-ConfigId-r11,
  p-C-AndCBSKList-r11 SEQUENCE (SIZE (1..2)) OF P-C-AndCBSK-r11,
  cqi-ReportBothProc-r11            CQI-ReportBothProc-r11 OPTIONAL, -- Need OR
  cqi-ReportPeriodicProcId-r11      INTEGER (0..maxCQI-ProcExt-r11) OPTIONAL, -- Need OR
  ...,
  alternativeCodebookEnabledFor4TXProc-r12 ENUMERATED {true} OPTIONAL, -- Need ON
  csi-IM-ConfigIdList-r12            CHOICE {
    release NULL,
    setup SEQUENCE (SIZE (1..2)) OF CSI-IM-ConfigId-r12 OPTIONAL, -- Need ON
  }
  cqi-ReportAperiodicProc2-r12      CHOICE {
    release NULL,
    setup CQI-ReportAperiodicProc-r11 OPTIONAL -- Need ON
  }
}

P-C-AndCBSK-r11 ::= SEQUENCE {
  p-C-r11 INTEGER (-8..15),
  codebookSubsetRestriction-r11 BIT STRING
}
```

-- ASN1STOP
CSI-Process field descriptions

**alternativeCodebookEnabledFor4TXProc**
Indicates whether code book in TS 36.213 [23] Table 7.2.4-0A to Table 7.2.4-0D is being used for deriving CSI feedback and reporting for a CSI process. EUTRAN may configure the field only if the number of CSI-RS ports for non-zero power transmission CSI-RS configuration is 4.

**cqi-ReportAperiodicProc**
If csi-MeasSubframeSets-r12 is configured for the same frequency as the CSI process, cqi-ReportAperiodicProc applies for CSI subframe set 1. If csi-MeasSubframeSet1-r10 or csi-MeasSubframeSet2-r10 are configured for the same frequency as the CSI process, cqi-ReportAperiodicProc applies for CSI subframe set 1 or CSI subframe set 2. Otherwise, cqi-ReportAperiodicProc applies for all subframes.


**cqi-ReportBothProc**
Includes CQI configuration parameters applicable for both aperiodic and periodic CSI reporting, for which CSI process specific values may be configured. E-UTRAN configures the field if and only if cqi-ReportPeriodicProcId is included and/or if cqi-ReportAperiodicProc is included.

**cqi-ReportPeriodicProcId**
Refers to a periodic CQI reporting configuration that is configured for the same frequency as the CSI process. Value 0 refers to the set of parameters defined by the REL-10 CQI reporting configuration fields, while the other values refer to the additional configurations E-UTRAN assigns by CQI-ReportPeriodicProcExt-r11 (and as covered by CQI-ReportPeriodicProcExtId).

**csi-IM-ConfigId**
Refers to a CSI-IM configuration that is configured for the same frequency as the CSI process.

**csi-IM-ConfigIdList**
Refers to one or two CSI-IM configurations that are configured for the same frequency as the CSI process. csi-IM-ConfigIdList can include 2 entries only if csi-MeasSubframeSets-r12 is configured for the same frequency as the CSI process. UE shall ignore csi-IM-ConfigId-r11 if csi-IM-ConfigIdList-r12 is configured.

**csi-RS-ConfigNZPId**
Refers to a CSI RS configuration using non-zero power transmission that is configured for the same frequency as the CSI process.

**p-C**
Parameter: $P_c$, see TS 36.213 [23, 7.2.5].

**p-C-AndCBSRList**
A p-C-AndCBSRList including 2 entries indicates that the subframe patterns configured for CSI (CQI/PMI/PTI/RI) reporting (i.e. as defined by field csi-MeasSubframeSet1 and csi-MeasSubframeSet2, or as defined by csi-MeasSubframeSets-r12) are to be used for this CSI process, while a single entry indicates that the subframe patterns are not to be used for this CSI process. E-UTRAN does not include 2 entries in p-C-AndCBSRList with csi-MeasSubframeSet1 and csi-MeasSubframeSet2 for CSI processes concerning a secondary frequency. E-UTRAN includes 2 entries in p-C-AndCBSRList when configuring both cqi-pmi-ConfigIndex and cqi-pmi-ConfigIndex2.

---

**CSI-ProcessId**
The IE CSI-ProcessId is used to identify a CSI process that is configured by the IE CSI-Process. The identity is unique within the scope of a carrier frequency.

**CSI-ProcessId information elements**

```
-- ASN1START
CSI-ProcessId-r11 ::= INTEGER (1..maxCSI-Proc-r11)
-- ASN1STOP
```

**CSI-RS-Config**
The IE CSI-RS-Config is used to specify the CSI (Channel-State Information) reference signal configuration.

**CSI-RS-Config information elements**

```
-- ASN1START
CSI-RS-Config-r10 ::= SEQUENCE {
```

---
CSI-RS-Config field descriptions

- **antennaPortsCount**
  Parameter represents the number of antenna ports used for transmission of CSI reference signals where value an1 corresponds to 1 antenna port, an2 to 2 antenna ports and so on, see TS 36.211 [21, 6.10.5].

- **ds-ZeroTxPowerCSI-RS**
  Parameter for additional zeroTxPowerCSI-RS for a serving cell, concerning the CSI-RS included in discovery signals.

- **zeroTxPowerCSI-RS2**
  Parameter for additional zeroTxPowerCSI-RS for a serving cell. E-UTRAN configures the field only if csi-MeasSubframeSets-r12 and TM 1 – 9 are configured for the serving cell.

- **p-C**
  Parameter: $P_c$, see TS 36.213 [23, 7.2.5].

- **resourceConfig**
  Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2].

- **subframeConfig**
  Parameter: $I_{\text{CSI-RS}}$, see TS 36.211 [21, table 6.10.5.3-1].

- **zeroTxPowerResourceConfigList**
  Parameter: ZeroPowerCSI-RS, see TS 36.213 [23, 7.2.7].

- **zeroTxPowerSubframeConfig**
  Parameter: $I_{\text{CSI-RS}}$, see TS 36.211 [21, table 6.10.5.3-1].

---

**CSI-RS-ConfigNZP**

The IE CSI-RS-ConfigNZP is the CSI-RS resource configuration using non-zero power transmission that E-UTRAN may configure on a serving frequency.

**CSI-RS-ConfigNZP information elements**

---

```asn1
CSI-RS-ConfigNZP ::= SEQUENCE {
  csi-RS-ConfigNZPId-r11 CSI-RS-ConfigNZPId-r11,
  antennaPortsCount-r11 ENUMERATED {an1, an2, an4, an8},
  resourceConfig-r11 INTEGER (0..31),
}
```
CSI-RS-ConfigNZP field descriptions

antennaPortsCount
Parameter represents the number of antenna ports used for transmission of CSI reference signals where an1 corresponds to 1, an2 to 2 antenna ports etc. see TS 36.211 [21, 6.10.5].

qcl-CRS-Info
Indicates CRS antenna ports that is quasi co-located with the CSI-RS antenna ports, see TS 36.213 [23, 7.2.5].

EUTRAN configures this field if and only if the UE is configured with qcl-Operation set to typeB.

resourceConfig
Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2].

subframeConfig
Parameter: I_{CSI-RS} see TS 36.211 [21, table 6.10.5.3-1].

scramblingIdentity
Parameter: Pseudo-random sequence generator parameter, n_{ID}, see TS 36.213 [23, 7.2.5].

--- CSI-RS-ConfigNZPId

The IE CSI-RS-ConfigNZPId is used to identify a CSI-RS resource configuration using non-zero transmission power, as configured by the IE CSI-RS-ConfigNZP. The identity is unique within the scope of a carrier frequency.

CSI-RS-ConfigNZPId information elements

--- CSI-RS-ConfigZP

The IE CSI-RS-ConfigZP is the CSI-RS resource configuration, for which UE assumes zero transmission power, that E-UTRAN may configure on a serving frequency.

CSI-RS-ConfigZP information elements
**CSI-RS-ConfigZP field descriptions**

<table>
<thead>
<tr>
<th>resourceConfigList</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter: ZeroPowerCSI-RS, see TS 36.213 [23, 7.2.7].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>subframeConfig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter: ( I_{\text{CSI-RS}} ), see TS 36.211 [21, table 6.10.5.3-1].</td>
</tr>
</tbody>
</table>

---

 CSI-RS-ConfigZPId

The IE **CSI-RS-ConfigZPId** is used to identify a CSI-RS resource configuration for which UE assumes zero transmission power, as configured by the IE **CSI-RS-ConfigZP**. The identity is unique within the scope of a carrier frequency.

**CSI-RS-ConfigZPId information elements**

```plaintext
-- ASN1START
CSI-RS-ConfigZPId-r11 ::= INTEGER (1..maxCSI-RS-ZP-r11)
-- ASN1STOP
```

---

 DMRS-Config

The IE **DMRS-Config** is the DMRS configuration that E-UTRAN may configure on a serving frequency.

**DMRS-Config information elements**

```plaintext
-- ASN1START
DMRS-Config-r11 ::= CHOICE {
  release      NULL,
  setup      SEQUENCE {
    scramblingIdentity-r11  INTEGER (0..503),
    scramblingIdentity2-r11 INTEGER (0..503)
  }
}
-- ASN1STOP
```

**DMRS-Config field descriptions**

<table>
<thead>
<tr>
<th>scramblingIdentity, scramblingIdentity2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter: ( h_{\text{DMRS}}^{ID} ), see TS 36.211 [21, 6.10.3.1].</td>
</tr>
</tbody>
</table>

---

 DRB-Identity

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

**DRB-Identity information elements**

```plaintext
-- ASN1START
DRB-Identity ::= INTEGER (1..32)
-- ASN1STOP
```

---

 EPDCCH-Config

The IE **EPDCCH-Config** specifies the subframes and resource blocks for EPDCCH monitoring that E-UTRAN may configure for a serving cell.
**EPDCCH-Config information element**

```asn1
-- ASN1START
EPDCCH-Config-r11 ::=  SEQUENCE{
  config-r11  CHOICE {
    release      NULL,
    setup       SEQUENCE {
      subframePatternConfig-r11  CHOICE {
        release      NULL,
        setup       SEQUENCE {
          subframePattern-r11   MeasSubframePattern-r10
        }                 OPTIONAL, -- Need ON
      }
    startSymbol-r11    INTEGER (1..4)       OPTIONAL, -- Need OP
    setConfigToReleaseList-r11  EPDCCH-SetConfigToReleaseList-r11  OPTIONAL, -- Need ON
    setConfigToAddModList-r11  EPDCCH-SetConfigToAddModList-r11  OPTIONAL -- Need ON
  }
}

EPDCCH-SetConfigToAddModList-r11 ::=  SEQUENCE (SIZE(1..maxEPDCCH-Set-r11)) OF EPDCCH-SetConfig-r11

EPDCCH-SetConfigToReleaseList-r11 ::=  SEQUENCE (SIZE(1..maxEPDCCH-Set-r11)) OF EPDCCH-SetConfigId-r11

EPDCCH-SetConfig-r11 ::=  SEQUENCE {
  setConfigId-r11     EPDCCH-SetConfigId-r11,
  transmissionType-r11   ENUMERATED {localised, distributed},
  resourceBlockAssignment-r11  SEQUENCE{ numberPRB-Pairs-r11    ENUMERATED {n2, n4, n8},
                                      resourceBlockAssignment-r11  BIT STRING (SIZE(4..38)) }
},
  dmrs-ScramblingSequenceInt-r11 INTEGER (0..503),
  pucch-ResourceStartOffset-r11 INTEGER (0..2047),
  re-MappingQCL-ConfigId-r11  PDSCH-RE-MappingQCL-ConfigId-r11 OPTIONAL, -- Need OR ...
}[[
  csi-RS-ConfigZPId2-r12    CHOICE {
    release      NULL,
    setup       CSI-RS-ConfigZPId-r11
  }                 OPTIONAL -- Need ON
}]

EPDCCH-SetConfigId-r11 ::= INTEGER (0..1)

-- ASN1STOP
```
**EPDCCH-Config field descriptions**

**csi-RS-ConfigZPId2**
Indicates the rate matching parameters in addition to those indicated by `re-MappingQCL-ConfigId`. E-UTRAN configures this field only when tm10 is configured.

**dmrs-ScramblingSequenceInt**
The DMRS scrambling sequence initialization parameter $n_{EPDCCH}^{\text{ID},i}$ defined in TS 36.211[21, 6.10.3A.1].

**EPDCCH-SetConfig**
Provides EPDCCH configuration set. See TS 36.213 [23, 9.1.4]. E-UTRAN configures at least one EPDCCH-SetConfig when EPDCCH-Config is configured.

**numberPRB-Pairs**
Indicates the number of physical resource-block pairs used for the EPDCCH set. Value n2 corresponds to 2 physical resource-block pairs; n4 corresponds to 4 physical resource-block pairs and so on. Value n8 is not supported if `dl-Bandwidth` is set to 6 resource blocks.

**pucch-ResourceStartOffset**
PUCCH format 1a, 1b and 3 resource starting offset for the EPDCCH set. See TS 36.213 [23, 10.1].

**re-MappingQCL-ConfigId**
Indicates the starting OFDM symbol, the related rate matching parameters and quasi co-location assumption for EPDCCH when the UE is configured with tm10. This field provides the identity of a configured `PDSCH-RE-MappingQCL-Config`. E-UTRAN configures this field only when tm10 is configured.

**resourceBlockAssignment**
Indicates the index to a specific combination of physical resource-block pair for EPDCCH set. See TS 36.213 [23, 9.1.4.4]. The size of `resourceBlockAssignment` is specified in TS 36.213 [23, 9.1.4.4] and based on `numberPRB-Pairs` and the signalled value of `dl-Bandwidth`.

**setConfigId**
Indicates the identity of the EPDCCH configuration set.

**startSymbol**
Indicates the OFDM starting symbol for any EPDCCH and PDSCH scheduled by EPDCCH on the same cell, see TS 36.213 [23, 9.1.4.1]. If not present, the UE shall release the configuration and shall derive the starting OFDM symbol of EPDCCH and PDSCH scheduled by EPDCCH from PCFICH. Values 1, 2, and 3 are applicable for `dl-Bandwidth` greater than 10 resource blocks. Values 2, 3, and 4 are applicable otherwise. E-UTRAN does not configure the field for UEs configured with tm10.

**subframePatternConfig**
Configures the subframes which the UE shall monitor the UE-specific search space on EPDCCH, except for pre-defined rules in TS 36.213 [23, 9.1.4]. If the field is not configured when EPDCCH is configured, the UE shall monitor the UE-specific search space on EPDCCH in all subframes except for pre-defined rules in TS 36.213 [23, 9.1.4].

**transmissionType**
Indicates whether distributed or localized EPDCCH transmission mode is used as defined in TS 36.211 [21, 6.8A.1].

---

**EIMTA-MainConfig**

The IE `EIMTA-MainConfig` is used to specify the eIMTA-RNTI used for eIMTA and the subframes used for monitoring PDCCH with eIMTA-RNTI. The IE `EIMTA-MainConfigServCell` is used to specify the eIMTA related parameters applicable for the concerned serving cell.

**EIMTA-MainConfig information element**

```asn1
-- ASN1START
EIMTA-MainConfig-r12 ::= CHOICE {
  release       NULL,
  setup        SEQUENCE {
    eimta-RNTI-r12    C-RNTI,
    eimta-CommandPeriodicity-r12 ENUMERATED {sf10, sf20, sf40, sf80},
    eimta-CommandSubframeSet-r12 BIT STRING (SIZE(10))
  }
}

EIMTA-MainConfigServCell-r12 ::= CHOICE {
  release       NULL,
  setup        SEQUENCE {
    eimta-UL-DL-ConfigIndex-r12       INTEGER {1..5},
    eimta-HARQ-ReferenceConfig-r12   ENUMERATED {sa2,sa4,sa5},
    mbsfn-SubframeConfigList-v1250   CHOICE {
      release       NULL,
      setup        SEQUENCE {
        subframeConfigList-r12 MBSFN-SubframeConfigList
      }
    }
  }
}
-- ASN1END
```
EIMTA-MainConfig field descriptions

**eimta-CommandPeriodicity**
Configures the periodicity to monitor PDCCH with eIMTA-RNTI, see TS 36.213 [23, 13.1]. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.

**eimta-CommandSubframeSet**
Configures the subframe(s) to monitor PDCCH with eIMTA-RNTI within the periodicity configured by *eimta-CommandPeriodicity*. The 10 bits correspond to all subframes in the last radio frame within each periodicity. The left most bit is for subframe 0 and so on. Each bit can be of value 0 or 1. The value of 1 means that the corresponding subframe is configured for monitoring PDCCH with eIMTA-RNTI, and the value of 0 means otherwise. In case of TDD as PCell, only the downlink subframes indicated by the UL/DL configuration in SIB1 can be configured for monitoring PDCCH with eIMTA-RNTI. In case of FDD as PCell, any of the ten subframes can be configured for monitoring PDCCH with eIMTA-RNTI.

**eimta-HARQ-ReferenceConfig**
Indicates UL/DL configuration used as the DL HARQ reference configuration for this serving cell. Value sa2 corresponds to Configuration2, sa4 to Configuration4 etc, as specified in TS 36.211 [21, table 4.2-2]. E-UTRAN configures the same value for all serving cells residing on same frequency band.

**eimta-UL-DL-ConfigIndex**
Index of $I$, see TS 36.212 [22, 5.3.3.1.4]. E-UTRAN configures the same value for all serving cells residing on same frequency band.

**mbsfn-SubframeConfigList**
Configure the MBSFN subframes for the UE on this serving cell. An uplink subframe indicated by the DL/UL subframe configuration in SIB1 can be configured as MBSFN subframe.

LogicalChannelConfig

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

LogicalChannelConfig information element

```asn1
LogicalChannelConfig ::= SEQUENCE {
    ul-SpecificParameters SEQUENCE {
        priority       INTEGER (1..16),
        prioritisedBitRate     ENUMERATED {
            kBps0, kBps8, kBps16, kBps32, kBps64, kBps128,
            kBps256, infinity, kBps512-v1020, kBps1024-v1020,
            kBps2048-v1020, spare5, spare4, spare3, spare2,
            spare1},
        bucketSizeDuration     ENUMERATED {
            ms50, ms100, ms150, ms300, ms500, ms1000, spare2,
            spare1},
        logicalChannelGroup     INTEGER (0..3) OPTIONAL
    },
    OPTIONAL,                -- Cond UL
    ...,
    logicalChannelSR-Mask-r9 ENUMERATED {setup} OPTIONAL -- Cond SRmask
},
logicalChannelSR-Prohibit-r12 BOOLEAN OPTIONAL -- Need ON

-- ASN1STOP
```
LogicalChannelConfig field descriptions

**bucketSizeDuration**
Bucket Size Duration for logical channel prioritization in TS 36.321 [6]. Value in milliseconds. Value ms50 corresponds to 50 ms, ms100 corresponds to 100 ms and so on.

**logicalChannelGroup**
Mapping of logical channel to logical channel group for BSR reporting in TS 36.321 [6].

**logicalChannelSR-Mask**
Controlling SR triggering on a logical channel basis when an uplink grant is configured. See TS 36.321 [6].

**logicalChannelSR-Prohibit**
Value TRUE indicates that the logicalChannelSR-ProhibitTimer is enabled for the logical channel. E-UTRAN only (optionally) configures the field (i.e. indicates value TRUE) if logicalChannelSR-ProhibitTimer is configured. See TS 36.321 [6].

**prioritisedBitRate**
Prioritized Bit Rate for logical channel prioritization in TS 36.321 [6]. Value in kilobytes/second. Value kBps0 corresponds to 0 kB/second, kBps8 corresponds to 8 kB/second, kBps16 corresponds to 16 kB/second and so on. Infinity is the only applicable value for SRB1 and SRB2.

**priority**
Logical channel priority in TS 36.321 [6]. Value is an integer.

---

**MAC-MainConfig**

The IE MAC-MainConfig is used to specify the MAC main configuration for signalling and data radio bearers. All MAC main configuration parameters can be configured independently per Cell Group (i.e. MCG or SCG), unless explicitly specified otherwise.

**MAC-MainConfig information element**

```asn1
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 PeriodicBSR-Timer-r12 OPTIONAL, -- Need ON
        retxBSR-Timer    RetxBSR-Timer-r12,  -- Need ON
        ttiBundling      BOOLEAN
    } OPTIONAL,  -- Need ON
    drx-Config       DRX-Config OPTIONAL, -- Need ON
    timeAlignmentTimerDedicated TimeAlignmentTimer,  -- Need ON
    phr-Config       CHOICE {
        release        NULL,  -- Need ON
        setup          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
}...
```

---

**Conditional presence**

| SRmask | The field is optionally present if ul-SpecificParameters is present, need OR; otherwise it is not present. |
| UL    | The field is mandatory present for UL logical channels; otherwise it is not present. |
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DRX-Config-v1130

OPTIONAL -- Need ON

}]

[[ e-HARQ-Pattern-r12

BOOLEAN

OPTIONAL, -- Need ON

dualConnectivityPHR

CHOICE {

release

NULL,

setup

SEQUENCE {

phr-ModeOtherCG-r12

ENUMERATED {real, virtual}

}

OPTIONAL, -- Need ON

logicalChannelSR-Config-r12

CHOICE {

release

NULL,

setup

SEQUENCE {

logicalChannelSR-ProhibitTimer-r12

ENUMERATED {sf20, sf40, sf64, sf128, sf512,

sf1024, sf2560, spare1}

}

OPTIONAL -- Need ON

}

}

MAC-MainConfigSCell-r11 ::= SEQUENCE {

stag-Id-r11

STAG-Id-r11 OPTIONAL, -- Need OP

...

}

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),

sf64

INTEGER(0..63),

sf80

INTEGER(0..79),

sf128

INTEGER(0..127),

sf160

INTEGER(0..159),

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)

-- Need OR

}

DRX-Config-v1130 ::= SEQUENCE {

drx-RetransmissionTimer-v1130

ENUMERATED {psf0-v1130} OPTIONAL, -- Need OR

longDRX-CycleStartOffset-v1130

CHOICE {

sf60-v1130

INTEGER(0..59),

sf70-v1130

INTEGER(0..69),

},

OPTIONAL, -- Need OR
shortDRX-Cycle-v1130  ENUMERATED {sf4-v1130} OPTIONAL --Need OR

PeriodicBSR-Timer-r12 ::=  ENUMERATED {
sf5, sf10, sf16, sf20, sf32, sf40, sf64, sf80, sf128, sf160, sf320, sf640, sf1280, sf2560, infinity, spare1}

RetxBSR-Timer-r12 ::=  ENUMERATED {
sf320, sf640, sf1280, sf2560, sf5120, sf10240, spare2, spare1}

STAG-ToReleaseList-r11 ::= SEQUENCE {SIZE {1..maxSTAG-r11})} OF STAG-Id-r11

STAG-ToAddModList-r11 ::= SEQUENCE {SIZE {1..maxSTAG-r11})} OF STAG-ToAddMod-r11

STAG-ToAddMod-r11 ::= SEQUENCE {
stag-Id-r11 STAG-Id-r11,
timeAlignmentTimerSTAG-r11 TimeAlignmentTimer,
...
}

STAG-Id-r11::=  INTEGER {1..maxSTAG-r11}

-- ASN1STOP
### MAC-MainConfig field descriptions

**dl-PathlossChange**  
DL Pathloss Change and the change of the required power backoff due to power management (as allowed by P-MPRC [42]) for PHR reporting in TS 36.321 [6]. Value in dB. Value dB1 corresponds to 1 dB, dB3 corresponds to 3 dB and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).

**drx-Config**  
Used to configure DRX as specified in TS 36.321 [6]. E-UTRAN configures the values in `DRX-Config-v1130` only if the UE indicates support for IDC indication. E-UTRAN configures `drx-Config-v1130` only if `drx-Config` (without suffix) is configured.

**drx-InactivityTimer**  
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.

**drx-RetransmissionTimer**  
Timer for DRX in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on. In case `drx-RetransmissionTimer-v1130` is signalled, the UE shall ignore `drx-RetransmissionTimer` (i.e. without suffix).

**drxShortCycleTimer**  

**dualConnectivityPHR**  
Indicates if power headroom shall be reported using Dual Connectivity Power Headroom Report MAC Control Element defined in TS 36.321 [6] (value setup). If PHR functionality and dual connectivity are configured, E-UTRAN always configures the value setup for this field and configures `phr-Config` and `dualConnectivityPHR` for both CGs.

**e-HARQ-Pattern**  
TRUE indicates that enhanced HARQ pattern for TTI bundling is enabled for FDD. E-UTRAN enables this field only when `ttiBundling` is set to TRUE.

**extendedBSR-Sizes**  
If value setup is configured, the BSR index indicates extended BSR size levels as defined in TS 36.321 [6, Table 6.1.3.1-1].

**extendedPHR**  
Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value setup). E-UTRAN always configures the value setup if more than one Serving Cell with uplink is configured and if dual connectivity is not configured. E-UTRAN configures `extendedPHR` only if `phr-Config` is configured. The UE shall release `extendedPHR` if `phr-Config` is released.

**logicalChannelSR-ProhibitTimer**  
Timer used to delay the transmission of an SR for logical channels enabled by `logicalChannelSR-Prohibit`. Value sf20 corresponds to 20 subframes, sf40 corresponds to 40 subframes, and so on. See TS 36.321 [6].

**longDRX-CycleStartOffset**  
`longDRX-Cycle` and `drxStartOffset` in TS 36.321 [6]. The value of `longDRX-Cycle` is in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. If `shortDRX-Cycle` is configured, the value of `longDRX-Cycle` shall be a multiple of the `shortDRX-Cycle` value. The value of `drxStartOffset` value is in number of sub-frames. In case `longDRX-CycleStartOffset-v1130` is signalled, the UE shall ignore `longDRX-CycleStartOffset` (i.e. without suffix).

**maxHARQ-Tx**  
Maximum number of transmissions for UL HARQ in TS 36.321 [6].

**onDurationTimer**  
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.

**periodicBSR-Timer**  
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.

**periodicPHR-Timer**  
Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on.

**phr-ModeOtherCG**  
Indicates the mode (i.e. real or virtual) used for the PHR of the activated cells that are part of the other Cell Group (i.e. MCG or SCG), when DC is configured.

**prohibitPHR-Timer**  
Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 sub-frames, sf100 corresponds to 100 sub-frames and so on.

**retxBSR-Timer**  
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.
MAC-MainConfig field descriptions

sCellDeactivationTimer
SCell deactivation timer in TS 36.321 [6]. Value in number of radio frames. Value rf4 corresponds to 4 radio frames, value rf8 corresponds to 8 radio frames and so on. E-UTRAN only configures the field if the UE is configured with one or more SCells other than the PSCell. If the field is absent, the UE shall delete any existing value for this field and assume the value to be set to infinity. The same value applies for each SCell of a Cell Group (i.e. MCG or SCG) (although the associated functionality is performed independently for each SCell).

shortDRX-Cycle
Short DRX cycle in TS 36.321 [6]. Value in number of sub-frames. Value sf2 corresponds to 2 sub-frames, sf5 corresponds to 5 subframes and so on. In case shortDRX-Cycle-v1130 is signalled, the UE shall ignore shortDRX-Cycle (i.e. without suffix).

sr-ProhibitTimer
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. SR period is defined in TS 36.213 [23, table 10.1.5-1].

stag-Id
Indicates the TAG of an SCell, see TS 36.321 [6]. Uniquely identifies the TAG within the scope of a Cell Group (i.e. MCG or SCG). If the field is not configured for an SCell (e.g. absent in MAC-MainConfigSCell), the SCell is part of the PTAG.

stag-ToAddModList, stag-ToReleaseList
Used to configure one or more STAGs. E-UTRAN ensures that a STAG contains at least one SCell with configured uplink. If, due to SCell release a reconfiguration would result in an ‘empty’ TAG, E-UTRAN includes release of the concerned TAG.

timeAlignmentTimerSTAG
Indicates the value of the time alignment timer for an STAG, see TS 36.321 [6].

ttiBundling
TRUE indicates that TTI bundling TS 36.321 [6] is enabled while FALSE indicates that TTI bundling is disabled. TTI bundling can be enabled for FDD and for TDD only for configurations 0, 1 and 6. The functionality is performed independently per Cell Group (i.e. MCG or SCG), but E-UTRAN does not configure TTI bundling for the SCG. For a TDD PCell, E-UTRAN does not simultaneously enable TTI bundling and semi-persistent scheduling in this release of specification. Furthermore, for a Cell Group, E-UTRAN does not simultaneously configure TTI bundling and SCells with configured uplink, and E-UTRAN does not simultaneously configure TTI bundling and eIMTA.

—

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

PDCP-Config information element

-- ASN1START

PDCP-Config ::= SEQUENCE {
  discardTimer
    ENUMERATED {ms50, ms100, ms150, ms300, ms500, ms750, 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
          }
        }
    }
},
-- ASN1END

ETS
PDCP-Config field descriptions

**discardTimer**
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.

**headerCompression**
E-UTRAN does not reconfigure header compression for an MCG DRB except for upon handover and upon the first reconfiguration after RRC connection re-establishment. E-UTRAN does not reconfigure header compression for a SCG DRB except for upon SCG change involving PDCP re-establishment. For split DRBs E-UTRAN configures only notUsed.

**maxCID**
Indicates the value of the MAX_CID parameter as specified in TS 36.323 [8]. The total value of MAX_CIDs across all bearers for the UE should be less than or equal to the value of maxNumberROHC-ContextSessions parameter as indicated by the UE.

**pdcp-SN-Size**
Indicates the PDCP Sequence Number length in bits. For RLC UM: value len7bits means that the 7-bit PDCP SN format is used and len12bits means that the 12-bit PDCP SN format is used. For RLC AM: value len15bits means that the 15-bit PDCP SN format is used, otherwise if the field is not included upon setup of the PCDP entity 12-bit PDCP SN format is used, as specified in TS 36.323 [8].

**profiles**
The profiles used by both compressor and decompressor in both UE and E-UTRAN. The field indicates which of the ROHC profiles specified in TS 36.323 [8] are supported, i.e. value true indicates that the profile is supported. Profile 0x0000 shall always be supported when the use of ROHC is configured. If support of two ROHC profile identifiers with the same 8 LSB’s is signalled, only the profile corresponding to the highest value shall be applied. E-UTRAN does not configure ROHC while t-Reordering is configured (i.e. for split DRBs or upon reconfiguration from split to MCG DRB).

**t-Reordering**
Indicates the value of the reordering timer, as specified in TS 36.323 [8]. Value in milliseconds. Value ms0 means 0 ms, ms20 means 20 ms and so on.

**rn-IntegrityProtection**
Indicates that integrity protection or verification shall be applied for all subsequent packets received and sent by the RN on the DRB.

**statusReportRequired**
Indicates whether or not the UE shall send a PDCP Status Report upon re-establishment of the PDCP entity and upon PDCP data recovery as specified in TS 36.323 [8].

**ul-DataSplitDRB-ViaSCG**
Indicates whether the UE shall send PDCP PDUs via SCG. E-UTRAN only configures the field (i.e. indicates value TRUE) for split DRBs.
### **Conditional presence**

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rlc-AM</strong></td>
<td>The field is mandatory present upon setup of a PDCP entity for a radio bearer configured with RLC AM. The field is optional, need ON, in case of reconfiguration of a PDCP entity at handover, at the first reconfiguration after RRC re-establishment or at SCG change involving PDCP re-establishment or PDCP data recovery for a radio bearer configured with RLC AM. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>Rlc-AM2</strong></td>
<td>The field is optionally present, need OP, upon setup of a PDCP entity for a radio bearer configured with RLC AM. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>Rlc-UM</strong></td>
<td>The field is mandatory present upon setup of a PDCP entity for a radio bearer configured with RLC UM. It is optionally present, Need ON, upon handover within E-UTRA, upon the first reconfiguration after re-establishment and upon SCG change involving PDCP re-establishment. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>RN</strong></td>
<td>The field is optionally present when signalled to the RN, need OR. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>Setup</strong></td>
<td>The field is mandatory present in case of radio bearer setup. Otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td><strong>SetupS</strong></td>
<td>The field is mandatory present in case of setup of or reconfiguration to a split DRB. The field is optionally present upon reconfiguration of a split DRB or upon DRB type change from split to MCG DRB, need ON. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

### **PDSCH-Config**

The IE `PDSCH-ConfigCommon` and the IE `PDSCH-ConfigDedicated` are used to specify the common and the UE specific PDSCH configuration respectively.

#### **PDSCH-Config information element**

```asn1
-- ASN1START

PDSCH-ConfigCommon ::= SEQUENCE {
  referenceSignalPower    INTEGER (-60..50),
  p-b         INTEGER (0..3)
}

PDSCH-ConfigDedicated ::= SEQUENCE {
  p-a         ENUMERATED {
    dB-6, dB-4dot77, dB-3, dB-1dot77,
    dB0, dB1, dB2, dB3
  }
}

PDSCH-ConfigDedicated-v1130 ::= SEQUENCE {
  dmr-ConfigPDSCH-r11     DMR-Config-r11 OPTIONAL, -- Need ON
  qcl-Operation      ENUMERATED {typeA, typeB} OPTIONAL, -- Need OR
  re-MappingQCLConfigToReleaseList-r11 RE-MappingQCLConfigToReleaseList-r11 OPTIONAL, -- Need ON
  re-MappingQCLConfigToAddModList-r11 RE-MappingQCLConfigToAddModList-r11 OPTIONAL -- Need ON
}

RE-MappingQCLConfigToAddModList-r11 ::= SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF PDSCH-RE-MappingQCL-config-r11

RE-MappingQCLConfigToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF PDSCH-RE-MappingQCL-Id-r11

PDSCH-RE-MappingQCL-config-r11 ::= SEQUENCE {
  pdsh-RE-MappingQCL-ConfigId-r11 PDSCCH-RE-MappingQCL-ConfigId-r11,
  optionalSetOfFields-r11     SEQUENCE {
    crs-PortsCount-r11     ENUMERATED {n1, n2, n4, spare1},
    crs-FreqShift-r11     INTEGER (0..5),
    mbsfn-SubframeConfigList-r11  CHOICE {
      release        NULL,
      setup        SEQUENCE {
        subframeConfigList MBSFN-SubframeConfigList
      }
    }
  }
}
```

---

ETSI
PDSCH-Config field descriptions

optionalSetOfFields
If absent, the UE releases the configuration provided previously, if any, and applies the values from the serving cell configured on the same frequency.

p-a
Parameter: $P_A$, see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4.77 corresponds to -4.77 dB etc.

p-b
Parameter: $P_B$, see TS 36.213 [23, Table 5.2-1].

pdsch-Start
The starting OFDM symbol of PDSCH for the concerned serving cell, see TS 36.213 [23, 7.1.6.4]. Values 1, 2, 3 are applicable when dl-Bandwidth for the concerned serving cell is greater than 10 resource blocks, values 2, 3, 4 are applicable when dl-Bandwidth for the concerned serving cell is less than or equal to 10 resource blocks, see TS 36.211 [21, Table 6.7-1]. Value $n1$ corresponds to 1, value $n2$ corresponds to 2 and so on.

cqi-CSI-RS-ConfigNZPId
Indicates the CSI-RS resource that is quasi co-located with the PDSCH antenna ports, see TS 36.213 [23, 7.1.9]. E-UTRAN configures this field if and only if the UE is configured with cqi-Operation set to type B.

cqi-Operation
Indicates the quasi co-location behaviour to be used by the UE, type A and type B, as described in TS 36.213 [23, 7.1.10].

referenceSignalPower
Parameter: Reference-signal power, which provides the downlink reference-signal EPRE, see TS 36.213 [23, 5.2]. The actual value in dBm.

re-MappingQCLConfigToAddModList, re-MappingQCLConfigToReleaseList
For a serving frequency E-UTRAN configures at least one PDSCH-RE-MappingQCL-Config when transmission mode 10 is configured for the serving cell on this carrier frequency. Otherwise it does not configure this IE.

tbsIndexAlt
Indicates the applicability of the alternative TBS index for the I TBS 26 and 33 (see TS 36.213 [23, Table 7.1.7.2.1-1]) to all subframes scheduled by DCI format 2C or 2D. Value $a26$ refers to the alternative TBS index $h_{BS} 26A$, and value $a33$ refers to the alternative TBS index $h_{BS} 33A$. If this field is not configured, the UE shall use $h_{BS} 26$ and $h_{BS} 33$ specified in Table 7.1.7.2.1-1 in TS 36.213 [23] for all subframes instead.

PDSCH-RE-MappingQCL-ConfigId
The IE PDSCH-RE-MappingQCL-ConfigId is used to identify a set of PDSCH parameters related to resource element mapping and quasi co-location, as configured by the IE PDSCH-RE-MappingQCL-Config. The identity is unique within the scope of a carrier frequency.

PDSCH-RE-MappingQCL-ConfigId information elements

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

**phich-Duration**
Parameter: PHICH-Duration, see TS 36.211 [21, Table 6.9.3-1].

**phich-Resource**
Parameter: Ng, see TS 36.211 [21, 6.9]. Value oneSixth corresponds to 1/6, half corresponds to 1/2 and so on.

---

**PhysicalConfigDedicated**

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

**PhysicalConfigDedicated information element**

```asn1
PhysicalConfigDedicated ::= SEQUENCE {
  pdsch-ConfigDedicated    PDSCH-ConfigDedicated   OPTIONAL,  -- Need ON
  pucch-ConfigDedicated    PUCCH-ConfigDedicated   OPTIONAL,  -- Need ON
  pusch-ConfigDedicated    PUSCH-ConfigDedicated   OPTIONAL,  -- Need ON

  uplinkPowerControlDedicated   UplinkPowerControlDedicated  OPTIONAL,  -- Need ON
  tpc-PDCCH-ConfigPUCCH    TPC-PDCCH-Config     OPTIONAL,  -- Need ON
  tpc-PDCCH-ConfigPUSCH    TPC-PDCCH-Config     OPTIONAL,  -- Need ON
  cqi-ReportConfig     CQI-ReportConfig    OPTIONAL,  -- Cond CQI-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

  ...,

  cqi-ReportConfig-v920    CQI-ReportConfig-v920  OPTIONAL,  -- Cond CQI-r8

  antennaInfo-v920 AntennaInfoDedicated-v920 OPTIONAL  -- Cond AI-r8

  csi-RS-Config-r10    CSI-RS-Config-r10  OPTIONAL,  -- Need ON
  pusch-ConfigDedicated-v1020  PUSCH-ConfigDedicated-v1020  OPTIONAL,  -- Need ON
  pucch-ConfigDedicated-v1020  PUCCH-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 SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL,  -- Need ON

  uplinkPowerControlDedicated-v1020 UplinkPowerControlDedicated-v1020 OPTIONAL  -- Need ON

  ...,

  [[ additionalSpectrumEmissionCA-r10    CHOICE {
    release         NULL,
    setup           SEQUENCE {
      additionalSpectrumEmissionPCell-r10  AdditionalSpectrumEmission
    }  OPTIONAL, -- Need ON
    ]

  [[ -- DL configuration as well as configuration applicable for DL and UL
    csi-RS-ConfigNZPToReleaseList-r11 CSI-RS-ConfigNZPToReleaseList-r11 OPTIONAL,  -- Need ON
    csi-RS-ConfigNZPToAddModList-r11 CSI-RS-ConfigNZPToAddModList-r11 OPTIONAL,  -- Need ON
    csi-RS-ConfigZPToReleaseList-r11 CSI-RS-ConfigZPToReleaseList-r11 OPTIONAL,  -- Need ON
    csi-RS-ConfigZPToAddModList-r11 CSI-RS-ConfigZPToAddModList-r11 OPTIONAL,  -- Need ON
    ]
```

---
PhysicalConfigDedicatedSCell-r10 ::= SEQUENCE {  
  nonUL-Configuration-r10     SEQUENCE {  
    antennaInfo-r10       AntennaInfoDedicated-r10 OPTIONAL, -- Need ON  
    crossCarrierSchedulingConfig-r10  CrossCarrierSchedulingConfig-r10 OPTIONAL, -- Need ON  
  }  
  ul-Configuration-r10     SEQUENCE {  
    antennaInfoUL-r10      AntennaInfoUL-r10   OPTIONAL, -- Need ON  
    pusch-ConfigDedicatedSCell-r10   PUSCH-ConfigDedicatedSCell-r10  OPTIONAL, -- Need ON  
    soundingRS-UL-ConfigDedicatedAperiodic-r10 SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL, -- Need ON  
  }  
  ...  
}

PhysicalConfigDedicatedSCell-v1250 ::= SEQUENCE {  
  nonUL-Configuration-v1250     SEQUENCE {  
    antennaInfo-v1250     AntennaInfoDedicated-v1250  OPTIONAL, -- Need ON  
    eimta-MainConfig-r122  EIMTA-MainConfig-r122  OPTIONAL, -- Need ON  
  }  
  ul-Configuration-v1250     SEQUENCE {  
    antennaInfoUL-v1250    AntennaInfoUL-v1250   OPTIONAL, -- Need ON  
    pusch-ConfigDedicatedSCell-v1250   PUSCH-ConfigDedicatedSCell-v1250  OPTIONAL, -- Need ON  
    soundingRS-UL-ConfigDedicatedAperiodic-v1250 SoundingRS-UL-ConfigDedicatedAperiodic-v1250 OPTIONAL, -- Need ON  
  }  
  ...  
}

PhysicalConfigDedicatedSCell-v1280 ::= SEQUENCE {  
  nonUL-Configuration-v1280     SEQUENCE {  
    eimta-MainConfig-r122  EIMTA-MainConfig-r122  OPTIONAL, -- Need ON  
  }  
  ul-Configuration-v1280     SEQUENCE {  
    eimta-MainConfigServCell-r122 EIMTA-MainConfigServCell-r122 OPTIONAL, -- Need ON  
  }  
  ...  
}
CSI-RS-ConfigNZPToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF CSI-RS-ConfigNZP-r11
CSI-RS-ConfigNZPToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF CSI-RS-ConfigNZPId-r11
CSI-RS-ConfigZPToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF CSI-RS-ConfigZP-r11
CSI-RS-ConfigZPToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF CSI-RS-ConfigZPId-r11

PhysicalConfigDedicated field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</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>csi-RS-Config</td>
<td>For a serving frequency E-UTRAN does not configure csi-RS-Config (includes zeroTxPowerCSI-RS) when transmission mode 10 is configured for the serving cell on this carrier frequency.</td>
</tr>
<tr>
<td>csi-RS-ConfigNZPToAddModList</td>
<td>For a serving frequency E-UTRAN configures one or more CSI-RS-ConfigNZP only when transmission mode 10 is configured for the serving cell on this carrier frequency. E-UTRAN configures a maximum of one CSI-RS-ConfigNZP for a serving frequency on which the UE supports only one CSI process (i.e. supportedCSI-Proc is indicated as n1).</td>
</tr>
<tr>
<td>csi-RS-ConfigZPToAddModList</td>
<td>For a serving frequency E-UTRAN configures one or more CSI-RS-ConfigZP only when transmission mode 10 is configured for the serving cell on this carrier frequency. E-UTRAN configures CSI-RS-ConfigZP only if supportedCSI-Proc is indicated as n1.</td>
</tr>
<tr>
<td>eimta-MainConfigPCell, eimta-MainConfigSCell</td>
<td>If E-UTRAN configures eimta-MainConfigPCell or eimta-MainConfigSCell for one serving cell in a frequency band, E-UTRAN configures eimta-MainConfigPCell or eimta-MainConfigSCell for all serving cells residing on the frequency band. E-UTRAN configures eimta-MainConfigPCell or eimta-MainConfigSCell only if eimta-MainConfig is configured.</td>
</tr>
<tr>
<td>epdcch-Config</td>
<td>indicates the EPDCCH-Config for the cell. E-UTRAN does not configure EPDCCH-Config for an SCell that is configured with value other for schedulingCellInfo in CrossCarrierSchedulingConfig.</td>
</tr>
<tr>
<td>pdsch-ConfigDedicated-v1130</td>
<td>For a serving frequency E-UTRAN configures pdsch-ConfigDedicated-v1130 only when transmission mode 10 is configured for the serving cell on this carrier frequency.</td>
</tr>
<tr>
<td>pdsch-ConfigDedicated-v1280</td>
<td>For a serving frequency E-UTRAN configures pdsch-ConfigDedicated-v1280 only when transmission mode 9 or 10 is configured for the serving cell on this carrier frequency.</td>
</tr>
<tr>
<td>pusch-ConfigDedicated-v1250</td>
<td>E-UTRAN configures pusch-ConfigDedicated-v1250 only if tpc-SubframeSet is configured.</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>
<tr>
<td>uplinkPowerControlDedicated</td>
<td>E-UTRAN configures uplinkPowerControlDedicated-v1130 only if uplinkPowerControlDedicated (without suffix) is configured.</td>
</tr>
<tr>
<td>uplinkPowerControlDedicatedSCell</td>
<td>E-UTRAN configures uplinkPowerControlDedicatedSCell-v1130 only if uplinkPowerControlDedicatedSCell-r10 is configured for this serving cell.</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.

--\hfill 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 $P_{\text{compensation}}$ defined in TS 36.304 [4]. Corresponds to parameter $P_{\text{E_{MAX}}} \text{ or } P_{\text{EMAX,c}}$ in TS 36.101 [42]. The UE transmit power on one serving cell shall not exceed the configured maximum UE output power of the serving cell determined by this value as specified in TS 36.101 [42, 6.2.5 or 6.2.5A] or, when transmitting sidelink discovery announcements within the coverage of the concerned cell, as specified in TS 36.101 [42, 6.2.5D].

\[P-Max\] information element

\[\text{P-Max} ::= \text{INTEGER} \{-30..33\}\]

--\hfill 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

\[\text{PRACH-ConfigSIB} ::= \text{SEQUENCE}\{
\text{rootSequenceIndex} \text{ INTEGER} \{0..837\},
\text{prach-ConfigInfo} \text{ PRACH-ConfigInfo}
\}\]

\[\text{PRACH-Config} ::= \text{SEQUENCE}\{
\text{rootSequenceIndex} \text{ INTEGER} \{0..837\},
\text{prach-ConfigInfo} \text{ PRACH-ConfigInfo} \text{ OPTIONAL -- Need ON}
\}\]

\[\text{PRACH-ConfigSCell-r10} ::= \text{SEQUENCE}\{
\text{prach-ConfigIndex-r10} \text{ INTEGER} \{0..63\}
\}\]

\[\text{PRACH-ConfigInfo} ::= \text{SEQUENCE}\{
\text{prach-ConfigIndex} \text{ INTEGER} \{0..63\},
\text{highSpeedFlag} \text{ BOOLEAN},
\text{zeroCorrelationZoneConfig} \text{ INTEGER} \{0..15\},
\text{prach-FreqOffset} \text{ INTEGER} \{0..94\}\]
**PRACH-Config** field descriptions

- **highSpeedFlag**
  Parameter: High-speed-flag, see TS 36.211, [21, 5.7.2]. TRUE corresponds to Restricted set and FALSE to Unrestricted set.

- **prach-ConfigIndex**
  Parameter: prach-ConfigurationIndex, see TS 36.211 [21, 5.7.1].

- **prach-FreqOffset**
  Parameter: prach-FrequencyOffset, see TS 36.211, [21, 5.7.1]. For TDD the value range is dependent on the value of prach-ConfigIndex.

- **rootSequenceIndex**
  Parameter: RACH_ROOT_SEQUENCE, see TS 36.211 [21, 5.7.1].

- **zeroCorrelationZoneConfig**
  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.

---

**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**

```asn1
-- 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**

```asn1
-- ASN1START
PUCCH-ConfigCommon ::= SEQUENCE {
    deltaPUCCH-Shift ENUMERATED {ds1, ds2, ds3},
    nRB-CQI INTEGER (0..96),
    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 CHOICE {
        format3-r10 SEQUENCE {
            n3PUCCH-AN-List-r10 SEQUENCE (SIZE (1..4)) OF INTEGER (0..549) OPTIONAL, -- Need ON
twoAntennaPortActivatedPUCCH-Format3-r10 CHOICE {
            release NULL, 
            setup SEQUENCE {
                n3PUCCH-AN-ListP1-r10 SEQUENCE (SIZE (1..4)) OF INTEGER (0..549)
            }
        }
    }
}
-- ASN1STOP
```
PUCCH-ConfigDedicated-v1130 ::= SEQUENCE {
  n1PUCCH-AN-CS-v1130     CHOICE {
    release        NULL,
    setup        SEQUENCE {
      n1PUCCH-AN-CS-ListP1-r11   SEQUENCE (SIZE (2..4)) OF INTEGER (0..2047)
    }
  }
}

nPUCCH-Param-r11     CHOICE {
  release        NULL,
  setup        SEQUENCE {
    nPUCCH-Identity-r11     INTEGER (0..503),
    n1PUCCH-AN-r11      INTEGER (0..2047)
  }
}

PUCCH-ConfigDedicated-v1250 ::= SEQUENCE {
  nkaPUCCH-Param-r12     CHOICE {
    release        NULL,
    setup        SEQUENCE {
      nkaPUCCH-AN-r12      INTEGER (0..2047)
    }
  }
}

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: \( \Delta_{\text{PUCCH}}^{\text{shift}} \), 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-r11** indicates UE-specific PUCCH AN resource offset, see TS 36.213 [23, 10.1].

**n1PUCCH-AN-CS-List**
Parameter: \( n_{\text{PUCCH}}^{(1)} \) for antenna port \( p_0 \) for PUCCH format 1b with channel selection, see TS 36.213 [23, 10.1.2.1, 10.1.3.2.1].

**n1PUCCH-AN-CS-ListP1**
Parameter: \( n_{\text{PUCCH}}^{(1,p_1)} \) for antenna port \( p_1 \) for PUCCH format 1b with channel selection, see TS 36.213 [23, 10.1]. E-UTRAN configures this field only when \( \text{pucch-Format} \) is set to \( \text{channelSelection} \).

**n1PUCCH-AN-Rep, n1PUCCH-AN-RepP1**
Parameter: \( n_{\text{PUCCH}}^{(1,p_0)} \) 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].

**nkaPUCCH-AN**
Parameter: \( N_{\text{PUCCH}}^{K_A} \), see TS 36.213 [23, 10.1.3].

**nkaPUCCH-AN-r12** indicates PUCCH format 1a/1b starting offset for the subframe set \( K_A \), see TS 36.213 [23, 10.1.3]. E-UTRAN configures \( n_{\text{PUCCH}}^{K_A} \) only if \( \text{eimta-MainConfig} \) is configured.

**nPUCCH-Identity**
Parameter: \( n_{\text{PUCCH}}^{ID} \), see TS 36.211 [21, 5.5.1.5].

**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 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 \( N_{\text{ANRep}}^{(2)} \) see TS 36.213 [23, 10.1] where n2 corresponds to repetition factor 2, n4 to 4.

**simultaneousPUCCH-PUSCH**
Parameter indicates whether simultaneous PUCCH and PUSCH transmissions is configured, see TS 36.213 [23, 10.1 and 5.1.1]. E-UTRAN configures this field for the PCell, only when the nonContiguousUL-RA-WithinCC-Info is set to supported in the band on which PCell is configured. Likewise, E-UTRAN configures this field for the PSCell, only when the nonContiguousUL-RA-WithinCC-Info is set to supported in the band on which PSCell is configured.

**tdd-AckNackFeedbackMode**
Parameter indicates one of the TDD ACK/NACK feedback modes used, see TS 36.213 [23, 7.3 and 10.1.3]. The value bundling corresponds to use of ACK/NACK bundling whereas, the value multiplexing corresponds to ACK/NACK multiplexing as defined in Tables 10.1.3-2, 10.1.3-3, and 10.1.3-4 in TS 36.213 [23]. The same value applies to both ACK/NACK feedback modes on PUCCH as well as on PUSCH.

**twoAntennaPortActivatedPUCCH-Format1a1b**
Indicates whether two antenna ports are configured for PUCCH format 1a/1b for HARQ-ACK, see TS 36.213 [23, 10.1]. The field also applies for PUCCH format 1a/1b transmission when format3 is configured, see TS 36.213 [23, 10.1.2.2.2, 10.1.3.2.2].

**twoAntennaPortActivatedPUCCH-Format3**
Indicates whether two antenna ports are configured for PUCCH format 3 for HARQ-ACK, see TS 36.213 [23, 10.1].

<table>
<thead>
<tr>
<th>Conditional presence</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 and the UE shall delete any existing value for this field. It is not present for FDD and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>
---

**PUSCH-Config**

The **PUSCH-ConfigCommon** is used to specify the common PUSCH configuration and the reference signal configuration for PUSCH and PUCCH. The **PUSCH-ConfigDedicated** is used to specify the UE specific PUSCH configuration.

### PUSCH-Config information element

```asn1
PUSCH-ConfigCommon ::= SEQUENCE {
    pusch-ConfigBasic                SEQUENCE {
        n-SB        INTEGER (1..4),
        hoppingMode       ENUMERATED {interSubFrame, intraAndInterSubFrame},
        pusch-HoppingOffset     INTEGER (0..98),
        enable64QAM       BOOLEAN
    },
    ul-ReferenceSignalsPUSCH      UL-ReferenceSignalsPUSCH
}
PUSCH-ConfigCommon-v1270 ::=  SEQUENCE {
    enable64QAM-v1270      ENUMERATED {true}
}
PUSCH-ConfigDedicated ::=   SEQUENCE {
    betaOffset-ACK-Index    INTEGER (0..15),
    betaOffset-RI-Index     INTEGER (0..15),
    betaOffset-CQI-Index    INTEGER (0..15)
}
PUSCH-ConfigDedicated-v1020 ::=  SEQUENCE {
    betaOffsetMC-r10     SEQUENCE {
        betaOffset-ACK-Index-MC-r10   INTEGER (0..15),
        betaOffset-RI-Index-MC-r10   INTEGER (0..15),
        betaOffset-CQI-Index-MC-r10   INTEGER (0..15)
    }                OPTIONAL, -- Need OR
    groupHoppingDisabled-r10   ENUMERATED {true}     OPTIONAL, -- Need OR
    dmrs-WithOCC-Activated-r10 ENUMERATED {true}     OPTIONAL -- Need OR
}
PUSCH-ConfigDedicated-v1130 ::=  SEQUENCE {
    pusch-DMRS-r11      CHOICE {
        release        NULL,
        setup        SEQUENCE {
           nPUSCH-Identity-r11     INTEGER (0..509),
            nDMRS-CSH-Identity-r11    INTEGER (0..509)
        }
    }
}
PUSCH-ConfigDedicated-v1250::=   SEQUENCE {
    uciOnPUSCH        CHOICE {
        release     NULL,
        setup        SEQUENCE {
            betaOffset-ACK-Index-SubframeSet2-r12    INTEGER (0..15),
            betaOffset-RI-Index-SubframeSet2-r12   INTEGER (0..15),
            betaOffset-CQI-Index-SubframeSet2-r12   INTEGER (0..15),
            betaOffsetMC-r12     SEQUENCE {
                betaOffset-ACK-Index-MC-SubframeSet2-r12   INTEGER (0..15),
                betaOffset-RI-Index-MC-SubframeSet2-r12   INTEGER (0..15),
                betaOffset-CQI-Index-MC-SubframeSet2-r12   INTEGER (0..15)
            }                OPTIONAL -- Need OR
        }
    }
}
PUSCH-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

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>betaOffset-ACK-Index</strong>, <strong>betaOffset-ACK-Index-MC</strong></td>
<td>Parameter: $I_{\text{HARQ-ACK}}^{\text{offset}}$, 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 and not configured with uplink power control subframe sets. The same value also applies for subframe set 1 of all serving cells with an uplink and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell).</td>
</tr>
<tr>
<td><strong>betaOffset-ACK-Index-SubframeSet2</strong>, <strong>betaOffset-ACK-Index-MC-SubframeSet2</strong></td>
<td>Parameter: $I_{\text{HARQ-ACK}}^{\text{offset}}$, for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-1]. One value applies for subframe set 2 of all serving cells with an uplink and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell configured with uplink power control subframe sets).</td>
</tr>
<tr>
<td><strong>betaOffset-CQI-Index</strong>, <strong>betaOffset-CQI-Index-MC</strong></td>
<td>Parameter: $I_{\text{CQI}}^{\text{offset}}$, 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 and not configured with uplink power control subframe sets. The same value also applies for subframe set 1 of all serving cells with an uplink and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell).</td>
</tr>
<tr>
<td><strong>betaOffset-CQI-Index-SubframeSet2</strong>, <strong>betaOffset-CQI-Index-MC-SubframeSet2</strong></td>
<td>Parameter: $I_{\text{CQI}}^{\text{offset}}$, for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-3]. One value applies for subframe set 2 of all serving cells with an uplink and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell configured with uplink power control subframe sets).</td>
</tr>
<tr>
<td><strong>betaOffset-RI-Index</strong>, <strong>betaOffset-RI-Index-MC</strong></td>
<td>Parameter: $I_{\text{RI}}^{\text{offset}}$, for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-2]. One value applies for all serving cells with an uplink and not configured with uplink power control subframe sets. The same value also applies for subframe set 1 of all serving cells with an uplink and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell).</td>
</tr>
<tr>
<td><strong>betaOffset-RI-Index-SubframeSet2</strong>, <strong>betaOffset-RI-Index-MC-SubframeSet2</strong></td>
<td>Parameter: $I_{\text{RI}}^{\text{offset}}$, for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-2]. One value applies for subframe set 2 of all serving cells with an uplink and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell configured with uplink power control subframe sets).</td>
</tr>
<tr>
<td><strong>cyclicShift</strong></td>
<td>Parameters: cyclicShift, see TS 36.211 [21, Table 5.5.2.1.1-2].</td>
</tr>
<tr>
<td><strong>dmrs-WithOCC-Activated</strong></td>
<td>Parameter: Activate-DMRS-with OCC, see TS 36.211 [21, 5.5.2.1].</td>
</tr>
<tr>
<td><strong>enable64QAM</strong></td>
<td>See TS 36.215 [23, 8.6.1]. If enable64QAM (without suffix) is set to TRUE, it indicates that 64QAM is allowed for UE categories 5 and 8 indicated in ue-Category while FALSE indicates that 64QAM is not allowed. If enable64QAM-v1270 is set to TRUE, it indicates that 64QAM is allowed for UL categories 5 and 13 indicated in ue-CategoryUL. E-UTRAN configures enable64QAM-v1270 only when enable64QAM (without suffix) is set to TRUE.</td>
</tr>
<tr>
<td><strong>groupAssignmentPUSCH</strong></td>
<td>Parameter: $\Delta_{\text{SS}}$ See TS 36.211 [21, 5.5.1.3].</td>
</tr>
<tr>
<td><strong>groupHoppingDisabled</strong></td>
<td>Parameter: Disable-sequence-group-hopping, see TS 36.211 [21, 5.5.1.3].</td>
</tr>
<tr>
<td><strong>groupHoppingEnabled</strong></td>
<td>Parameter: Group-hopping-enabled, see TS 36.211 [21, 5.5.1.3].</td>
</tr>
<tr>
<td><strong>hoppingMode</strong></td>
<td>Parameter: Hopping-mode, see TS 36.211 [21, 5.3.4].</td>
</tr>
<tr>
<td><strong>nDMRS-CSH-Identity</strong></td>
<td>Parameter: $N_{\text{csh DMRS ID}}^{\text{ID}}$, see TS 36.211 [21, 5.5.2.1.1].</td>
</tr>
<tr>
<td><strong>nPUSCH-Identity</strong></td>
<td>Parameter: $n_{\text{PUSCH}}^{\text{ID}}$, see TS 36.211 [21, 5.5.1.5].</td>
</tr>
<tr>
<td><strong>n-SB</strong></td>
<td>Parameter: $N_{\text{SB}}$, see TS 36.211 [21, 5.3.4].</td>
</tr>
<tr>
<td><strong>pusch-hoppingOffset</strong></td>
<td>Parameter: $N_{\text{HO}}^{\text{RB}}$, see TS 36.211 [21, 5.3.4].</td>
</tr>
<tr>
<td><strong>sequenceHoppingEnabled</strong></td>
<td>Parameter: Sequence-hopping-enabled, see TS 36.211 [21, 5.5.1.4].</td>
</tr>
<tr>
<td><strong>ul-ReferenceSignalsPUSCH</strong></td>
<td>Used to specify parameters needed for the transmission on PUSCH (or PUCCH).</td>
</tr>
</tbody>
</table>
**RACH-ConfigCommon**

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

**RACH-ConfigCommon** information element

```asn1
RACH-ConfigCommon ::= SEQUENCE {
  preambleInfo SEQUENCE {
    numberOfRA-Preambles ENUMERATED {
      n4, n8, n12, n16 ,n20, n24, n28,
      n32, n36, n40, n44, n48, n52, n56,
      n60, n64},
    preambleGroupAConfig 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},
      ... },
    powerRampingParameters PowerRampingParameters,
    ra-SupervisionInfo SEQUENCE {
      preambleTransMax PreambleTransMax,
      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),
    ... } OPTIONAL -- Need OP },
  powerRampingParameters PowerRampingParameters,
  ra-SupervisionInfo SEQUENCE {
    preambleTransMax PreambleTransMax,
    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),
  ... } OPTIONAL -- Need OP
}

RACH-ConfigCommon-v1250 ::= SEQUENCE {
  txFailParams-r12 SEQUENCE {
    connEstFailCount-r12 ENUMERATED {n1, n2, n3, n4},
    connEstFailOffsetValidity-r12 ENUMERATED {s30, s60, s120, s240,
      s300, s420, s600, s900},
    connEstFailOffset-r12 INTEGER (0..15) OPTIONAL -- Need OP
  }},
RACH-ConfigCommonSCell-r11 ::= SEQUENCE {
  powerRampingParameters-r11 PowerRampingParameters,
  ra-SupervisionInfo-r11 SEQUENCE {
    preambleTransMax-r11 PreambleTransMax
  },
  ... }

PowerRampingParameters ::= SEQUENCE {
  powerRampingStep ENUMERATED {dB0, dB2,dB4, dB6},
  preambleInitialReceivedTargetPower ENUMERATED {
    dBm-120, dBm-118, dBm-116, dBm-114, dBm-112,
    dBm-110, dBm-108, dBm-106, dBm-104, dBm-102,
    dBm-100, dBm-98, dBm-96, dBm-94,
    dBm-92, dBm-90}
}

PreambleTransMax ::= ENUMERATED {
  n3, n4, n5, n6, n7, n8, n10, n20, n50,
  n100, n200}

-- ASN1STOP
```
RACH-ConfigCommon field descriptions

connEstFailCount
Number of times that the UE detects T300 expiry on the same cell before applying connEstFailOffset.

connEstFailOffset
Parameter “Qoffsettemp” in TS 36.304 [4]. If the field is not present the value of infinity shall be used for “Qoffsettemp”.

connEstFailOffsetValidity
Amount of time that the UE applies connEstFailOffset before removing the offset from evaluation of the cell. Value s30 corresponds to 30 seconds, s60 corresponds to 60 seconds, and so on.

mac-ContentionResolutionTimer
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.

maxHARQ-Msg3Tx
Maximum number of Msg3 HARQ transmissions in TS 36.321 [6], used for contention based random access. Value is an integer.

messagePowerOffsetGroupB
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.

messageSizeGroupA
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.

numberOfRA-Preambles
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.

powerRampingStep
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.

preambleInitialReceivedTargetPower
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.

preamblesGroupAConfig
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.

preambleTransMax
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.

ra-ResponseWindowSize
Duration of the RA response window in TS 36.321 [6]. Value in subframes. Value sf2 corresponds to 2 subframes, sf3 corresponds to 3 subframes and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).

sizeOfRA-PreamblesGroupA
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.

RACH-ConfigDedicated

The IE RACH-ConfigDedicated is used to specify the dedicated random access parameters.

RACH-ConfigDedicated information element

-- ASN1START

RACH-ConfigDedicated ::= SEQUENCE {
  ra-PreambleIndex INTEGER (0..63),
  ra-PRACH-MaskIndex INTEGER (0..15)
}

-- ASN1STOP

RACH-ConfigDedicated field descriptions

ra-PRACH-MaskIndex
Explicitly signalled PRACH Mask Index for RA Resource selection in TS 36.321 [6].

ra-PreambleIndex
---

**RadioResourceConfigCommon**

The IE *RadioResourceConfigCommonSIB* and IE *RadioResourceConfigCommon* are used to specify common radio resource configurations in the system information and in the mobility control information, respectively, e.g., the random access parameters and the static physical layer parameters.

### RadioResourceConfigCommon information element

```asn1
RadioResourceConfigCommonSIB ::= SEQUENCE {
  rach-ConfigCommon     RACH-ConfigCommon,
bchc-Config     BCCH-Config,
pchc-Config     PCCH-Config,
prach-ConfigCommon     PRACH-ConfigCommon,
pdsch-ConfigCommon     PDSCH-ConfigCommon,
pucch-ConfigCommon     PUCCH-ConfigCommon,
soundingRS-UL-ConfigCommon   SoundingRS-UL-ConfigCommon,
uplinkPowerControlCommon   UplinkPowerControlCommon,
ul-CyclicPrefixLength    UL-CyclicPrefixLength,
...,
[[ uplinkPowerControlCommon-v1020 UplinkPowerControlCommon-v1020  OPTIONAL -- Need OR ]],
[[ rach-ConfigCommon-v1250   RACH-ConfigCommon-v1250  OPTIONAL -- Need OR ]],
[[ pusch-ConfigCommon-v1270  PUSCH-ConfigCommon-v1270  OPTIONAL -- Need OR ]]
}

RadioResourceConfigCommon ::=  SEQUENCE {
  rach-ConfigCommon     RACH-ConfigCommon     OPTIONAL, -- Need ON
  prach-ConfigCommon     PRACH-ConfigCommon     OPTIONAL, -- Need ON
  pdsch-ConfigCommon     PDSCH-ConfigCommon     OPTIONAL, -- Need ON
  pucch-ConfigCommon     PUCCH-ConfigCommon     OPTIONAL, -- Need ON
  phich-Config          PHICH-Config          OPTIONAL, -- Need ON
  soundingRS-UL-ConfigCommon   SoundingRS-UL-ConfigCommon   OPTIONAL, -- Need ON
  uplinkPowerControlCommon   UplinkPowerControlCommon   OPTIONAL, -- Need ON
  antennaInfoCommon     AntennaInfoCommon     OPTIONAL, -- Need ON
  p-Max        P-Max        OPTIONAL, -- Need OP
  tdd-Config       TDD-Config       OPTIONAL -- Cond TDD
  ul-CyclicPrefixLength    UL-CyclicPrefixLength,
...,
[[ uplinkPowerControlCommon-v1020 UplinkPowerControlCommon-v1020  OPTIONAL -- Need OR ]],
[[ tdd-Config-v1130     TDD-Config-v1130     OPTIONAL -- Cond TDD3 ]],
[[ pusch-ConfigCommon-v1270  PUSCH-ConfigCommon-v1270  OPTIONAL -- Need OR ]]
}
```

---

### RadioResourceConfigCommonPSCell-r12

```asn1
RadioResourceConfigCommonPSCell-r12 ::= SEQUENCE {
  basicFields-r12      RadioResourceConfigCommonSCell-r10,
pucch-ConfigCommon-r12    PUCCH-ConfigCommon,
rach-ConfigCommon-r12    RACH-ConfigCommon,
uplinkPowerControlCommonPSCell-r12 UplinkPowerControlCommonPSCell-r12,
...,
}
```

---

### RadioResourceConfigCommonSCell-r10

```asn1
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
    uplinkPowerControlCommonSCell-r10
      UplinkPowerControlCommonSCell-r10,
      -- A special version of IE UplinkPowerControlCommon may be introduced
      -- 3: Physical configuration, control
      soundingRS-UL-ConfigCommon-r10
        SoundingRS-UL-ConfigCommon,
      ul-CyclicPrefixLength-r10
        UL-CyclicPrefixLength,
      -- 4: Physical configuration, physical channels
      prach-ConfigSCell-r10
        PRACH-ConfigSCell-r10
          OPTIONAL, -- Cond TDD-OR-NoR11
        pusch-ConfigCommon-r10
          PUSCH-ConfigCommon
            OPTIONAL, -- Need OR
    ...,
    [[ ul-CarrierFreq-v1090
        ARFCN-ValueEUTRA-v9e0
          OPTIONAL -- Need OP
    ]],
    [[ rach-ConfigCommonSCell-r11
        RACH-ConfigCommonSCell-r11
          OPTIONAL, -- Cond ULSCell
    ]],
    [[ pusch-ConfigCommon-v1270
        PUSCH-ConfigCommon-v1270
          OPTIONAL -- Need OR
    ]]
},
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 `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]. 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, 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.

**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

```asn1
RadioResourceConfigDedicated ::= SEQUENCE { srb-ToAddModList SRB-ToAddModList OPTIONAL, -- Cond HO-Conn drb-ToAddModList DRB-ToAddModList OPTIONAL, -- Cond HO-toEUTRA drb-ToReleaseList DRB-ToReleaseList OPTIONAL, -- Need ON mac-MainConfig CHOICE { explicitValue MAC-MainConfig, } }```

---
defaultValue     NULL
OPTIONAL,       -- Cond HO-
toEUTRA2
sps-Config       SPS-Config     OPTIONAL, -- Need ON
physicalConfigDedicated PhysicalConfigDedicated OPTIONAL, -- Need ON
...,
[[ rlf-TimersAndConstants-r9 RLF-TimersAndConstants-r9 OPTIONAL -- Need ON
]],
[[ measSubframePatternPCell-r10 MeasSubframePatternPCell-r10 OPTIONAL -- Need ON
]],
[[ neighCellsCRS-Info-r11 NeighCellsCRS-Info-r11 OPTIONAL -- Need ON
]],
[[ naics-Info-r12 NAICS-AssistanceInfo-r12 OPTIONAL -- Need ON
]]
RadioResourceConfigDedicatedPSCell-r12 ::=  SEQUENCE {
-- UE specific configuration extensions applicable for an PCell
physicalConfigDedicatedPSCell-r12  PhysicalConfigDedicated OPTIONAL, -- Need ON
sps-Config-r12       SPS-Config     OPTIONAL, -- Need ON
naics-Info-r12       NAICS-AssistanceInfo-r12 OPTIONAL, -- Need ON
...
}
RadioResourceConfigDedicatedSCG-r12 ::=  SEQUENCE {
-- UE specific configuration extensions applicable for an SCG
...,
[[ mac-MainConfigSCG-r12 MAC-MainConfig OPTIONAL, -- Need ON
]],
[[ naics-Info-r12    NAICS-AssistanceInfo-r12 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-ToAddModListSCG-r12 ::=  SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddModSCG-r12
DRB-ToAddMod ::= SEQUENCE {
srb-Identity      INTEGER (0..15)   OPTIONAL,  -- Cond DRB-Setup
drb-Identity      DRB-Identity,
pdcp-Config       PDCP-Config    OPTIONAL,  -- Cond PDCP
rlc-Config       RLC-Config    OPTIONAL,  -- Cond SetupM
logicalChannelIdentity    INTEGER (3..10)   OPTIONAL,  -- Cond DRB-SetupM
logicalChannelConfig    LogicalChannelConfig OPTIONAL,  -- Cond SetupM
...,
[[ drb-TypeChange-r12      ENUMERATED {toMCG} OPTIONAL,  -- Need OP
  rlc-Config-v1250     RLC-Config-v1250  OPTIONAL  -- Need ON
]]
DRB-ToAddModSCG-r12 ::= SEQUENCE {
drb-Identity-r12     DRB-Identity,
drb-Type-r12      CHOICE {
    split-r12       NULL,
    scg-r12        SEQUENCE {

eps-BearerIdentity-r12 INTEGER (0..15) OPTIONAL, -- Cond DRB-Setup
pdcp-Config-r12 PDCP-Config OPTIONAL -- Cond PDCP-S
}
)
rlc-ConfigSCG-r12 RLC-Config OPTIONAL, -- Cond SetupS2
rlc-Config-v1250 RLC-Config-v1250 OPTIONAL, -- Need ON
logicalChannelIdentitySCG-r12 INTEGER (3..10) OPTIONAL, -- Cond DRB-SetupS
logicalChannelConfigSCG-r12 LogicalChannelConfig OPTIONAL, -- Cond SetupS
...
}
DRB-ToReleaseList ::= SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity
MeasSubframePatternPCell-r10 ::= CHOICE {
  release NULL,
  setup MeasSubframePattern-r10
}
NeighCellsCRS-Info-r11 ::= CHOICE {
  release NULL,
  setup CRS-AssistanceInfoList-r11
}
CRS-AssistanceInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11
CRS-AssistanceInfo-r11 ::= SEQUENCE {
  physCellId-r11 PhysCellId,
  antennaPortsCount-r11 ENUMERATED {an1, an2, an4, spare1},
  mbsfn-SubframeConfigList-r11 MBSFN-SubframeConfigList,
  ...
}
NAICS-AssistanceInfo-r12 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    neighCellsToReleaseList-r12 NeighCellsToReleaseList-r12 OPTIONAL, -- Need ON
    neighCellsToAddModList-r12 NeighCellsToAddModList-r12 OPTIONAL, -- Need ON
    servCellp-a-r12 P-a OPTIONAL -- Need ON
  }
}
NeighCellsToReleaseList-r12 ::= SEQUENCE (SIZE (1..maxNeighCell-r12)) OF PhysCellId
NeighCellsToAddModList-r12 ::= SEQUENCE (SIZE (1..maxNeighCell-r12)) OF NeighCellsInfo-r12
NeighCellsInfo-r12 ::= SEQUENCE {
  physCellId-r12 PhysCellId,
  p-b-r12 INTEGER (0..3),
  cbs-PortsCount-r12 ENUMERATED {n1, n2, n4, spare},
  mbsfn-SubframeConfig-r12 MBSFN-SubframeConfigList OPTIONAL, -- Need ON
  p-alist-r12 SEQUENCE (SIZE (1..maxP-a-PerNeighCell-r12)) OF P-a,
  resAllocGranularity-r12 INTEGER (1..4),
  ...
}
P-a ::= ENUMERATED { dB-6, dB-4dot77, dB-3, dB-1dot77,
  dB0, dB1, dB2, dB3

-- ASN1STOP
### RadioResourceConfigDedicated field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>crs-PortsCount</td>
<td>Parameter represents the number of antenna ports for cell-specific reference signal used by the signalled neighboring cell where n1 corresponds to 1 antenna port, n2 to 2 antenna ports etc. see TS 36.211 [21, 6.10.1].</td>
</tr>
<tr>
<td>drb-Identity</td>
<td>In case of DC, the DRB identity is unique within the scope of the UE i.e. an SCG DRB can not use the same value as used for an MCG or split DRB. For a split DRB the same identity is used for the MCG- and SCG parts of the configuration.</td>
</tr>
<tr>
<td>drb-ToAddModListSCG</td>
<td>When an SCG is configured, E-UTRAN configures at least one SCG or split DRB.</td>
</tr>
<tr>
<td>drb-Type</td>
<td>This field indicates whether the DRB is split or SCG DRB. E-UTRAN does not configure split and SCG DRBs simultaneously for the UE.</td>
</tr>
<tr>
<td>drb-TypeChange</td>
<td>Indicates that a split/SCG DRB is reconfigured to an MCG DRB (i.e. E-UTRAN only signals the field in case the DRB type changes).</td>
</tr>
<tr>
<td>logicalChannelConfig</td>
<td>For SRBs a choice is used to indicate whether the logical channel configuration is signalled explicitly or set to the default logical channel configuration for SRB1 as specified in 9.2.1.1 or for SRB2 as specified in 9.2.1.2.</td>
</tr>
<tr>
<td>logicalChannelIdentity</td>
<td>The logical channel identity for both UL and DL.</td>
</tr>
<tr>
<td>mac-MainConfig</td>
<td>Although the ASN.1 includes a choice that is used to indicate whether the mac-MainConfig is signalled explicitly or set to the default MAC main configuration as specified in 9.2.2, EUTRAN does not apply &quot;defaultValue&quot;.</td>
</tr>
<tr>
<td>mbsfn-SubframeConfig</td>
<td>Defines the MBSFN subframe configuration used by the signalled neighboring cell. If absent, UE assumes no MBSFN configuration for the neighboring cell.</td>
</tr>
<tr>
<td>measSubframePatternPCell</td>
<td>Time domain measurement resource restriction pattern for the PCell measurements (RSRP, RSRQ and the radio link monitoring).</td>
</tr>
<tr>
<td>neighCellsCRS-Info</td>
<td>This field contains assistance information, concerning the primary frequency, used by the UE to mitigate interference from CRS while performing RRM/RLM/CSI measurement or data demodulation. When the received CRS assistance information is for a cell with CRS colliding with that of the CRS of the cell to measure, the UE may use the CRS assistance information to mitigate CRS interference (as specified in TS 36.101 [42]) on the subframes indicated by measSubframePatternPCell, measSubframePatternConfigNeigh, csi-MeasSubframeSet1 if configured, and the CSI subframe set 1 if csi-MeasSubframeSets-r12 is configured. Furthermore, the UE may use CRS assistance information to mitigate CRS interference from the cells in the IE for the demodulation purpose as specified in TS 36.101 [42]. EUTRAN does not configure neighCellsCRS-Info-r11 if eimta-MainConfigPCell-r12 is configured.</td>
</tr>
<tr>
<td>neighCellsToAddModList</td>
<td>This field contains assistance information used by the UE to cancel and suppress interference of a neighbouring cell. If this field is present for a neighbouring cell, the UE assumes that the transmission parameters listed in the sub-fields are used by the neighbouring cell. If this field is present for a neighbouring cell, the UE assumes that the neighbour cell is subframe and SFN synchronized to the serving cell, has the same system bandwidth, UL/DL and special subframe configuration, and cyclic prefix length as the serving cell.</td>
</tr>
<tr>
<td>p-aList</td>
<td>Indicates the restricted subset of power offset for QPSK, 16QAM, and 64QAM PDSCH transmissions for the neighbouring cell by using the parameter $P_A$, see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4.77 corresponds to -4.77 dB etc.</td>
</tr>
<tr>
<td>p-b</td>
<td>Parameter: $P_b$, indicates the cell-specific ratio used by the signalled neighboring cell, see TS 36.213 [23, Table 5.2-1].</td>
</tr>
<tr>
<td>physicalConfigDedicated</td>
<td>The default dedicated physical configuration is specified in 9.2.4.</td>
</tr>
<tr>
<td>resAllocGranularity</td>
<td>Indicates the resource allocation and precoding granularity in PRB pair level of the signaled neighboring cell, see TS 36.213 [23, 7.1.6].</td>
</tr>
<tr>
<td>rlc-Config</td>
<td>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 and the AM RLC LI field size only upon handover within E-UTRA or upon the first reconfiguration after RRC connection re-establishment or upon SCG Change for SCG and split DRBs.</td>
</tr>
<tr>
<td>servCellp-a</td>
<td>Indicates the power offset for QPSK C-RNTI based PDSCH transmissions used by the serving cell, see 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>
### RadioResourceConfigDedicated field descriptions

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

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

**transmissionModeList**  
Indicates a subset of transmission mode 1, 2, 3, 4, 6, 8, 9, 10, for the signaled neighboring cell for which `NeighCellsInfo` applies. When TM10 is signaled, other signaled transmission parameters in `NeighCellsInfo` are not applicable to up to 8 layer transmission scheme of TM10. E-UTRAN may indicate TM9 when TM10 with QCL type A and DMRS scrambling with \( r_{\text{ID}}^{(i)} = N_{\text{ID}}^{\text{cell}} \) in TS 36.211 [21, 6.10.3.1] is used in the signalled neighbour cell and TM9 or TM10 with QCL type A and DMRS scrambling with \( r_{\text{ID}}^{(i)} = N_{\text{ID}}^{\text{cell}} \) in TS 36.211 [21, 6.10.3.1] is used in the serving cell.

UE behaviour with NAICS when TM10 is used is only defined when QCL type A and DMRS scrambling with \( r_{\text{ID}}^{(i)} = N_{\text{ID}}^{\text{cell}} \) in TS 36.211 [21, 6.10.3.1] is used for the serving cell and all signalled neighbour cells. The first/ leftmost bit is for transmission mode 1, the second bit is for transmission mode 2, and so on.

### Conditional presence

<table>
<thead>
<tr>
<th>Field</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>DRB-SetupM</strong></td>
<td>The field is mandatory present upon setup of MCG or split DRB; The field is optionally present, Need ON, upon change from SCG to MCG DRB; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>DRB-SetupS</strong></td>
<td>The field is mandatory present upon setup of SCG or split DRB, or upon change from MCG to split DRB; The field is optionally present, Need ON, upon change from MCG to SCG DRB; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>HO-Conn</strong></td>
<td>The field is mandatory present in case of handover to E-UTRA or when the <code>fullConfig</code> is included in the <code>RRCConnectionReconfiguration</code> message or in case of RRC connection establishment; 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; 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 set up; the field is optionally present, need ON, upon reconfiguration of the corresponding split DRB, upon the corresponding DRB type change from split to MCG bearer, upon the corresponding DRB type change from MCG to split bearer, upon handover within E-UTRA and upon the first reconfiguration after re-establishment but in all these cases only when <code>fullConfig</code> is not included in the RRCConnectionReconfiguration message; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>PDCP-S</strong></td>
<td>The field is mandatory present if the corresponding DRB is being set up; the field is optionally present, need ON, upon SCG change; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>RLC-Setup</strong></td>
<td>This field is optionally present if the corresponding DRB is being setup; the field is not present.</td>
</tr>
<tr>
<td><strong>SCellAdd</strong></td>
<td>The field is optionally present, need ON, upon SCell addition; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>Setup</strong></td>
<td>The field is mandatory present if the corresponding SRB/DRB is being setup; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td><strong>SetupM</strong></td>
<td>The field is mandatory present upon setup of an MCG or split DRB; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td><strong>SetupS</strong></td>
<td>The field is mandatory present upon setup of an SCG or split DRB, as well as upon change from MCG to split DRB; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td><strong>SetupS2</strong></td>
<td>The field is mandatory present upon setup of an SCG or split DRB, as well as upon change from MCG to split or SCG DRB. For an SCG DRB the field is optionally present, need ON. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>
The IE **RLC-Config** is used to specify the RLC configuration of SRBs and DRBs.

**RLC-Config** information element

```asn1
RLC-Config ::=  
    CHOICE {
        am         SEQUENCE {
            ul-AM-RLC       UL-AM-RLC,
            dl-AM-RLC       DL-AM-RLC
        },
        um-Bi-Directional     SEQUENCE {
            ul-UM-RLC       UL-UM-RLC,
            dl-UM-RLC       DL-UM-RLC
        },
        um-Uni-Directional-UL    SEQUENCE {
            ul-UM-RLC       UL-UM-RLC
        },
        um-Uni-Directional-DL    SEQUENCE {
            dl-UM-RLC       DL-UM-RLC
        },
        ...                  
    }

RLC-Config-v1250 ::=  
    SEQUENCE {
        ul-extended-RLC-LI-Field-r12   BOOLEAN,
        dl-extended-RLC-LI-Field-r12   BOOLEAN
    }

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 {
    m5, m10, m15, m20, m25, m30, m35, 
    m40, m45, m50, m55, m60, m65, m70, 
    m75, m80, m85, m90, m95, m100, m105, 
    m110, m115, m120, m125, m130, m135, 
    m140, m145, m150, m155, m160, m165, 
    m170, m175, m180, m185, m190, m195, 
    m200, m205, m210, m215, m220, m225, 
    m230, m235, m240, m245, m250, m300, 
    m350, m400, m450, m500, spare9, spare8, 
    spare7, spare6, spare5, spare4, spare3, 
    spare2, spare1}

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 {
    ...
```
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}
RLF-TimersAndConstantsSCG-r12 ::=   CHOICE {
  release        NULL,
  setup        SEQUENCE {
    t313-r12       ENUMERATED {
      ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
    n313-r12       ENUMERATED {
      n1, n2, n3, n4, n6, n8, n10, n20},
    n314-r12       ENUMERATED {
      n1, n2, n3, n4, n5, n6, n8, n10},
    ...
  }
}
-- ASN1STOP

**RLF-TimersAndConstants field descriptions**

*n3xy*

Constants are described in section 7.4. *n1* corresponds with 1, *n2* corresponds with 2 and so on.

*t3xy*

Timers are described in section 7.3. Value *ms0* corresponds with 0 ms, *ms50* corresponds with 50 ms and so on.

---

**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),
      }
    }
  }
```
## 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 noninterleaving corresponds to no cross-interleaving according to TS 36.216 [55, 7.4.2 and 7.4.3].

### n1PUCCH-AN-List
Parameter: \( n_{PUCCH}^{(l)} \), see TS 36.216, [55, 7.5.1]. This parameter is only applicable for TDD. Configures PUCCH HARQ-ACK resources if the RN is configured to use HARQ-ACK channel selection, HARQ-ACK multiplexing or HARQ-ACK bundling.

### n1PUCCH-AN-P0, n1PUCCH-AN-P1
Parameter: \( n_{PUCCH}^{(l, p)} \), 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
}
```

-- ASN1STOP
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: $n_{PUCCH,SR}$ 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

```text
-- ASN1START
SoundingRS-UL-ConfigCommon ::= CHOICE {
  release NULL,
  setup  SEQUENCE {
    srs-BandwidthConfig ENUMERATED {bw0, bw1, bw2, bw3, bw4, bw5, bw6, bw7},
    srs-SubframeConfig ENUMERATED {
      sc0, sc1, sc2, sc3, sc4, sc5, sc6, sc7,
      sc8, sc9, sc10, sc11, sc12, sc13, sc14, sc15},
    ackNackRS-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,
        ...
      }
    }
  }
}
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}
-- ASN1END
```
### SoundingRS-UL-Config field descriptions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ackNackSRS-SimultaneousTransmission</strong></td>
<td>Parameter: <code>Simultaneous-AN-and-SRS</code>, 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><strong>cyclicShift, cyclicShiftAp</strong></td>
<td>Parameter: $n_{SRS}$ for periodic and aperiodic sounding reference signal transmission respectively. See TS 36.211 [21, 5.5.3.1], where $cs0$ corresponds to 0 etc.</td>
</tr>
<tr>
<td><strong>duration</strong></td>
<td>Parameter: Duration for periodic sounding reference signal transmission. See TS 36.213 [21, 8.2]. FALSE corresponds to “single” and value TRUE to “indefinite”.</td>
</tr>
<tr>
<td><strong>freqDomainPosition, freqDomainPositionAp</strong></td>
<td>Parameter: $n_{RRC}$ for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3.2].</td>
</tr>
<tr>
<td><strong>srs-AntennaPort, srs-AntennaPortAp</strong></td>
<td>Indicates the number of antenna ports used for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3]. UE shall release <code>srs-AntennaPort</code> if <code>SoundingRS-UL-ConfigDedicated</code> is released.</td>
</tr>
<tr>
<td><strong>srs-Bandwidth, srs-BandwidthAp</strong></td>
<td>Parameter: $B_{SRS}$ for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, tables 5.5.3.2-1, 5.5.3.2-2, 5.5.3.2-3 and 5.5.3.2-4].</td>
</tr>
<tr>
<td><strong>srs-BandwidthConfig</strong></td>
<td>Parameter: SRS Bandwidth Configuration. See TS 36.211, [21, table 5.5.3.2-1, 5.5.3.2-2, 5.5.3.2-3 and 5.5.3.2-4]. Actual configuration depends on UL bandwidth. $bw0$ corresponds to value 0, $bw1$ to value 1 and so on.</td>
</tr>
<tr>
<td><strong>srs-ConfigApDCI-Format0 / srs-ConfigApDCI-Format1a2b2c / srs-ConfigApDCI-Format4</strong></td>
<td>Parameters indicate the resource configurations for aperiodic sounding reference signal transmissions triggered by DCI formats 0, 1A, 2B, 2C, 4. See TS 36.213 [23, 8.2].</td>
</tr>
<tr>
<td><strong>srs-HoppingBandwidth</strong></td>
<td>Parameter: SRS hopping bandwidth $b_{hbw}$ ∈ {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><strong>srs-MaxUpPts</strong></td>
<td>Parameter: $srsMaxUpPts$, see TS 36.211 [21, 5.5.3.2]. If this field is present, reconfiguration of $m_{SRS,0}^{max}$ applies for UpPts, otherwise reconfiguration does not apply.</td>
</tr>
<tr>
<td><strong>srs-SubframeConfig</strong></td>
<td>Parameter: SRS SubframeConfiguration. See TS 36.211, [21, table 5.5.3.3-1] applies for FDD whereas TS 36.211, [21, table 5.5.3.3-2] applies for TDD. $sc0$ corresponds to value 0, $sc1$ to value 1 and so on.</td>
</tr>
<tr>
<td><strong>transmissionComb, transmissionCombAp</strong></td>
<td>Parameter: $k_{TC}$ ∈ {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

| TDD | 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. |

---

**SPS-Config**

The IE `SPS-Config` is used to specify the semi-persistent scheduling configuration.

**SPS-Config** information element
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
      ...,
      [ p0-PersistentSubframeSet2-r12 CHOICE {
          release NULL,
          setup SEQUENCE {
            p0-NominalPUSCH-PersistentSubframeSet2-r12 INTEGER (-126..24),
            p0-UE-PUSCH-PersistentSubframeSet2-r12 INTEGER (-8..7)
          }
        } OPTIONAL -- Need ON
      }]
    }
}

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: \( n_p^{(1)}_{\text{PUCCH}} \) for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1]. Field \( n_{1\text{-PUCCH-AN-PersistentListP1} \) 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: \( P_{\text{O_NOMINAL_PUSCH}}(0) \) . 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. If uplink power control subframe sets are configured by \( \text{tpc-SubframeSet} \), this field applies for uplink power control subframe set 1.

**p0-NominalPUSCH-PersistentSubframeSet2**
Parameter: \( P_{\text{O_NOMINAL_PUSCH}}(0) \) . See TS 36.213 [23, 5.1.1.1], unit dBM step 1. This field is applicable for persistent scheduling, only. If \( p0\)-PersistentSubframeSet2-r12 is not configured, apply the value of \( p0\)-NominalPUSCH-SubframeSet2-r12 for \( p0\)-NominalPUSCH-PersistentSubframeSet2. E-UTRAN configures this field only if uplink power control subframe sets are configured by \( \text{tpc-SubframeSet} \), in which case this field applies for uplink power control subframe set 2.

**p0-UE-PUSCH-Persistent**
Parameter: \( P_{\text{O_UE_PUSCH}}(0) \) . 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. If uplink power control subframe sets are configured by \( \text{tpc-SubframeSet} \), this field applies for uplink power control subframe set 1.

**p0-UE-PUSCH-PersistentSubframeSet2**
Parameter: \( P_{\text{O_UE_PUSCH}}(0) \) . See TS 36.213 [23, 5.1.1.1], unit dB. This field is applicable for persistent scheduling, only. If \( p0\)-PersistentSubframeSet2-r12 is not configured, apply the value of \( p0\)-UE-PUSCH-SubframeSet2-r12 for \( p0\)-UE-PUSCH-PersistentSubframeSet2. E-UTRAN configures this field only if uplink power control subframe sets are configured by \( \text{tpc-SubframeSet} \), in which case this field applies for uplink power control subframe set 2.

**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.

**Conditional presence | Explanation**
---
**TDD** | 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.

---

**TDD-Config**

The IE TDD-Config is used to specify the TDD specific physical channel configuration.

**TDD-Config information element**

```
-- ASN1START
TDD-Config ::= SEQUENCE {
  subframeAssignment ENUMERATED {
    sa0, sa1, sa2, sa3, sa4, sa5, sa6},
  specialSubframePatterns ENUMERATED {
```
TDD-Config field descriptions

specialSubframePatterns
Indicates Configuration as in TS 36.211 [21, table 4.2-1] where ssp0 points to Configuration 0, ssp1 to Configuration 1 etc. Value ssp7 points to Configuration 7 for extended cyclic prefix and value ssp9 points to Configuration 9 for normal cyclic prefix. E-UTRAN signals ssp7 only when setting specialSubframePatterns (without suffix i.e. the version defined in REL-8) to ssp4. E-UTRAN signals value ssp9 only when setting specialSubframePatterns (without suffix) to ssp5. If specialSubframePatterns-v1130 is present, the UE shall ignore specialSubframePatterns (without suffix).

subframeAssignment
Indicates DL/UL subframe configuration where sa0 points to Configuration 0, sa1 to Configuration 1 etc. as specified in TS 36.211 [21, table 4.2-2]. E-UTRAN configures the same value for serving cells residing on same frequency band.

subframeAssignmentSL
Indicates UL/ DL subframe configuration where sa0 points to Configuration 0, sa1 to Configuration 1 etc. as specified in TS 36.211 [21, table 4.2-2]. The value none means that no TDD specific physical channel configuration is applicable (i.e. the carrier on which MasterInformationBlock-SL is transmitted is an FDD UL carrier).

TimeAlignmentTimer
The IE TimeAlignmentTimer is used to control how long the UE considers the serving cells belonging to the associated TAG to be uplink time aligned. Corresponds to the Timer for time alignment in TS 36.321 [6]. Value in number of sub-frames. Value sf500 corresponds to 500 sub-frames, sf750 corresponds to 750 sub-frames and so on.

TPC-PDCCH-Config
The IE TPC-PDCCH-Config is used to specify the RNTIs and indexes for PUCCH and PUSCH power control according to TS 36.212 [22]. The power control function can either be setup or released with the IE.
TPC-PDCCH-Config field descriptions

indexOfFormat3
Index of N when DCI format 3 is used. See TS 36.212 [22, 5.3.3.1.6].

IndexOfFormat3A
Index of M when DCI format 3A is used. See TS 36.212 [22, 5.3.3.1.7].

tpc-Index
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).

tpc-RNTI
RNTI for power control using DCI format 3/3A, see TS 36.212 [22].

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

UplinkPowerControlCommon ::= SEQUENCE {
p0-NominalPUSCH INTEGER (-126..24),
alpha Alpha-r12,
p0-NominalPUCCH INTEGER (-127..-96),
deltaFList-PUCCH DeltaFList-PUCCH,
deltaPreambleMsg3 INTEGER (-1..6)
}

UplinkPowerControlCommon-common-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}
}

UplinkPowerControlCommonPSCell-r12 ::= SEQUENCE {
deltaF-PUCCH-Format3-r12 ENUMERATED {deltaF-1, deltaF0, deltaF1, deltaF2, deltaF3, deltaF4, deltaF5, deltaF6},
deltaF-PUCCH-Format1bCS-r12 ENUMERATED {deltaF1, deltaF2, spare2, spare1},
p0-NominalPUCCH-r12 INTEGER (-127..-96),
deltaFList-PUCCH-r12 DeltaFList-PUCCH
}

UplinkPowerControlCommonSCell-r10 ::= SEQUENCE {
p0-NominalPUSCH-r10 INTEGER (-126..24),
alpha-r10 Alpha-r12
}

UplinkPowerControlCommonSCell-v1130 ::= SEQUENCE {
deltaPreambleMsg3-r11 INTEGER (-1..6)
}

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
}

UplinkPowerControlDedicated-v1130 ::= SEQUENCE {
pSRS-Offset-v1130 INTEGER (16..31) OPTIONAL, -- Need OR
pSRS-OffsetAp-v1130 INTEGER (16..31) OPTIONAL, -- Need OR

UplinkPowerControl
DeltaTxD-OffsetListPUCCH-v1130  DeltaTxD-OffsetListPUCCH-v1130 OPTIONAL  -- Need OR
}

UplinkPowerControlDedicated-v1250 ::= SEQUENCE {
  set2PowerControlParameter  CHOICE {
    release       NULL,
    setup       SEQUENCE {
      tpc-SubframeSet-r12     BIT STRING (SIZE(10)),
      p0-NominalPUSCH-SubframeSet2-r12  INTEGER (-126..24),
      alpha-SubframeSet2-r12    Alpha-r12,
      p0-UE-PUSCH-SubframeSet2-r12  INTEGER (-8..7)
    }
  }
}

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}
}

Alpha-r12 ::=      ENUMERATED {al0, al04, al05, al06, al07, al08, al09, all}

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}
}

DeltaTxD-OffsetListPUCCH-r10 ::=  SEQUENCE {
  deltaTxD-OffsetPUCCH-Format1-r10  ENUMERATED {dB0, dB-2},
  deltaTxD-OffsetPUCCH-Format1a-b-r10 ENUMERATED {dB0, dB-2},
  deltaTxD-OffsetPUCCH-Format2a-b-r10 ENUMERATED {dB0, dB-2},
  deltaTxD-OffsetPUCCH-Format3-r10  ENUMERATED {dB0, dB-2},
  ...
}

DeltaTxD-OffsetListPUCCH-v1130 ::=  SEQUENCE {
  deltaTxD-OffsetPUCCH-Format1bCS-r11  ENUMERATED {dB0, dB-1}
}
-- ASN1STOP
### UplinkPowerControl field descriptions

**accumulationEnabled**
Parameter: Accumulation-enabled, see TS 36.213 [23, 5.1.1.1]. TRUE corresponds to “enabled” whereas FALSE corresponds to “disabled”.

**alpha**
Parameter: $\alpha$ See TS 36.213 [23, 5.1.1.1] where $\alpha_0$ corresponds to 0, $\alpha_{04}$ corresponds to value 0.4, $\alpha_{05}$ to 0.5, $\alpha_{06}$ to 0.6, $\alpha_{07}$ to 0.7, $\alpha_{08}$ to 0.8, $\alpha_{09}$ to 0.9 and $\alpha_1$ corresponds to 1. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by tpc-SubframeSet.

**alpha-SubframeSet2**
Parameter: $\alpha$. See TS 36.213 [23, 5.1.1.1] where $\alpha_0$ corresponds to 0, $\alpha_{04}$ corresponds to value 0.4, $\alpha_{05}$ to 0.5, $\alpha_{06}$ to 0.6, $\alpha_{07}$ to 0.7, $\alpha_{08}$ to 0.8, $\alpha_{09}$ to 0.9 and $\alpha_1$ corresponds to 1. This field applies for uplink power control subframe set 2 if uplink power control subframe sets are configured by tpc-SubframeSet.

**deltaF-PUCCH-FormatX**
Parameter: $\Delta_F$ 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.

**deltaMCS-Enabled**
Parameter: $K_s$ See TS 36.213 [23, 5.1.1.1]. en0 corresponds to value 0 corresponding to state “disabled”. en1 corresponds to value 1.25 corresponding to “enabled”.

**deltaPreambleMsg3**
Parameter: $\Delta_{\text{PREAMBLE\_ MSG3}}$ see TS 36.213 [23, 5.1.1.1]. Actual value = IE value * 2 [dB].

**deltaTxD-OffsetPUCCH-FormatX**
Parameter: $\Delta_T$ for the PUCCH formats 1, 1a/1b, 1b with channel selection, 2/2a/2b and 3 when two antenna ports are configured for PUCCH transmission. See TS 36.213 [23, 5.1.2.1] where $\Delta_T$-0 corresponds to 0 dB, $\Delta_T$-1 corresponds to -1 dB, $\Delta_T$-2 corresponds to -2 dB. EUTRAN configures the field $\Delta_T$-SubframeSet-r11 for the PCell and/or the PSCell only.

**filterCoefficient**
Specifies the filtering coefficient for RSRP measurements used to calculate path loss, as specified in TS 36.213 [23, 5.1.1.1]. The same filtering mechanism applies as for quantityConfig described in 5.5.3.2.

**p0-NominalPUSCH**
Parameter: $P_{0\_\text{Nominal\_PUSCH}}$ See TS 36.213 [23, 5.1.2.1], unit dBm.

**p0-NominalPUSCH-SubframeSet2**
Parameter: $P_{0\_\text{Nominal\_PUSCH\_SubframeSet2}}$ See TS 36.213 [23, 5.1.2.1], unit dBm. This field is applicable for non-persistent scheduling only. This field applies for uplink power control subframe set 2 if uplink power control subframe sets are configured by tpc-SubframeSet.

**p0-UE-PUSCH**
Parameter: $P_{0\_\text{UE\_PUSCH}}$ See TS 36.213 [23, 5.1.2.1]. Unit dB. This field is applicable for non-persistent scheduling, only. This field applies for uplink power control subframe set 2 if uplink power control subframe sets are configured by tpc-SubframeSet.

**pathlossReferenceLinking**
Indicates whether the UE shall apply as pathloss reference either the downlink of the PCell or of the SCell that corresponds with this uplink (i.e. according to the cellIdentification within the field sCellToAddMod). For SCells part of an STAG E-UTRAN sets the value to sCell.

**pSSRS-Offset, pSSRS-OffsetAp**
Parameter: $p_{\text{SSRS\_Offset}}$ for periodic and aperiodic sounding reference signal transmission repectively. See TS 36.213 [23, 5.1.3.1]. For $K_s=1.25$, the actual parameter value is $p_{\text{SSRS\_Offset}}$ value – 3. For $K_s=0$, the actual parameter value is $-10.5 + 1.5*p_{\text{SSRS\_Offset}}$ value.

If $p_{\text{SSRS\_Offset\_v1130}}$ is included, the UE ignores $p_{\text{SSRS\_Offset}}$ (i.e., without suffix). Likewise, if $p_{\text{SSRS\_OffsetAp\_v1130}}$ is included, the UE ignores $p_{\text{SSRS\_OffsetAp\_r10}}$. For $K_s=0$, E-UTRAN does not set values larger than 26.
### UplinkPowerControl field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>tpc-SubframeSet</td>
<td>Indicates the uplink subframes (including UpPTS in special subframes) of the uplink power control subframe sets. Value 0 means the subframe belongs to uplink power control subframe set 1, and value 1 means the subframe belongs to uplink power control subframe set 2.</td>
</tr>
</tbody>
</table>

### 6.3.3 Security control information elements

#### NextHopChainingCount

The IE *NextHopChainingCount* is used to update the $K_{NB}$ key and corresponds to parameter NCC: See TS 33.401 [32, 7.2.8.4].

#### NextHopChainingCount information element

```asn1
NextHopChainingCount ::= INTEGER (0..7)
```

#### 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.

#### SecurityAlgorithmConfig information element

```asn1
SecurityAlgorithmConfig ::= SEQUENCE {
  cipheringAlgorithm     CipheringAlgorithm-r12,
  integrityProtAlgorithm    ENUMERATED {
    eia0-v920, eia1, eia2, eia3-v1130, spare4, spare3,
    spare2, spare1, ...
  }
}
CipheringAlgorithm-r12 ::= ENUMERATED {
  eea0, eea1, eea2, eea3-v1130, spare4, spare3,
  spare2, spare1, ...
}
```

#### SecurityAlgorithmConfig field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cipheringAlgorithm</td>
<td>Indicates the ciphering algorithm to be used for SRBs and DRBs, as specified in TS 33.401 [32, 5.1.3.2].</td>
</tr>
<tr>
<td>integrityProtAlgorithm</td>
<td>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).</td>
</tr>
</tbody>
</table>

#### 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 [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].

ARFCN-ValueGERAN information element

```asn1
ARFCN-ValueGERAN ::= INTEGER
```
ARFCN-ValueGERAN ::= INTEGER (0..1023)
-- ASN1STOP

— **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].

**ARFCN-ValueUTRA information element**

ARFCN-ValueUTRA ::= INTEGER (0..16383)
-- ASN1STOP

— **BandclassCDMA2000**

The IE `BandclassCDMA2000` is used to define the CDMA2000 band in which the CDMA2000 carrier frequency can be found, as defined in C.S0057 [24, table 1.5-1].

**BandclassCDMA2000 information element**

BandclassCDMA2000 ::= ENUMERATED {
  bc0, bc1, bc2, bc3, bc4, bc5, bc6, bc7, bc8,
  bc9, bc10, bc11, bc12, bc13, bc14, bc15, bc16,
  bc17, bc18-v9a0, bc19-v9a0, bc20-v9a0, bc21-v9a0,
  spare10, spare9, spare8, spare7, spare6, spare5, spare4,
  spare3, spare2, spare1, ...
}
-- ASN1STOP

— **BandIndicatorGERAN**

The IE `BandIndicatorGERAN` indicates how to interpret an associated GERAN carrier ARFCN, see TS 45.005 [20]. More specifically, the IE indicates the GERAN frequency band in case the ARFCN value can concern either a DCS 1800 or a PCS 1900 carrier frequency. For ARFCN values not associated with one of these bands, the indicator has no meaning.

**BandIndicatorGERAN information element**

BandIndicatorGERAN ::= ENUMERATED {dcs1800, pcs1900}
-- ASN1STOP

— **CarrierFreqCDMA2000**

The IE `CarrierFreqCDMA2000` used to provide the CDMA2000 carrier information.

**CarrierFreqCDMA2000 information element**

CarrierFreqCDMA2000 ::= SEQUENCE {
  bandClass       BandclassCDMA2000,
  arfcn       ARFCN-ValueCDMA2000
}
-- ASN1STOP
CarrierFreqGERAN

The IE CarrierFreqGERAN is used to provide an unambiguous carrier frequency description of a GERAN cell.

CarrierFreqGERAN information element

```
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 CarrierFreqsGERAN 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

```
CarrierFreqsGERAN ::= SEQUENCE {
    startingARFCN      ARFCN-ValueGERAN,
    bandIndicator      BandIndicatorGERAN,
    followingARFCNs      CHOICE {
        explicitListOfARFCNs    ExplicitListOfARFCNs,
        equallySpacedARFCNs     SEQUENCE {
            arfcn-Spacing      INTEGER (1..8),
            numberOfFollowingARFCNs    INTEGER (0..31)
        },
        variableBitMapOfARFCNs    OCTET STRING (SIZE (1..16))
    }
}
```

ExplicitListOfARFCNs ::= SEQUENCE (SIZE (0..31)) OF ARFCN-ValueGERAN

--- ASN1STOP
CarrierFreqsGERAN field descriptions

- **arfcn-Spacing**
  Space, \( d \), between a set of equally spaced ARFCN values.

- **bandIndicator**
  Indicates how to interpret the ARFCN of the BCCH carrier.

- **explicitListOfARFCNs**
  The remaining ARFCN values in the set are explicitly listed one by one.

- **followingARFCNs**
  Field containing a representation of the remaining ARFCN values in the set.

- **numberOfFollowingARFCNs**
  The number, \( n \), of the remaining equally spaced ARFCN values in the set. The complete set of \((n+1)\) ARFCN values is defined as: \{\(s, ((s + d) \mod 1024), ((s + 2d) \mod 1024) \ldots ((s + n*d) \mod 1024)\)\}.

- **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".

---

**CarrierFreqListMBMS**

The IE **CarrierFreqListMBMS** is used to indicate the E-UTRA ARFCN values of the one or more MBMS frequencies the UE is interested to receive.

**CarrierFreqListMBMS information element**

```asn1
CarrierFreqListMBMS-r11 ::=  SEQUENCE (SIZE (1..maxFreqMBMS-r11)) OF ARFCN-ValueEUTRA-r9
```

---

**CDMA2000-Type**

The IE **CDMA2000-Type** is used to describe the type of CDMA2000 network.

**CDMA2000-Type information element**

```asn1
CDMA2000-Type ::=     ENUMERATED {type1XRTT, typeHRPD}
```

---

**CellIdentity**

The IE **CellIdentity** is used to unambiguously identify a cell within a PLMN.

**CellIdentity information element**

```asn1
CellIdentity ::=     BIT STRING (SIZE (28))
```

---

**CellIndexList**

The IE **CellIndexList** concerns a list of cell indices, which may be used for different purposes.
CellIndexList information element

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

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 BYTE STRING (SIZE (12)),
totalZone       BYTE STRING (SIZE (3)),
zoneTimer       BYTE STRING (SIZE (3))
}
CSFB-RegistrationParam1XRTT-v920 ::= SEQUENCE {
powerDownReg-r9 ENUMERATED {true}
}

-- ASN1STOP
### CSFB-RegistrationParam1XRTT field descriptions

- **foreignNIDReg**
The CDMA2000 1xRTT NID roamer registration indicator.

- **foreignSIDReg**
The CDMA2000 1xRTT SID roamer registration indicator.

- **homeReg**
The CDMA2000 1xRTT Home registration indicator.

- **multipleNID**
The CDMA2000 1xRTT Multiple NID storage indicator.

- **multipleSID**
The CDMA2000 1xRTT Multiple SID storage indicator.

- **nid**
Used along with the `sid` as a pair to control when the UE should Register or Re-Register with the CDMA2000 1xRTT network.

- **parameterReg**
The CDMA2000 1xRTT Parameter-change registration indicator.

- **powerDownReg**
The CDMA2000 1xRTT Power-down registration indicator. If set to TRUE, the UE that has a valid / current CDMA2000 1xRTT pre-registration will perform a CDMA2000 1xRTT power down registration when it is switched off.

- **powerUpReg**
The CDMA2000 1xRTT Power-up registration indicator.

- **registrationPeriod**
The CDMA2000 1xRTT Registration period.

- **registrationZone**
The CDMA2000 1xRTT Registration zone.

- **sid**
Used along with the `nid` as a pair to control when the UE should Register or Re-Register with the CDMA2000 1xRTT network.

- **totalZone**
The CDMA2000 1xRTT Number of registration zones to be retained.

- **zoneTimer**
The CDMA2000 1xRTT Zone timer length.

---

### CellGlobalIdEUTRA

The IE `CellGlobalIdEUTRA` specifies the Evolved Cell Global Identifier (ECGI), the globally unique identity of a cell in E-UTRA.

#### CellGlobalIdEUTRA information element

```asn1
CellGlobalIdEUTRA ::=     SEQUENCE {
    plmn-Identity       PLMN-Identity,
    cellIdentity       CellIdentity
}
```

---

### CellGlobalIdEUTRA field descriptions

- **cellIdentity**
Identity of the cell within the context of the PLMN.

- **plmn-Identity**
Identifies the PLMN of the cell as given by the first PLMN entry in the `plmn-IdentityList` in `SystemInformationBlockType1`.

---

### CellGlobalIdUTRA

The IE `CellGlobalIdUTRA` specifies the global UTRAN Cell Identifier, the globally unique identity of a cell in UTRA.

#### CellGlobalIdUTRA information element

```asn1
CellGlobalIdUTRA ::=     SEQUENCE {
    cellIdentity       CellIdentity
}
```
CellGlobalIdUTRA field descriptions

- **cellIdentity**: UTRA Cell Identifier which is unique within the context of the identified PLMN as defined in TS 25.331 [19].
- **plmn-Identity**: Identifies the PLMN of the cell as given by the common PLMN broadcast in the MIB, as defined in TS 25.331 [19].

– **CellGlobalIdGERAN**

The IE *CellGlobalIdGERAN* specifies the Cell Global Identification (CGI), the globally unique identity of a cell in GERAN.

**CellGlobalIdGERAN information element**

- **cellIdentity**: Cell Identifier which is unique within the context of the GERAN location area as defined in TS 23.003 [27].
- **locationAreaCode**: A fixed length code identifying the location area within a PLMN as defined in TS 23.003 [27].
- **plmn-Identity**: Identifies the PLMN of the cell, as defined in TS 23.003 [27].

– **CellGlobalIdCDMA2000**

The IE *CellGlobalIdCDMA2000* specifies the Cell Global Identification (CGI), the globally unique identity of a cell in CDMA2000.

**CellGlobalIdCDMA2000 information element**

- **cellGlobalId1XRTT**: Unique identifier for a CDMA2000 1xRTT cell, corresponds to BASEID, SID and NID parameters (in that order) defined in C.S0005 [25].
- **cellGlobalIdHRPD**: Unique identifier for a CDMA2000 HRPD cell, corresponds to SECTOR ID parameter defined in C.S0024 [26, 14.9].
-- **CSG-Identity**

The IE *CSG-Identity* is used to identify a Closed Subscriber Group.

**CSG-Identity information element**

```plain
-- ASN1START
CSG-Identity ::= BIT STRING (SIZE (27))
-- ASN1STOP
```

-- **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**

```plain
-- ASN1START
FreqBandIndicator ::= INTEGER (1..maxFBI)
FreqBandIndicator-v9e0 ::= INTEGER (maxFBI-Plus1..maxFBI2)
FreqBandIndicator-r11 ::= INTEGER (1..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**

```plain
-- 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
    ]],
  [[ drb-ContinueROHC-r11 ENUMERATED {true}     OPTIONAL -- Cond HO
    ]]
}
MobilityControlInfoSCG-r12 ::= SEQUENCE {
  t307-r12              ENUMERATED {
    ms50, ms100, ms150, ms200, ms500, ms1000,
  -- 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.

*cipheringAlgorithmSCG*

Indicates the ciphering algorithm to be used for SCG DRBs. E-UTRAN includes the field upon SCG change when one or more SCG DRBs are configured. Otherwise E-UTRAN does not include the field.

*dl-Bandwidth*

Parameter: Downlink bandwidth, see TS 36.101 [42].

*drb-ContinueROHC*

This field indicates whether to continue or reset, for this handover, the header compression protocol context for the RLC UM bearers configured with the header compression protocol. Presence of the field indicates that the header compression protocol context continues while absence indicates that the header compression protocol context is reset. E-UTRAN includes the field only in case of a handover within the same eNB.

*rach-ConfigDedicated*

The dedicated random access parameters. If absent the UE applies contention based random access as specified in TS 36.321 [6].

*T304*

Timer T304 as described in section 7.3. ms50 corresponds with 50 ms, ms100 corresponds with 100 ms and so on.

*T307*

Timer T307 as described in section 7.3. ms50 corresponds with 50 ms, ms100 corresponds with 100 ms and so on.

*ul-Bandwidth*

Parameter: Uplink bandwidth, see TS 36.101 [42, table 5.6-1]. For TDD, the parameter is absent and it is equal to downlink bandwidth. If absent for FDD, apply the same value as applies for the downlink bandwidth.
<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDD</td>
<td>The field is mandatory with default value (the default duplex distance defined for the concerned band, as specified in TS 36.101 [42]) in case of “FDD”; otherwise the field is not present.</td>
</tr>
<tr>
<td>HO</td>
<td>This field is optionally present, need OP, in case of handover within E-UTRA when the fullConfig is not included; otherwise the field is not present.</td>
</tr>
<tr>
<td>HO-toEUTRA</td>
<td>The field is mandatory present in case of inter-RAT handover to E-UTRA; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td>HO-toEUTRA2</td>
<td>The field is absent if carrierFreq-v9e0 is present. Otherwise it is mandatory present in case of inter-RAT handover to E-UTRA and optionally present, need ON, in all other cases.</td>
</tr>
<tr>
<td>SCGEst</td>
<td>This field is mandatory present in case of SCG establishment; otherwise the field is optionally present, need ON.</td>
</tr>
</tbody>
</table>

---

**MobilityParametersCDMA2000 (1xRTT)**

The MobilityParametersCDMA2000 contains the parameters provided to the UE for handover and (enhanced) CSFB to 1xRTT support, as defined in C.S0097 [53].

**MobilityParametersCDMA2000 information element**

```
-- ASN1START
MobilityParametersCDMA2000 ::= OCTET STRING
-- ASN1STOP
```

---

**MobilityStateParameters**

The IE MobilityStateParameters contains parameters to determine UE mobility state.

**MobilityStateParameters information element**

```
-- 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**

- **n-CellChangeHigh**
  The number of cell changes to enter high mobility state. Corresponds to $N_{CR,H}$ in TS 36.304 [4].

- **n-CellChangeMedium**
  The number of cell changes to enter medium mobility state. Corresponds to $N_{CR,M}$ in TS 36.304 [4].

- **t-Evaluation**
  The duration for evaluating criteria to enter mobility states. Corresponds to $T_{CRmax}$ in TS 36.304 [4]. Value in seconds, s30 corresponds to 30 s and so on.

- **t-HystNormal**
  The additional duration for evaluating criteria to enter normal mobility state. Corresponds to $T_{CRmaxHyst}$ in TS 36.304 [4]. Value in seconds, s30 corresponds to 30 s and so on.

---

**MultiBandInfoList**

**MultiBandInfoList information element**

```
-- 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

MultiBandInfoList-r11 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-r11

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

-- 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

-- ASN1START

PhysCellId ::= INTEGER (0..503)

-- ASN1STOP

– PhysCellIdRange

The IE PhysCellIdRange is used to encode either a single or a range of physical cell identities. The range is encoded by using a start value and by indicating the number of consecutive physical cell identities (including start) in the range. For fields comprising multiple occurrences of PhysCellIdRange, E-UTRAN may configure overlapping ranges of physical cell identities.

PhysCellIdRange information element

-- ASN1START

PhysCellIdRange ::= SEQUENCE {
    start PhysCellId,
    range ENUMERATED {
        n4, n8, n12, n16, n24, n32, n48, n64, n84, n96, n128, n168, n252, n504, spare2, spare1
    } OPTIONAL -- Need OP
}

-- ASN1STOP
PhysCellIdRange field descriptions

**range**
Indicates the number of physical cell identities in the range (including start). Value n4 corresponds with 4, n8 corresponds with 8 and so on. The UE shall apply value 1 in case the field is absent, in which case only the physical cell identity value indicated by start applies.

**start**
Indicates the lowest physical cell identity in the range.

---

**PhysCellIdRangeUTRA-FDDList**

The IE PhysCellIdRangeUTRA-FDDList is used to encode one or more of PhysCellIdRangeUTRA-FDD. While the IE PhysCellIdRangeUTRA-FDD is used to encode either a single physical layer identity or a range of physical layer identities, i.e. primary scrambling codes. Each range is encoded by using a start value and by indicating the number of consecutive physical cell identities (including start) in the range.

**PhysCellIdRangeUTRA-FDDList information element**

```asn1
PhysCellIdRangeUTRA-FDDList-r9 ::=  SEQUENCE (SIZE (1..maxPhysCellIdRange-r9)) OF

PhysCellIdRangeUTRA-FDD-r9 ::=   SEQUENCE {
  start-r9       PhysCellIdUTRA-FDD,
  range-r9       INTEGER (2..512)    OPTIONAL -- Need OP
}
```

**PhysCellIdRangeUTRA-FDDList field descriptions**

**range**
Indicates the number of primary scrambling codes in the range (including start). The UE shall apply value 1 in case the field is absent, in which case only the primary scrambling code value indicated by start applies.

**start**
Indicates the lowest primary scrambling code in the range.

---

**PhysCellIdCDMA2000**

The IE PhysCellIdCDMA2000 identifies the PNOffset that represents the “Physical cell identity” in CDMA2000.

**PhysCellIdCDMA2000 information element**

```asn1
PhysCellIdCDMA2000 ::=    INTEGER (0..maxPNOffset)
```

---

**PhysCellIdGERAN**

The IE PhysCellIdGERAN contains the Base Station Identity Code (BSIC).

**PhysCellIdGERAN information element**

```asn1
PhysCellIdGERAN ::=    SEQUENCE {
  networkColourCode     BIT STRING (SIZE (3)),
  baseStationColourCode    BIT STRING (SIZE (3))
}
```
PhysCellIdGERAN field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>baseStationColourCode</td>
<td>Base station Colour Code as defined in TS 23.003 [27].</td>
</tr>
<tr>
<td>network ColourCode</td>
<td>Network Colour Code as defined in TS 23.003 [27].</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**

```plaintext
-- 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**

```plaintext
-- 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**

```plaintext
-- 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><strong>MCC</strong></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>

---

**PLMN-IdentityList3**

Includes a list of PLMN identities.

#### PLMN-IdentityList3 information element

```asn1
PLMN-IdentityList3-r11 ::= SEQUENCE (SIZE (1..16)) OF PLMN-Identity
```

---

**PreRegistrationInfoHRPD**

```asn1
PreRegistrationInfoHRPD ::= SEQUENCE {
  preRegistrationAllowed    BOOLEAN, -- cond PreRegAllowed
  preRegistrationZoneIdIdHRPD OPTIONAL, -- cond PreRegAllowed
  secondaryPreRegistrationZoneIdListHRPD OPTIONAL -- Need OR
}
SecondaryPreRegistrationZoneIdListHRPD ::= SEQUENCE (SIZE (1..2)) OF PreRegistrationZoneIdHRPD
PreRegistrationZoneIdHRPD ::= INTEGER (0..255)
```

---

### 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.

**preRegistrationZoneIdIdHRPD**
ColorCode (see C.S0024 [26], C.S0087 [44]) of the CDMA2000 Reference Cell corresponding to the HRPD sector under the HRPD AN that is configured for this LTE cell. It is used to control when the UE should register or re-register.

**secondaryPreRegistrationZoneIdListHRPD**
List of SecondaryColorCodes (see C.S0024 [26], C.S0087 [44]) of the CDMA2000 Reference Cell corresponding to the HRPD sector under the HRPD AN that is configured for this LTE cell. They are used to control when the UE should re-register.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PreRegAllowed</strong></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>
The IE $Q_{\text{QualMin}}$ is used to indicate for cell selection/re-selection the required minimum received RSRQ level in the (E-UTRA) cell. Corresponds to parameter $Q_{\text{qualmin}}$ in 36.304 [4]. Actual value $Q_{\text{qualmin}} = \text{IE value [dB]}$.

$Q_{\text{QualMin}}$ information element

\begin{verbatim}
Q-QualMin-r9 ::= INTEGER (-34..-3)
\end{verbatim}

The IE $Q_{\text{RxLevMin}}$ is used to indicate for cell selection/re-selection the required minimum received RSRP level in the (E-UTRA) cell. Corresponds to parameter $Q_{\text{rxlevmin}}$ in 36.304 [4]. Actual value $Q_{\text{rxlevmin}} = \text{IE value * 2 [dBm]}$.

$Q_{\text{RxLevMin}}$ information element

\begin{verbatim}
Q-RxLevMin ::= INTEGER (-70..-22)
\end{verbatim}

The IE $Q_{\text{OffsetRange}}$ is used to indicate a cell, CSI-RS resource or frequency specific offset to be applied when evaluating candidates for cell re-selection or when evaluating triggering conditions for measurement reporting. The value in dB. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.

$Q_{\text{OffsetRange}}$ information element

\begin{verbatim}
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}
\end{verbatim}

The IE $Q_{\text{OffsetRangeInterRAT}}$ is used to indicate a frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value in dB.

$Q_{\text{OffsetRangeInterRAT}}$ information element

\begin{verbatim}
Q-OffsetRangeInterRAT ::= INTEGER (-15..15)
\end{verbatim}

The IE $\text{ReselectionThreshold}$ 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
ReelectionThresholdQ-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

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

```
-- 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>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 ::=    BIT STRING (SIZE (16))
```

---

**T-Reselection**
The IE T-Reselection concerns the cell reselection timer TreselectionRAT for E-UTRA, UTRA, GERAN or CDMA2000. Value in seconds.

```
T-Reselection ::=     INTEGER (0..7)
```

---

**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 "Nrb" 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

```
-- ASN1START
AllowedMeasBandwidth ::= ENUMERATED {mbw6, mbw15, mbw25, mbw50, mbw75, mbw100}
-- ASN1STOP
```

CSI-RSRP-Range

The IE CSI-RSRP-Range specifies the value range used in CSI-RSRP measurements and thresholds. Integer value for CSI-RSRP measurements according to mapping table in TS 36.133 [16].

```
-- ASN1START
CSI-RSRP-Range-r12 ::= INTEGER(0..97)
-- ASN1STOP
```

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.

```
-- ASN1START
Hysteresis ::= INTEGER (0..30)
-- ASN1STOP
```

LocationInfo

The IE LocationInfo is used to transfer detailed location information available at the UE to correlate measurements and UE position information.

```
-- ASN1START
LocationInfo-r10 ::= SEQUENCE {
  locationCoordinates-r10 CHOICE {
    ellipsoid-Point-r10 OCTET STRING,
    ellipsoidPointWithAltitude-r10 OCTET STRING,
    ...,
    ellipsoidPointWithUncertaintyCircle-r11 OCTET STRING,
    ellipsoidPointWithUncertaintyEllipse-r11 OCTET STRING,
    ellipsoidPointWithAltitudeAndUncertaintyEllipse-r11 OCTET STRING,
    ellipsoidArc-r11 OCTET STRING,
    polygon-r11 OCTET STRING
  },
  horizontalVelocity-r10 OCTET STRING OPTIONAL,
  gnss-TOD-msec-r10 OCTET STRING OPTIONAL,
  ...
}
-- ASN1STOP
```
LocationInfo field descriptions

<table>
<thead>
<tr>
<th>EllipsoidArc</th>
<th>Parameter EllipsoidArc defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ellipsoid-Point</td>
<td>Parameter Ellipsoid-Point defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td>EllipsoidPointWithAltitude</td>
<td>Parameter EllipsoidPointWithAltitude defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td>EllipsoidPointWithAltitudeAndUncertaintyEllipsoid</td>
<td>Parameter EllipsoidPointWithAltitudeAndUncertaintyEllipsoid defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td>EllipsoidPointWithUncertaintyCircle</td>
<td>Parameter EllipsoidPointWithUncertaintyCircle defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td>EllipsoidPointWithUncertaintyEllipse</td>
<td>Parameter EllipsoidPointWithUncertaintyEllipse defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td>Gns-TOD-msec</td>
<td>Parameter Gns-TOD-msec defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td>HorizontalVelocity</td>
<td>Parameter HorizontalVelocity defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td>Polygon</td>
<td>Parameter Polygon defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
</tbody>
</table>

—

MBSFN-RSRQ-Range

The IE MBSFN-RSRQ-Range specifies the value range used in MBSFN RSRQ measurements. Integer value for MBSFN RSRQ measurements according to mapping table in TS 36.133 [16].

**MBSFN-RSRQ-Range information element**

```
-- ASN1START
MBSFN-RSRQ-Range-r12 ::=    INTEGER(0..31)
-- ASN1STOP
```

—

MeasConfig

The IE MeasConfig specifies measurements to be performed by the UE, and covers intra-frequency, inter-frequency and inter-RAT mobility as well as configuration of measurement gaps.

**MeasConfig information element**

```
-- ASN1START
MeasConfig ::=    SEQUENCE {
    -- Measurement objects
   _measObjectToRemoveList MeasObjectToRemoveList OPTIONAL, -- Need ON
    _measObjectToAddModList MeasObjectToAddModList OPTIONAL, -- Need ON
    -- Reporting configurations
    reportConfigToRemoveList ReportConfigToRemoveList OPTIONAL, -- Need ON
    reportConfigToAddModList ReportConfigToAddModList OPTIONAL, -- Need ON
    -- Measurement identities
    measIdToRemoveList MeasIdToRemoveList OPTIONAL, -- Need ON
    measIdToAddModList MeasIdToAddModList OPTIONAL, -- Need ON
    -- Other parameters
    quantityConfig QuantityConfig OPTIONAL, -- Need ON
    measGapConfig MeasGapConfig OPTIONAL, -- Need ON
    s-Measure RSRP-Range OPTIONAL, -- Need ON
    preRegistrationInfoHRPD PreRegistrationInfoHRPD OPTIONAL, -- Need OP
    speedStatePars CHOICE {
        release NULL,
        setup SEQUENCE {
            mobilityStateParameters MobilityStateParameters,
        }
    }
-- ASN1STOP
```
timeToTrigger-SF    OPTIONAL, -- Need ON
...,
[] measObjectToAddModList-v9e0    MeasObjectToAddModList-v9e0    OPTIONAL -- Need ON
[] allowInterruptions-r11    BOOLEAN    OPTIONAL -- Need ON
[] measScaleFactor-r12    CHOICE {
    release NULL,
    setup MeasScaleFactor-r12
})    OPTIONAL, -- Need ON
measIdToRemoveListExt-r12    MeasIdToRemoveListExt-r12    OPTIONAL, -- Need ON
measIdToAddModListExt-r12    MeasIdToAddModListExt-r12    OPTIONAL, -- Need ON
measRSRQ-OnAllSymbols-r12    BOOLEAN    OPTIONAL -- Need ON
}]
MeasIdToRemoveList ::= SEQUENCE (SIZE (1..maxMeasId)) OF MeasId
MeasIdToRemoveListExt-r12 ::= SEQUENCE (SIZE (1..maxMeasId)) OF MeasId-v1250
MeasObjectToRemoveList ::= SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectId
ReportConfigToRemoveList ::= SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigId
-- ASN1STOP

MeasConfig field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>allowInterruptions</td>
<td>Value TRUE indicates that the UE is allowed to cause interruptions to serving cells when performing measurements of deactivated SCell carriers for measCycleSCell of less than 640ms, as specified in TS 36.133 [16]. E-UTRAN enables this field only when an SCell is configured.</td>
</tr>
<tr>
<td>measGapConfig</td>
<td>Used to setup and release measurement gaps.</td>
</tr>
<tr>
<td>_measIdToRemoveList</td>
<td>List of measurement identities to remove. Field _measIdToRemoveListExt includes additional measurement identities i.e. extends the size of the measurement identity list using the general principles specified in 5.1.2.</td>
</tr>
<tr>
<td>measObjectToAddModList</td>
<td>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).</td>
</tr>
<tr>
<td>measObjectToRemoveList</td>
<td>List of measurement objects to remove.</td>
</tr>
<tr>
<td>measRSRQ-OnAllSymbols</td>
<td>Value TRUE indicates that the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. If widebandRSRQ-Meas is enabled for the frequency in MeasObjectEUTRA, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols with wider bandwidth for concerned frequency in accordance with TS 36.214 [48].</td>
</tr>
<tr>
<td>measScaleFactor</td>
<td>Even if reducedMeasPerformance is not included in any measObjectEUTRA or measObjectUTRA, E-UTRAN may configure this field. The UE behavior is specified in TS 36.133 [16].</td>
</tr>
<tr>
<td>PreRegistrationInfoHRPD</td>
<td>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.</td>
</tr>
<tr>
<td>reportConfigToRemoveList</td>
<td>List of measurement reporting configurations to remove.</td>
</tr>
<tr>
<td>s-Measure</td>
<td>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.</td>
</tr>
<tr>
<td>timeToTrigger-SF</td>
<td>The timeToTrigger in ReportConfigEUTRA and in ReportConfigInterRAT are multiplied with the scaling factor applicable for the UE’s speed state.</td>
</tr>
</tbody>
</table>

— MeasDS-Config

The IE MeasDS-Config specifies information applicable for discovery signals measurement.
MeasDS-Config information elements

--- ASN1START

```
MeasDS-Config-r12 ::= CHOICE {
  release       NULL,
  setup        SEQUENCE {
    dmtc-PeriodOffset-r12 CHOICE {
      ms40-r12      INTEGER(0..39),
      ms80-r12      INTEGER(0..79),
      ms160-r12     INTEGER(0..159),
      ...
    },
    ds-OccasionDuration-r12 CHOICE {
      durationFDD-r12   INTEGER(1..maxDS-Duration-r12),
      durationTDD-r12   INTEGER(2..maxDS-Duration-r12)
    },
    measCSI-RS-ToRemoveList-r12 MeasCSI-RS-ToRemoveList-r12 OPTIONAL, -- Need ON
    measCSI-RS-ToAddModList-r12 MeasCSI-RS-ToAddModList-r12 OPTIONAL, -- Need ON
    ...
  }
}
MeasCSI-RS-ToRemoveList-r12 ::= SEQUENCE (SIZE (1..maxCSI-RS-Meas-r12)) OF MeasCSI-RS-Id-r12
MeasCSI-RS-ToAddModList-r12 ::= SEQUENCE (SIZE (1..maxCSI-RS-Meas-r12)) OF MeasCSI-RS-Config-r12
MeasCSI-RS-Id-r12 ::= INTEGER (1..maxCSI-RS-Meas-r12)
MeasCSI-RS-Config-r12 ::= SEQUENCE {
  measCSI-RS-Id-r12    MeasCSI-RS-Id-r12,
  physCellId-r12     INTEGER (0..503),
  scramblingIdentity-r12   INTEGER (0..503),
  resourceConfig-r12    INTEGER (0..31),
  subframeOffset-r12    INTEGER (0..4),
  csi-RS-IndividualOffset-r12  Q-OffsetRange,
  ...
}
--- ASN1STOP
```

MeasDS-Config field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>csi-RS-individualOffset</td>
<td>CSI-RS individual offset applicable to a specific CSI-RS resource. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.</td>
</tr>
<tr>
<td>dmtc-PeriodOffset</td>
<td>Indicates the discovery signals measurement timing configuration (DMTC) periodicity (dmtc-Periodicity) and offset (dmtc-Offset) for this frequency. For DMTC periodicity, value ms40 corresponds to 40ms, ms80 corresponds to 80ms and so on. The value of DMTC offset is in number of subframe(s). The duration of a DMTC occasion is 6ms.</td>
</tr>
<tr>
<td>ds-OccasionDuration</td>
<td>Indicates the duration of discovery signal occasion for this frequency. Discovery signal occasion duration is common for all cells transmitting discovery signals on one frequency.</td>
</tr>
<tr>
<td>measCSI-RS-ToAddModList</td>
<td>List of CSI-RS resources to add/ modify in the CSI-RS resource list for discovery signals measurement.</td>
</tr>
<tr>
<td>measCSI-RS-ToRemoveList</td>
<td>List of CSI-RS resources to remove from the CSI-RS resource list for discovery signals measurement.</td>
</tr>
<tr>
<td>physCellId</td>
<td>Indicates the physical cell identity where UE may assume that the CSI-RS and the PSS/SSS/CRS corresponding to the indicated physical cell identity are quasi co-located with respect to average delay and doppler shift.</td>
</tr>
<tr>
<td>resourceConfig</td>
<td>Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2].</td>
</tr>
<tr>
<td>scramblingIdentity</td>
<td>Parameter: Pseudo-random sequence generator parameter, ( n_{\text{id}} ), see TS 36.213 [23, 7.2.5].</td>
</tr>
<tr>
<td>subframeOffset</td>
<td>Indicates the subframe offset between SSS of the cell indicated by physCellId and the CSI-RS resource in a discovery signal occasion.</td>
</tr>
</tbody>
</table>
The IE *MeasGapConfig* specifies the measurement gap configuration and controls setup/release of measurement gaps.

### MeasGapConfig information element

```asn1
MeasGapConfig ::= CHOICE {
  release        NULL,
  setup        SEQUENCE {
    gapOffset       CHOICE {
      gp0         INTEGER (0..39),
      gp1         INTEGER (0..79),
      ...
    }
  }
}
```

**MeasGapConfig field descriptions**

**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].

---

The IE *MeasId* is used to identify a measurement configuration, i.e., linking of a measurement object and a reporting configuration.

### MeasId information element

```asn1
MeasId ::= INTEGER (1..maxMeasId)
MeasId-v1250 ::= INTEGER (maxMeasId-Plus1..maxMeasId-r12)
```

---

The IE *MeasIdToAddModList* concerns a list of measurement identities to add or modify, with for each entry the `measId`, the associated `measObjectId` and the associated `reportConfigId`. Field `measIdToAddModListExt` includes additional measurement identities i.e. extends the size of the measurement identity list using the general principles specified in 5.1.2.

### MeasIdToAddModList information element

```asn1
MeasIdToAddModList ::= SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddMod
MeasIdToAddModListExt-r12 ::= SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddModExt-r12
```

```asn1
MeasIdToAddMod ::= SEQUENCE {
  measId        MeasId,
  measObjectId      MeasObjectId,
  reportConfigId      ReportConfigId
}
```

```asn1
MeasIdToAddModExt-r12 ::= SEQUENCE {
  measId-v1250      MeasId-v1250,
  measObjectId-r12     MeasObjectId,
  reportConfigId-r12     ReportConfigId
}
MeasObjectCDMA2000

The IE MeasObjectCDMA2000 specifies information applicable for inter-RAT CDMA2000 neighbouring cells.

MeasObjectCDMA2000 information element

MeasObjectCDMA2000 ::= SEQUENCE {
  cdma2000-Type      CDMA2000-Type,
  carrierFreq       CarrierFreqCDMA2000,
  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
}

MeasObjectCDMA2000 field descriptions

carrierInfo
Identifies CDMA2000 carrier frequency for which this configuration is valid.

cdma2000-Type
The type of CDMA2000 network: CDMA2000 1xRTT or CDMA2000 HRPD.

cellIndex
Entry index in the neighbouring cell list.

cellsToAddModList
List of cells to add/modify in the neighbouring cell list.

cellsToRemoveList
List of cells to remove from the neighbouring cell list.

physCellId
CDMA2000 Physical cell identity of a cell in neighbouring cell list expressed as PNOffset.

searchWindowSize
Provides the search window size to be used by the UE for the neighbouring pilot, see C.S0005 [25].

MeasObjectEUTRA

The IE MeasObjectEUTRA specifies information applicable for intra-frequency or inter-frequency E-UTRA cells.

MeasObjectEUTRA information element

MeasObjectEUTRA ::= SEQUENCE {
  carrierFreq       ARFCN-ValueEUTRA,
  allowedMeasBandwidth    AllowedMeasBandwidth,
  presenceAntennaPort1    PresenceAntennaPort1,
  neighCellConfig      NeighCellConfig,
  offsetFreq       Q-OffsetRange DEFAULT dB0,
  -- Cell list
  cellsToRemoveList     CellIndexList OPTIONAL, -- Need ON
  cellsToAddModList     CellsToAddModList OPTIONAL, -- Need ON
  -- Black list
  blackCellsToRemoveList     CellIndexList OPTIONAL, -- Need ON
  blackCellsToAddModList     BlackCellsToAddModList OPTIONAL, -- Need ON
cellForWhichToReportCGI  

...,

[[measCycleSCell-r10  
    MeasCycleSCell-r10  OPTIONAL,  -- Need ON  
    measSubframePatternConfigNeigh-r10  
    MeasSubframePatternConfigNeigh-r10  OPTIONAL  
    -- Need ON  
]],

[[widebandRSRQ-Meas-r11  
    BOOLEAN OPTIONAL  -- Cond WB-RSRQ  
]],

[[altTTT-CellsToRemoveList-r12  
    CellIndexList  OPTIONAL,  -- Need ON  
    altTTT-CellsToAddModList-r12  
    AltTTT-CellsToAddModList-r12  OPTIONAL,  -- Need ON  
    t312-r12  
    release  
    setup  
    NULL,  
    ENUMERATED {ms0, ms50, ms100, ms200,  
    ms300, ms400, ms500, ms1000}  
    OPTIONAL,  -- Need ON  
    reducedMeasPerformance-r12  
    BOOLEAN OPTIONAL  -- Cond WB-RSRQ  
    -- 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 {  
        measSubframePatternConfigNeigh-r10  
          MeasSubframePattern-r10,  
        measSubframeCellList-r10  
          MeasSubframeCellList-r10  
            OPTIONAL  
              -- Cond always  
      }  
    }

MeasSubframeCellList-r10 ::=  

  SEQUENCE (SIZE (1..maxCellMeas)) OF PhysCellIdRange  

AltTTT-CellsToAddModList-r12 ::=  

  SEQUENCE (SIZE (1..maxCellMeas)) OF AltTTT-CellsToAddMod-r12  

AltTTT-CellsToAddMod-r12 ::= SEQUENCE {  
    cellIndex-r12     INTEGER (1..maxCellMeas),  
    physCellIdRange-r12  
      PhysCellIdRange  
  }

-- ASN1STOP
### MeasObjectEUTRA field descriptions

#### altTTT-CellsToAddModList
List of cells to add/modify in the cell list for which the alternative time to trigger specified by alternativeTimeToTrigger in reportConfigEUTRA, if configured, applies.

#### altTTT-CellsToRemoveList
List of cells to remove from the list of cells for alternative time to trigger.

#### blackCellsToAddModList
List of cells to add/modify in the black list of cells.

#### blackCellsToRemoveList
List of cells to remove from the black list 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.

#### measDS-Config
Parameters applicable to discovery signals measurement on the carrier frequency indicated by carrierFreq.

#### 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.

#### reducedMeasPerformance
If set to TRUE, the EUTRA carrier frequency is configured for reduced measurement performance, otherwise it is configured for normal measurement performance, see TS 36.133 [16].

#### t312
The value of timer T312. Value ms0 represents 0 ms, ms50 represents 50 ms and so on.

#### widebandRSRQ-Meas
If this field is set to TRUE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16].

### Conditional presence

<table>
<thead>
<tr>
<th></th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>always</td>
<td>The field is mandatory present.</td>
</tr>
<tr>
<td>WB-RRSRQ</td>
<td>The field is optionally present, need ON, if the measurement bandwidth indicated by allowedMeasBandwidth is 50 resource blocks or larger; otherwise it is not present and the UE shall delete any existing value for this field, if configured.</td>
</tr>
</tbody>
</table>

---

**MeasObjectGERAN**

The IE MeasObjectGERAN specifies information applicable for inter-RAT GERAN neighbouring frequencies.
MeasObjectGERAN information element

```
MeasObjectGERAN ::= SEQUENCE {
  carrierFreqs      CarrierFreqsGERAN,
  offsetFreq       Q-OffsetRangeInterRAT DEFAULT 0,
  ncc-Permitted      BIT STRING(SIZE (8)) DEFAULT '11111111'B,
  cellForWhichToReportCGI    PhysCellIdGERAN OPTIONAL, -- Need ON
  ...
}
```

MeasObjectGERAN field descriptions

- **ncc-Permitted**
  Field encoded as a bit map, where bit N is set to "0" if a BCCH carrier with NCC = N-1 is not permitted for monitoring and set to "1" if a BCCH carrier with NCC = N-1 is permitted for monitoring; N = 1 to 8; bit 1 of the bitmap is the leading bit of the bit string.

- **carrierFreqs**
  If E-UTRAN includes `cellForWhichToReportCGI`, it includes only one GERAN ARFCN value in `carrierFreqs`.

---

MeasObjectId

The IE `MeasObjectId` used to identify a measurement object configuration.

```
MeasObjectId ::= INTEGER (1..maxObjectId)
```

---

MeasObjectToAddModList

The IE `MeasObjectToAddModList` concerns a list of measurement objects to add or modify.

```
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
}
```

---
Conditional presence | Explanation
---|---
eutra | 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 and the UE shall delete any existing value for this field.

---

MeasObjectUTRA

The IE MeasObjectUTRA specifies information applicable for inter-RAT UTRA neighbouring cells.

**MeasObjectUTRA information element**

```asn1
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 ]],
[[ reducedMeasPerformance-r12 BOOLEAN OPTIONAL -- Need ON ]]
}

CellsToAddModListUTRA-FDD ::=  SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModUTRA-FDD

CellsToAddModUTRA-FDD ::= SEQUENCE {
cellIndex       INTEGER (1..maxCellMeas),
physCellId       PhysCellIdUTRA-FDD
}

CellsToAddModListUTRA-TDD ::=  SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModUTRA-TDD

CellsToAddModUTRA-TDD ::= SEQUENCE {
cellIndex       INTEGER (1..maxCellMeas),
physCellId       PhysCellIdUTRA-TDD
}

CSG-AllowedReportingCells-r9 ::= SEQUENCE {
physCellIdRangeUTRA-FDList-r9 PhysCellIdRangeUTRA-FDList-r9 OPTIONAL -- Need OR
}
```

-- ASN1STOP
### MeasObjectUTRA field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>carrierFreq</td>
<td>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.</td>
</tr>
<tr>
<td>cellIndex</td>
<td>Entry index in the neighbouring cell list.</td>
</tr>
<tr>
<td>cellsToAddModListUTRA-FDD</td>
<td>List of UTRA FDD cells to add/modify in the neighbouring cell list.</td>
</tr>
<tr>
<td>cellsToAddModListUTRA-TDD</td>
<td>List of UTRA TDD 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>csg-allowedReportingCells</td>
<td>One or more ranges of physical cell identities for which UTRA-FDD reporting is allowed.</td>
</tr>
<tr>
<td>reducedMeasPerformance</td>
<td>If set to <code>TRUE</code> the UTRA carrier frequency is configured for reduced measurement performance, otherwise it is configured for normal measurement performance, see TS 36.133 [16].</td>
</tr>
</tbody>
</table>

---

### MeasResults

The IE `MeasResults` covers measured results for intra-frequency, inter-frequency and inter-RAT mobility.

#### MeasResults information element

```asn1
MeasResults ::= SEQUENCE {
  measId MeasId,
  measResultPCell SEQUENCE {
    rsrpResult RSRP-Range,
    rsrqResult RSRQ-Range
  },
  measResultNeighCells CHOICE {
    measResultListEUTRA MeasResultListEUTRA,
    measResultListUTRA MeasResultListUTRA,
    measResultListGERAN MeasResultListGERAN,
    measResultsCDMA2000 MeasResultsCDMA2000,
    ...
  } OPTIONAL,
  ...
  [ [ measResultForECID-r9 MeasResultForECID-r9 OPTIONAL ] ],
  [ [ locationInfo-r10 LocationInfo-r10 OPTIONAL ],
    measResultServFreqList-r10 MeasResultServFreqList-r10 OPTIONAL ]
  [ [ measId-v1250 MeasId-v1250 OPTIONAL,
    measResultPCell-v1250 RSRQ-Range-v1250 OPTIONAL,
}

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,
    ...
    [ [ additionalSI-Info-r9 AdditionalSI-Info-r9 OPTIONAL ] ],
    [ [ primaryPLMN-Suitable-r12 ENUMERATED {true} OPTIONAL ] ]
  } 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,
  ...,
  [ [ measResultSCell-v1250     RSRQ-Range-v1250 OPTIONAL,
      measResultBestNeighCell-v1250 RSRQ-Range-v1250 OPTIONAL ] ]
}

MeasResultCSI-RS-List-r12 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultCSI-RS-r12

MeasResultCSI-RS-r12 ::= SEQUENCE {
  measCSI-RS-Id-r12       MeasCSI-RS-Id-r12,
  csi-RSRP-Result-r12     CSI-RSRP-Range-r12,
  ...,
  [ [ additionalSI-Info-r9  AdditionalSI-Info-r9  OPTIONAL ] ],
  [ [ primaryPLMN-Suitable-r12 ENUMERATED {true}  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 ] ],
    [ [ primaryPLMN-Suitable-r12 ENUMERATED {true}  OPTIONAL ] ]
  }
}

MeasResultListGERAN ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultGERAN

MeasResultGERAN ::= SEQUENCE {
  carrierFreq            CarrierFreqGERAN,
  physCellId             PhysCellIdGERAN,
  cgi-Info               SEQUENCE {
    cellGlobalId          CellGlobalIdGERAN,
    routingAreaCode       BIT STRING (SIZE (8)) OPTIONAL
  },
  measResult              SEQUENCE {
    rssi        INTEGER (0..63),
    ...,
  }}

MeasResultsCDMA2000 ::= SEQUENCE {
  preRegistrationStatusHRPD  BOOLEAN,
 _measResultListCDMA2000 MeasResultListCDMA2000
}

MeasResultListCDMA2000 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultCDMA2000

MeasResultCDMA2000 ::= SEQUENCE {
  physCellId             PhysCellIdCDMA2000,
  cgi-Info               CellGlobalIdCDMA2000 OPTIONAL,
  measResult              SEQUENCE {
    pilotPnPhase           INTEGER (0..32767) OPTIONAL,
MeasResults field descriptions

csg-MemberStatus
Indicates whether or not the UE is a member of the CSG of the neighbour cell.

currentSFN
Indicates the current system frame number when receiving the UE Rx-Tx time difference measurement results from lower layer.

locationAreaCode
A fixed length code identifying the location area within a PLMN, as defined in TS 23.003 [27].

measId
Identifies the measurement identity for which the reporting is being performed. If the measId-v1250 is included, the measId (i.e. without a suffix) is ignored by eNB.

measResult
Measured result of an E-UTRA cell;
Measured result of a UTRA cell;
Measured result of a GERAN cell or frequency; or
Measured result of a CDMA2000 cell.
Measured result of UE Rx–Tx time difference.

measResultCSI-RS-List
Measured results of the CSI-RS resources in discovery signals measurement.

measResultListCDMA2000
List of measured results for the maximum number of reported best cells for a CDMA2000 measurement identity.

measResultListEUTRA
List of measured results for the maximum number of reported best cells for an E-UTRA measurement identity.

measResultListGERAN
List of measured results for the maximum number of reported best cells or frequencies for a GERAN measurement identity.

measResultListUTRA
List of measured results for the maximum number of reported best cells for a UTRA measurement identity.

measResultPCell
Measured result of the PCell.

measResultsCDMA2000
Contains the CDMA2000 HRPD pre-registration status and the list of CDMA2000 measurements.

MeasResultServFreqList
Measured results of the serving frequencies: the measurement result of each SCell, if any, and of the best neighbouring cell on each serving frequency.

pilotPnPhase
Indicates the arrival time of a CDMA2000 pilot, measured relative to the UE’s time reference in units of PN chips, see C.S0005 [25]. This information is used in either SRVCC handover or enhanced 1xRTT CS fallback procedure to CDMA2000 1xRTT.

pilotStrength

plmn-IdentityList
The list of PLMN Identity read from broadcast information when the multiple PLMN Identities are broadcast.

preRegistrationStatusHRPD
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.
MeasResults field descriptions

routingAreaCode
The RAC identity read from broadcast information, as defined in TS 23.003 [27].

rsrpResult
Measured RSRP result of an E-UTRA cell.
The rsrpResult is only reported if configured by the eNB.

rsrqResult
Measured RSRQ result of an E-UTRA cell.
The rsrqResult is only reported if configured by the eNB.

rsi
GERAN Carrier RSSI. RXLEV is mapped to a value between 0 and 63, TS 45.008 [28]. When mapping the RXLEV value to the RSSI bit string, the first/lastmost bit of the bit string contains the most significant bit.

ue-RxTxTimeDiffResult
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].

utra-EcN0
According to CPICH_Ec/No in TS 25.133 [29] for FDD. Fourteen spare values. The field is not present for TDD.

utra-RSCP

MeasScaleFactor

The IE MeasScaleFactor specifies the factor for scaling the measurement performance requirements in TS 36.133 [16].

MeasScaleFactor information element

QuantityConfig

The IE QuantityConfig specifies the measurement quantities and layer 3 filtering coefficients for E-UTRA and inter-RAT measurements.
**filterCoefficientCSI-RSRP-r12**
FilterCoefficient  OPTIONAL  -- Need OR

---

**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}
}

---

**QuantityConfig** field descriptions

---

**filterCoefficient2-FDD**
Specifies the filtering coefficient used for the UTRAN FDD measurement quantity, which is not included in measQuantityUTRA-FDD, when reportQuantityUTRA-FDD is present in ReportConfigInterRAT.

**filterCoefficientCSI-RSRP**
Specifies the filtering coefficient used for CSI-RSRP.

**filterCoefficientRSRP**
Specifies the filtering coefficient used for RSRP.

**filterCoefficientRSRQ**
Specifies the filtering coefficient used for RSRQ.

**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.

---

**ReportConfigEUTRA**

The IE ReportConfigEUTRA specifies criteria for triggering of an E-UTRA measurement reporting event. The E-UTRA measurement reporting events concerning CRS are labelled AN with N equal to 1, 2 and so on.
Event A1: Serving becomes better than absolute threshold;
Event A2: Serving becomes worse than absolute threshold;
Event A3: Neighbour becomes amount of offset better than PCell/ PSCell;
Event A4: Neighbour becomes better than absolute threshold;
Event A5: PCell/ PSCell becomes worse than absolute threshold1 AND Neighbour becomes better than another absolute threshold2.
Event A6: Neighbour becomes amount of offset better than SCell.

The E-UTRA measurement reporting events concerning CSI-RS are labelled C\textsubscript{N} with \(N\) equal to 1 and 2.
Event C1: CSI-RS resource becomes better than absolute threshold;
Event C2: CSI-RS resource becomes amount of offset better than reference CSI-RS resource.

\textit{ReportConfigEUTRA} information element

```asn1
ReportConfigEUTRA ::= SEQUENCE {
  triggerType      CHOICE {
    event        SEQUENCE {
      eventId        CHOICE {
        eventA1        SEQUENCE {
          a1-Threshold      ThresholdEUTRA
        },
        eventA2        SEQUENCE {
          a2-Threshold      ThresholdEUTRA
        },
        eventA3        SEQUENCE {
          a3-Offset       INTEGER (-30..30), reportOnLeave BOOLEAN
        },
        eventA4        SEQUENCE {
          a4-Threshold      ThresholdEUTRA
        },
        eventA5        SEQUENCE {
          a5-Threshold1      ThresholdEUTRA,
          a5-Threshold2      ThresholdEUTRA
        },
        ...
        eventA6-r10       SEQUENCE {
          a6-Offset-r10      INTEGER (-30..30),
          a6-ReportOnLeave-r10    BOOLEAN
        },
        eventC1-r12       SEQUENCE {
          c1-Threshold-r12     ThresholdEUTRA-v1250,
          c1-ReportOnLeave-r12    BOOLEAN
        },
        ...
      },
  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
```
```asn1
-module (
  [includeLocationInfo-r10 ENUMERATED {true} OPTIONAL, -- Need OR
   reportAddNeighMeas-r10 ENUMERATED {setup} OPTIONAL -- Need OR
  ],
  [alternativeTimeToTrigger-r12 CHOICE {
    release NULL,
    setup TimeToTrigger
  } OPTIONAL, -- Need ON
   useT312-r12 BOOLEAN OPTIONAL, -- Need ON
   usePSCell-r12 BOOLEAN OPTIONAL, -- Need ON
   aN-Threshold1-v1250 RSRQ-RangeConfig-r12 OPTIONAL, -- Need ON
   a5-Threshold2-v1250 RSRQ-RangeConfig-r12 OPTIONAL, -- Need ON
   reportStrongestCSI-RSs-r12 BOOLEAN OPTIONAL, -- Need ON
   reportCRS-Meas-r12 BOOLEAN OPTIONAL, -- Need ON
   triggerQuantityCSI-RS-r12 BOOLEAN OPTIONAL -- Need ON
  }]
)

RSRQ-RangeConfig-r12 := CHOICE {
  release NULL,
  setup RSRQ-Range-v1250
}

ThresholdEUTRA := CHOICE {
  threshold-RSRP RSRP-Range,
  threshold-RSRQ RSRQ-Range
}

ThresholdEUTRA-v1250 := CSI-RSRP-Range-r12

-- ASN.1 STOP
```
ReportConfigEUTRA field descriptions

**a3-Offset/ a6-Offset/ c2-Offset**  
Offset value to be used in EUTRA measurement report triggering condition for event a3/ a6/ c2. The actual value is IE value + 0.5 dB.

**alternativeTimeToTrigger**  
Indicates the time to trigger applicable for cells specified in altTTT-CellsToAddModList of the associated measurement object, if configured.

**aN-ThresholdM/ cN-ThresholdM**  
Threshold to be used in EUTRA measurement report triggering condition for event number aN/ cN. If multiple thresholds are defined for event number aN/ cN, the thresholds are differentiated by M.

**c1-ReportOnLeave/ c2-ReportOnLeave**  
Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a CSI-RS resource in csi-RS-TriggeredList, as specified in 5.5.4.1.

**c2-RefCSI-RS**  
Identity of the CSI-RS resource from the measCSI-RS-ToAddModList of the associated measObject, to be used as the reference CSI-RS resource in EUTRA measurement report triggering condition for event c2.

**eventId**  
Choice of E-UTRA event triggered reporting criteria. EUTRAN may set this field to eventIdC1 or eventIdC2 only if measDS-Config is configured in the associated measObject with one or more CSI-RS resources.

**maxReportCells**  
Max number of cells, excluding the serving cell, to include in the measurement report concerning CRS, and max number of CSI-RS resources to include in the measurement report concerning CSI-RS.

**reportAmount**  
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.

**reportCRS-Meas**  
Indicates that UE shall include rsrp, rsrq together with csi-rsrp in the measurement report, if possible.

**reportOnLeave/ a6-ReportOnLeave**  
Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a cell in cellsTriggeredList, as specified in 5.5.4.1.

**reportQuantity**  
The quantities to be included in the measurement report. The value both means that both the rsrp and rsrq quantities are to be included in the measurement report. In case triggerQuantityCSI-RS is included, only value sameAsTriggerQuantity applies.

**reportStrongestCSI-RSs**  
Indicates that periodical CSI-RS measurement report is performed. EUTRAN configures value TRUE only if measDS-Config is configured in the associated measObject with one or more CSI-RS resources.

**si-RequestForHO**  
The field applies to the reportCGI functionality, and when the field is included, the UE is allowed to use autonomous gaps in acquiring system information from the neighbour cell, applies a different value for T321, and includes different fields in the measurement report.

**ThresholdEUTRA**  
For RSRP: RSRP based threshold for event evaluation. The actual value is IE value – 140 dBm.  
For RSRQ: RSRQ based threshold for event evaluation. The actual value is (IE value – 40)/2 dB.  
For CSI-RSRP: CSI-RSRP based threshold for event evaluation. The actual value is IE value – 140 dBm.  
EUTRAN configures the same threshold quantity for all the thresholds of an event.

**timeToTrigger**  
Time during which specific criteria for the event needs to be met in order to trigger a measurement report.

**triggerQuantity**  
The quantity used to evaluate the triggering condition for the event concerning CRS. EUTRAN sets the value according to the quantity of the ThresholdEUTRA for this event. The values rsrp and rsrq correspond to Reference Signal Received Power (RSRP) and Reference Signal Received Quality (RSRQ), see TS 36.214 [48].

**triggerQuantityCSI-RS**  
The quantity used to evaluate the triggering condition for the event concerning CSI-RS. The value TRUE corresponds to CSI Reference Signal Received Power (CSI-RSRP), see TS 36.214 [48]. E-UTRAN configures value TRUE if and only if the measurement reporting event concerns CSI-RS.

**ue-RxTxTimeDiffPeriodical**  
If this field is present, the UE shall perform UE Rx-Tx time difference measurement reporting and ignore the fields triggerQuantity, reportQuantity and maxReportCells. If the field is present, the only applicable values for the corresponding triggerType and purpose are periodical and reportStrongestCells respectively.

**usePSCell**  
If this field is set to TRUE the UE shall use the PSCell instead of the PCell. E-UTRAN configures value TRUE only TRUE events A3 and A5, see 5.5.4.4 and 5.5.4.6.

**useT312**  
If value TRUE is configured, the UE shall use the timer T312 with the value t312 as specified in the corresponding measObject. If the corresponding measObject does not include the timer T312 then the timer T312 is considered as not configured. E-UTRAN configures value TRUE only if triggerType is set to event.
---

**ReportConfigId**

The IE *ReportConfigId* is used to identify a measurement reporting configuration.

**ReportConfigId information element**

```
--- ASN1START
ReportConfigId ::= INTEGER (1..maxReportConfigId)
--- ASN1STOP
```

---

**ReportConfigInterRAT**

The IE *ReportConfigInterRAT* specifies criteria for triggering of an inter-RAT measurement reporting event. The inter-RAT measurement reporting events 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 [25] for details.

**ReportConfigInterRAT information element**

```
--- ASN1START
ReportConfigInterRAT ::= SEQUENCE {
  triggerType          CHOICE {
    event       SEQUENCE {
      eventId     CHOICE {
        eventB1     SEQUENCE {
          b1-Threshold CHOICE {
            b1-ThresholdUTRA ThresholdUTRA,
            b1-ThresholdGERAN  ThresholdGERAN,
            b1-ThresholdCDMA2000 ThresholdCDMA2000
          },
          eventB2     SEQUENCE {
            b2-Threshold1 ThresholdUTRA,
            b2-Threshold2 CHOICE {
              b2-Threshold2UTRA  ThresholdUTRA,
              b2-Threshold2GERAN ThresholdGERAN,
              b2-Threshold2CDMA2000 ThresholdCDMA2000
            },
            ...
          },
          hysteresis Hysteresis,
          timeToTrigger TimeToTrigger
        },
        eventB2     SEQUENCE {
          b2-Threshold1 ThresholdUTRA,
          b2-Threshold2 CHOICE {
            b2-Threshold2UTRA  ThresholdUTRA,
            b2-Threshold2GERAN ThresholdGERAN,
            b2-Threshold2CDMA2000 ThresholdCDMA2000
          },
          ...
        },
        maxReportCells INTEGER (1..maxCellReport),
        reportInterval ReportInterval,
        reportAmount   ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
      }
    }
  }
  periodical       SEQUENCE {
    purpose         ENUMERATED {
      reportStrongestCells, reportStrongestCellsForSON, reportCGI
    }
  }
}
--- ASN1STOP
ReportConfigInterRAT field descriptions

bN-ThresholdM
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.

eventId
Choice of inter-RAT event triggered reporting criteria.

maxReportCells
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.

Purpose
reportStrongestCellsForSON applies only in case reportConfig is linked to a measObject set to measObjectUTRA or measObjectCDMA2000.

reportAmount
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.

reportQuantityUTRA-FDD
The quantities to be included in the UTRA measurement report. The value both means that both the cpich RSCP and cpich EcN0 quantities are to be included in the measurement report.

si-RequestForHO
The field applies to the reportCGI functionality, and when the field is included, the UE is allowed to use autonomous gaps in acquiring system information from the neighbour cell, applies a different value for T321, and includes different fields in the measurement report.

ThresholdGERAN
The actual value is IE value – 110 dBm.

ThresholdUTRA
utra-RSCP corresponds to CPICH_RSCP in TS 25.133 [29] for FDD and P-CCPCH_RSCP in TS 25.123 [30] for TDD.utra-EcN0 corresponds to CPICH_Ec/No in TS 25.133 [29] for FDD, and is not applicable for TDD.

For utra-RSCP: The actual value is IE value – 115 dBm.
For utra-EcN0: The actual value is (IE value – 49)/2 dB.

timeToTrigger
Time during which specific criteria for the event needs to be met in order to trigger a measurement report.

---

Conditional presence | Explanation
---------------------|--------------------------------------------------
reportCGI            | The field is optional, need OR, in case purpose is included and set to reportCGI; otherwise the field is not present and the UE shall delete any existing value for this field.

ReportConfigToAddModList
The IE ReportConfigToAddModList concerns a list of reporting configurations to add or modify
ReportConfigToAddModList information element

```asn
ReportConfigToAddModList ::= SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigToAddMod

ReportConfigToAddMod ::= SEQUENCE {
    reportConfigId ReportConfigId,
    reportConfig CHOICE {
        reportConfigEUTRA ReportConfigEUTRA,
        reportConfigInterRAT ReportConfigInterRAT
    }
}
```

---

ReportInterval

The `ReportInterval` indicates the interval between periodical reports. The `ReportInterval` is applicable if the UE performs periodical reporting (i.e. when `reportAmount` exceeds 1), for `triggerType` `event` as well as for `triggerType` `periodical`. Value `ms120` corresponds with 120 ms, `ms240` corresponds with 240 ms and so on, while value `min1` corresponds with 1 min, `min6` corresponds with 6 min and so on.

```asn
ReportInterval ::= ENUMERATED {
    ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240,
    min1, min6, min12, min30, min60, spare3, spare2, spare1
}
```

---

RSRP-Range

The `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].

```asn
RSRP-Range ::= INTEGER(0..97)

RSRP-RangeSL-r12 ::= INTEGER(0..13)

RSRP-RangeSL2-r12 ::= INTEGER(0..7)

RSRP-RangeSL3-r12 ::= INTEGER(0..11)
```

---

**RSRP-Range field descriptions**

<table>
<thead>
<tr>
<th>RSRP-RangeSL</th>
<th>Value 0 corresponds to -infinity, value 1 to -115dBm, value 2 to -110dBm, and so on (i.e. in steps of 5dBm) until value 12, which corresponds to -60dBm, while value 13 corresponds to +infinity.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSRP-RangeSL2</td>
<td>Value 0 corresponds to -infinity, value 1 to -110dBm, value 2 to -100dBm, and so on (i.e. in steps of 10dBm) until value 6, which corresponds to -60dBm, while value 7 corresponds to +infinity.</td>
</tr>
<tr>
<td>RSRP-RangeSL3</td>
<td>Value 0 corresponds to -110dBm, value 1 to -105dBm, value 2 to -100dBm, and so on (i.e. in steps of 5dBm) until value 10, which corresponds to -60dBm, while value 11 corresponds to +infinity.</td>
</tr>
</tbody>
</table>
The IE \textit{RSRQ-Range} specifies the value range used in RSRQ measurements and thresholds. Integer value for RSRQ measurements is according to mapping table in TS 36.133 [16]. A given field using \textit{RSRQ-Range-v1250} shall only be signalled if the corresponding original field (using \textit{RSRQ-Range} i.e. without suffix) is set to value 0 or 34. Only a UE indicating support of \textit{extendedRSRQ-LowerRange-r12} or \textit{rsrq-OnAllSymbols-r12} may report \textit{RSRQ-Range-v1250}, and this may be done without explicit configuration from the E-UTRAN. If received, the UE shall use the value indicated by the \textit{RSRQ-Range-v1250} and ignore the value signalled by \textit{RSRQ-Range} (without the suffix).

\textbf{RSRQ-Range information element}

\begin{verbatim}
  RSRQ-Range ::= INTEGER(0..34)
  RSRQ-Range-v1250 ::= INTEGER(-30..46)
\end{verbatim}

The IE \textit{RSRQ-Type} specifies the RSRQ value type used in RSRQ measurements, see TS 36.214 [48].

\textbf{RSRQ-Type information element}

\begin{verbatim}
  RSRQ-Type-r12 ::= SEQUENCE {
    allSymbols-r12       BOOLEAN,
    wideBand-r12       BOOLEAN
  }
\end{verbatim}

\textbf{RSRQ-Type field descriptions}

\begin{tabular}{|l|}
  \hline
  \textit{allSymbols}  \\
  Value TRUE indicates use of all OFDM symbols when performing RSRQ measurements. \\
  \hline
  \textit{wideBand}    \\
  Value TRUE indicates use of a wider bandwidth when performing RSRQ measurements. \\
  \hline
\end{tabular}

The IE \textit{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.

\textbf{TimeToTrigger information element}

\begin{verbatim}
  TimeToTrigger ::= ENUMERATED {
    ms0, ms40, ms64, ms80, ms100, ms128, ms160, ms256, 
    ms320, ms480, ms512, ms640, ms1024, ms1280, ms2560, 
    ms5120 }
\end{verbatim}
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**

  ```asn1
  AbsoluteTimeInfo-r10 ::=    BIT STRING (SIZE (48))
  ```

- **AreaConfiguration**

  The *AreaConfiguration* indicates area for which UE is requested to perform measurement logging. If not configured, measurement logging is not restricted to specific cells or tracking areas but applies as long as the RPLMN is contained in *plmn-IdentityList* stored in *VarLogMeasReport*.

  **AreaConfiguration information element**

  ```asn1
  AreaConfiguration-r10 ::= CHOICE {
    cellGlobalIdList-r10   CellGlobalIdList-r10,
    trackingAreaCodeList-r10  TrackingAreaCodeList-r10
  }

  AreaConfiguration-v1130 ::=  SEQUENCE {
    trackingAreaCodeList-v1130  TrackingAreaCodeList-v1130
  }

  CellGlobalIdList-r10 ::=    SEQUENCE (SIZE (1..32)) OF CellGlobalIdEUTRA

  TrackingAreaCodeList-r10 ::=   SEQUENCE (SIZE (1..8)) OF TrackingAreaCode

  TrackingAreaCodeList-v1130 ::= SEQUENCE {
    plmn-Identity-perTAC-List-r11   SEQUENCE (SIZE (1..8)) OF PLMN-Identity
  }
  ```

  **AreaConfiguration field descriptions**

  *plmn-Identity-perTAC-List* Includes the PLMN identity for each of the TA codes included in *trackingAreaCodeList*. The PLMN identity listed first in *plmn-Identity-perTAC-List* corresponds with the TA code listed first in *trackingAreaCodeList* and so on.

- **C-RNTI**

  The IE *C-RNTI* identifies a UE having a RRC connection within a cell.

  **C-RNTI information element**

  ```asn1
  C-RNTI ::=       BIT STRING (SIZE (16))
  ```
---

**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

```asn1
DedicatedInfoCDMA2000 ::= OCTET STRING
```

---

**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

```asn1
DedicatedInfoNAS ::= OCTET STRING
```

---

**FilterCoefficient**

The IE `FilterCoefficient` specifies the measurement filtering coefficient. Value `fc0` corresponds to $k = 0$, `fc1` corresponds to $k = 1$, and so on.

**FilterCoefficient** information element

```asn1
FilterCoefficient ::= ENUMERATED {
  fc0, fc1, fc2, fc3, fc4, fc5,
  fc6, fc7, fc8, fc9, fc11, fc13,
  fc15, fc17, fc19, spare1, ...
}
```

---

**LoggingDuration**

The `LoggingDuration` indicates the duration for which UE is requested to perform measurement logging. Value `min10` corresponds to 10 minutes, value `min20` corresponds to 20 minutes and so on.

**LoggingDuration** information element

```asn1
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**

```asn1
LoggingInterval-r10 ::= ENUMERATED {
  ms1280, ms2560, ms5120, ms10240, ms20480, ms30720, ms40960, ms61440}
```

– **MeasSubframePattern**

The IE *MeasSubframePattern* is used to specify a subframe pattern. The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where SFN is that of PCell and x is the size of the bit string divided by 10. "1" denotes that the corresponding subframe is used.

**MeasSubframePattern information element**

```asn1
MeasSubframePattern-r10 ::= CHOICE {
  subframePatternFDD-r10    BIT STRING (SIZE (40)),
  subframePatternTDD-r10    CHOICE {
    subframeConfig1-5-r10     BIT STRING (SIZE (20)),
    subframeConfig0-r10      BIT STRING (SIZE (70)),
    subframeConfig6-r10      BIT STRING (SIZE (60)),
    ...
  },
  ...
}
```

– **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**

```asn1
MMEC ::= BIT STRING (SIZE (8))
```

– **NeighCellConfig**

The IE *NeighCellConfig* is used to provide the information related to MBSFN and TDD UL/DL configuration of neighbour cells.

**NeighCellConfig information element**

```asn1
NeighCellConfig ::= BIT STRING (SIZE (2))
```
**NeighCellConfig field descriptions**

**neighCellConfig**
Provides information related to MBSFN and TDD UL/DL configuration of neighbour cells of this frequency

00: Not all neighbour cells have the same MBSFN subframe allocation as the serving cell on this frequency, if configured, and as the PCell otherwise

10: The MBSFN subframe allocations of all neighbour cells are identical to or subsets of that in the serving cell on this frequency, if configured, and of that in the PCell otherwise

01: No MBSFN subframes are present in all neighbour cells

11: Different UL/DL allocation in neighbouring cells for TDD compared to the serving cell on this frequency, if configured, and compared to the PCell otherwise.

For TDD, 00, 10 and 01 are only used for same UL/DL allocation in neighbouring cells compared to the serving cell on this frequency, if configured, and compared to the PCell otherwise.

---

**OtherConfig**

The IE *OtherConfig* contains configuration related to other configuration

**OtherConfig information element**

```
-- ASN1START
OtherConfig-r9 ::= SEQUENCE {
    reportProximityConfig-r9            ReportProximityConfig-r9 OPTIONAL, -- Need ON
    ...,
    [[ idc-Config-r11     IDC-Config-r11     OPTIONAL, -- Need ON
      powerPrefIndicationConfig-r11 PowerPrefIndicationConfig-r11 OPTIONAL, -- Need ON
      obtainLocationConfig-r11 ObtainLocationConfig-r11 OPTIONAL -- Need ON
    ]]
  }
IDC-Config-r11 ::=     SEQUENCE {
    idc-Indication-r11     ENUMERATED {setup}  OPTIONAL, -- Need OR
    autonomousDenialParameters-r11 SEQUENCE {
        autonomousDenialSubframes-r11 ENUMERATED {n2, n5, n10, n15, n20, n30, spare2, spare1},
        autonomousDenialValidity-r11 ENUMERATED {
            sf200, sf500, sf1000, sf2000, spare4, spare3, spare2, spare1}
    }  OPTIONAL,   -- Need OR
    ...,
    [[ idc-Indication-UL-CA-r11  ENUMERATED {setup}  OPTIONAL  -- Cond idc-Ind
      ]]
  }
ObtainLocationConfig-r11 ::= SEQUENCE {
    obtainLocation-r11    ENUMERATED {setup}    OPTIONAL  -- Need OR
  }
PowerPrefIndicationConfig-r11 ::= CHOICE{
    release     NULL,
    setup       SEQUENCE{
        powerPrefIndicationTimer-r11  ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20,
                                                        s30, s60, s90, s120, s300, s600, spare3,
                                                        spare2, spare1}
    }
  }
ReportProximityConfig-r9 ::= SEQUENCE {
    proximityIndicationEUTRA-r9 ENUMERATED {enabled}          OPTIONAL, -- Need OR
    proximityIndicationUTRA-r9 ENUMERATED {enabled}            OPTIONAL -- Need OR
  }
-- ASN1STOP
```
### OtherConfig field descriptions

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>autonomousDenialSubframes</strong></td>
<td>Indicates the maximum number of the UL subframes for which the UE is allowed to deny any UL transmission. Value n2 corresponds to 2 subframes, n5 to 5 subframes and so on. E-UTRAN does not configure autonomous denial for frequencies on which SCG cells are configured.</td>
</tr>
<tr>
<td><strong>autonomousDenialValidity</strong></td>
<td>Indicates the validity period over which the UL autonomous denial subframes shall be counted. Value sf200 corresponds to 200 subframes, sf500 corresponds to 500 subframes and so on.</td>
</tr>
<tr>
<td><strong>idc-Indication</strong></td>
<td>The field is used to indicate whether the UE is configured to initiate transmission of the InDeviceCoexIndication message to the network.</td>
</tr>
<tr>
<td><strong>idc-Indication-UL-CA</strong></td>
<td>The field is used to indicate whether the UE is configured to provide IDC indications for UL CA using the InDeviceCoexIndication message.</td>
</tr>
<tr>
<td><strong>obtainLocation</strong></td>
<td>Requests the UE to attempt to have detailed location information available using GNSS. E-UTRAN configures the field only if includeLocationInfo is configured for one or more measurements.</td>
</tr>
<tr>
<td><strong>powerPrefIndicationTimer</strong></td>
<td>Prohibit timer for Power Preference Indication reporting. Value in seconds. Value s0 means prohibit timer is set to 0 second or not set, value s0dot5 means prohibit timer is set to 0.5 second, value s1 means prohibit timer is set to 1 second and so on.</td>
</tr>
<tr>
<td><strong>reportProximityConfig</strong></td>
<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.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>idc-Ind</td>
<td>The field is optionally present if idc-Indication is present, need OR. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

**— RAND-CDMA2000 (1xRTT)**

The RAND-CDMA2000 concerns a random value, generated by the eNB, to be passed to the CDMA2000 upper layers.

**RAND-CDMA2000 information element**

```
-- ASN1START
RAND-CDMA2000 ::= BIT STRING (SIZE (32))
-- ASN1STOP
```

**— RAT-Type**

The IE RAT-Type is used to indicate the radio access technology (RAT), including E-UTRA, of the requested/ transferred UE capabilities.

**RAT-Type information element**

```
-- ASN1START
RAT-Type ::= ENUMERATED {
  eutra, utra, geran-cs, geran-ps, cdma2000-1XRTT,
  spare3, spare2, spare1,
}
-- ASN1STOP
```
— **RRC-TransactionIdentifier**

The IE `RRC-TransactionIdentifier` is used, together with the message type, for the identification of an RRC procedure (transaction).

**RRC-TransactionIdentifier** information element

```plaintext
RRC-TransactionIdentifier ::= INTEGER (0..3)
```

— **S-TMSI**

The IE `S-TMSI` contains an S-Temporary Mobile Subscriber Identity, a temporary UE identity provided by the EPC which uniquely identifies the UE within the tracking area, see TS 23.003 [27].

**S-TMSI** information element

```plaintext
S-TMSI ::= SEQUENCE {
  mmec        MMEC,
  m-TMSI        BIT STRING (SIZE (32))
}
```

**S-TMSI** field descriptions

--- **m-TMSI**

The first/leftmost bit of the bit string contains the most significant bit of the M-TMSI.

— **TraceReference**

The `TraceReference` contains parameter Trace Reference as defined in TS 32.422 [58].

**TraceReference** information element

```plaintext
TraceReference-r10 ::= SEQUENCE {
  plmn-Identity-r10    PLMN-Identity,
  traceId-r10      OCTET STRING (SIZE (3))
}
```

— **UE-CapabilityRAT-ContainerList**

The IE `UE-CapabilityRAT-ContainerList` contains list of containers, one for each RAT for which UE capabilities are transferred, if any.

**UE-CapabilityRAT-ContainerList** information element

```plaintext
UE-CapabilityRAT-ContainerList ::=SEQUENCE (SIZE (0..maxRAT-Capabilities)) OF UE-CapabilityRAT-
  Container
UE-CapabilityRAT-Container ::= SEQUENCE {
  rat-Type       RAT-Type,
  ueCapabilityRAT-Container   OCTET STRING
}
```
UECapabilityRAT-ContainerList field descriptions

ueCapabilityRAT-Container
Container for the UE capabilities of the indicated RAT. The encoding is defined in the specification of each RAT:
For E-UTRA: the encoding of UE capabilities is defined in IE UE-EUTRA-Capability.
For UTRA: the octet string contains the INTER RAT HANDOVER INFO message defined in TS 25.331 [19].
For GERAN CS: the octet string contains the concatenated string of the Mobile Station Classmark 2 and Mobile Station Classmark 3. The first 5 octets correspond to Mobile Station Classmark 2 and the following octets correspond to Mobile Station Classmark 3. The Mobile Station Classmark 2 is formatted as 'TLV' and is coded in the same way as the Mobile Station Classmark 2 information element in TS 24.008 [49]. The first octet is the Mobile station classmark 2 IEI and its value shall be set to 33H. The second octet is the Length of mobile station classmark 2 and its value shall be set to 3. The octet 3 contains the first octet of the value part of the Mobile Station Classmark 2 information element, the octet 4 contains the second octet of the value part of the Mobile Station Classmark 2 information element and so on. For each of these octets, the first/ leftmost/ most significant bit of the octet contains b8 of the corresponding octet of the Mobile Station Classmark 2. The Mobile Station Classmark 3 is formatted as 'V' and is coded in the same way as the value part in the Mobile station classmark 3 information element in TS 24.008 [49]. The sixth octet of this octet string contains octet 1 of the value part of Mobile station classmark 3, the seventh of 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 [33]. The A21 Mobile Subscription Information contains the supported CDMA2000 1xRTT band class and band sub-class information.

NOTE: The value part is specified by means of CSN.1, which encoding results in a bit string, to which final padding may be appended up to the next octet boundary TS 24.008 [49]. The first/ leftmost bit of the CSN.1 bit string is placed in the first/ leftmost/ most significant bit of the first octet. This continues until the last bit of the CSN.1 bit string, which is placed in the last/ rightmost/ least significant bit of the last octet.

-- UE-EUTRA-Capability

The IE UE-EUTRA-Capability is used to convey the E-UTRA UE Radio Access Capability Parameters, see TS 36.306 [5], and the Feature Group Indicators for mandatory features (defined in Annexes B.1 and C.1) to the network. The IE UE-EUTRA-Capability is transferred in E-UTRA or in another RAT.

UE-EUTRA-Capability information element

```asn1
UE-EUTRA-Capability ::= SEQUENCE {
  accessStratumRelease AccessStratumRelease,
  ue-Category       INTEGER (1..5),
  pdcp-Parameters      PDCP-Parameters,
  phyLayerParameters     PhyLayerParameters,
  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

```asn1
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
}
```

```asn1
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    UE-EUTRA-Capability-v10l0-IEs  OPTIONAL
}

UE-EUTRA-Capability-v10j0-IEs ::= SEQUENCE {
  rf-Parameters-v10j0  RF-Parameters-v10j0  OPTIONAL,
  nonCriticalExtension    SEQUENCE ()  OPTIONAL
}

UE-EUTRA-Capability-v10l0-IEs ::= SEQUENCE {
  rf-Parameters-v10l0  RF-Parameters-v10l0  OPTIONAL,
  otherParameters-v10l0  Other-Parameters-v10l0  OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v10m0-IEs  OPTIONAL
}

UE-EUTRA-Capability-v10m0-IEs ::= SEQUENCE {
  -- Following field is only to be used for late REL-11 extensions
  lateNonCriticalExtension   OCTET STRING  OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v10n0-IEs  OPTIONAL
}

UE-EUTRA-Capability-v10n0-IEs ::= SEQUENCE {
  rf-Parameters-v10n0  RF-Parameters-v10n0  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-lXRTT-v920  OPTIONAL,
  deviceType-r9  ENUMERATED {noBenFromBatConsumpOpt}  OPTIONAL,
  csg-ProximityIndicationParameters-r9  CSG-ProximityIndicationParameters-r9,
  neighCellSI-AcquisitionParameters-r9  NeighCellSI-AcquisitionParameters-r9,
  son-Parameters-r9  SON-Parameters-r9,
  nonCriticalExtension    UE-EUTRA-Capability-v940-IEs  OPTIONAL
}

UE-EUTRA-Capability-v940-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING (CONTAINING UE-EUTRA-Capability-v9a0-IEs)  OPTIONAL,
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,
  featureGroupIndRel110-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    UE-EUTRA-Capability-v1130-IEs   OPTIONAL
}

UE-EUTRA-Capability-v1130-IEs ::= SEQUENCE {
  pdcp-Parameters-v1130    PDCP-Parameters-v1130,
  phyLayerParameters-v1130   PhyLayerParameters-v1130    OPTIONAL,
  rf-Parameters-v1130     RF-Parameters-v1130      OPTIONAL,
  measParameters-v1130    MeasParameters-v1130     OPTIONAL,
  interRAT-ParametersCDMA2000-v1130 IRAT-ParametersCDMA2000-v1130,
  otherParameters-r11    Other-Parameters-r11,
  fdd-Add-UE-EUTRA-Capabilities-v1130 UE-EUTRA-CapabilityAddXDD-Mode-v1130 OPTIONAL,
  tdd-Add-UE-EUTRA-Capabilities-v1130 UE-EUTRA-CapabilityAddXDD-Mode-v1130 OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v1170-IEs   OPTIONAL
}

UE-EUTRA-Capability-v1170-IEs ::= SEQUENCE {
  phyLayerParameters-v1170   PhyLayerParameters-v1170    OPTIONAL,
  ue-Category-v1170     INTEGER (9..10)       OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v1180-IEs   OPTIONAL
}

UE-EUTRA-Capability-v1180-IEs ::= SEQUENCE {
  rf-Parameters-v1180     RF-Parameters-v1180      OPTIONAL,
  mmbs-Parameters-r1     MMBS-Parameters-r1     OPTIONAL,
  fdd-Add-UE-EUTRA-Capabilities-v1180 UE-EUTRA-CapabilityAddXDD-Mode-v1180 OPTIONAL,
  tdd-Add-UE-EUTRA-Capabilities-v1180 UE-EUTRA-CapabilityAddXDD-Mode-v1180 OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v11a0-IEs   OPTIONAL
}

UE-EUTRA-Capability-v11a0-IEs ::= SEQUENCE {
  ue-Category-v11a0     INTEGER (11..12)      OPTIONAL,
  measParameters-v11a0    MeasParameters-v11a0     OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v1250-IEs   OPTIONAL
}

UE-EUTRA-Capability-v1250-IEs ::= SEQUENCE {
  phyLayerParameters-v1250   PhyLayerParameters-v1250    OPTIONAL,
  rf-Parameters-v1250     RF-Parameters-v1250      OPTIONAL,
  rlc-Parameters-r12     RLC-Parameters-r12      OPTIONAL,
  ue-BasedNetwPerfMesParameters-v1250 UE-BasedNetwPerfMesParameters-v1250 OPTIONAL,
  ue-CategoryDL-r12      INTEGER (0..14)       OPTIONAL,
  ue-CategoryUL-r12      INTEGER (0..13)       OPTIONAL,
  wlan-IW-Parameters-r12 WLAN-IW-Parameters-r12     OPTIONAL,
  mac-Parameters-r12     MAC-Parameters-r12      OPTIONAL,
  fdd-Add-UE-EUTRA-Capabilities-v1250 UE-EUTRA-CapabilityAddXDD-Mode-v1250 OPTIONAL,
  tdd-Add-UE-EUTRA-Capabilities-v1250 UE-EUTRA-CapabilityAddXDD-Mode-v1250 OPTIONAL,
  sl-Parameters-r12     SL-Parameters-r12      OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v1260-IEs   OPTIONAL
}

UE-EUTRA-Capability-v1260-IEs ::= SEQUENCE {
  }
ue-CategoryDL-v1260 INTEGER (15..16) OPTIONAL,
nonCriticalExtension UE-EUTRA-Capability-v1270-IEs OPTIONAL
}

UE-EUTRA-Capability-v1270-IEs ::= SEQUENCE {
rf-Parameters-v1270 RF-Parameters-v1270 OPTIONAL,
nonCriticalExtension UE-EUTRA-Capability-v1270-IEs OPTIONAL
}

UE-EUTRA-Capability-v1280-IEs ::= SEQUENCE {
phyLayerParameters-v1280 PhyLayerParameters-v1280 OPTIONAL,
nonCriticalExtension SEQUENCE () OPTIONAL
}

UE-EUTRA-CapabilityAddXDD-Mode-r9 ::= SEQUENCE {
phyLayerParameters-r9 PhyLayerParameters OPTIONAL,
featureGroupIndicators-r9 BIT STRING (SIZE (32)) OPTIONAL,
featureGroupIndRel19Add-r9 BIT STRING (SIZE (32)) OPTIONAL,
terRAT-ParametersGERAN-r9 IRAT-ParametersGERAN OPTIONAL,
terRAT-ParametersUTRA-r9 IRAT-ParametersUTRA-v920 OPTIONAL,
terRAT-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,
terRAT-ParametersUTRA-TDD-v1060 IRAT-ParametersUTRA-TDD-v1020 OPTIONAL,
...
[[ otdoa-PositioningCapabilities-r10 OTDOA-PositioningCapabilities-r10 OPTIONAL ]]
}

UE-EUTRA-CapabilityAddXDD-Mode-r11 ::= SEQUENCE {
phyLayerParameters-v1130 PhyLayerParameters-v1130 OPTIONAL,
mesParameters-v1130 MesParameters-v1130 OPTIONAL,
otherParameters-r11 Other-Parameters-r11 OPTIONAL,
...
}

AccessStratumRelease ::= ENUMERATED {
rel8, rel9, rel10, rel11, rel12, spare3,
spare2, spare1, ...}

DC-Parameters-r12 ::= SEQUENCE {
drb-TypeSplit-r12 ENUMERATED {supported} OPTIONAL,
drb-TypeSCG-r12 ENUMERATED {supported} OPTIONAL
}

MAC-Parameters-r12 ::= SEQUENCE {
logicalChannelSR-ProhibitTimer-r12 ENUMERATED {supported} OPTIONAL,
longDRX-Command-r12 ENUMERATED {supported} OPTIONAL
}

RLC-Parameters-r12 ::= SEQUENCE {
extended-RLC-LI-Field-r12 ENUMERATED {supported}
}

PDCP-Parameters ::= SEQUENCE {
supportedROHC-Profiles SEQUENCE {
profile0x0001 BOOLEAN,
profile0x0002 BOOLEAN,
profile0x0003 BOOLEAN,
profile0x0004 BOOLEAN,
profile0x0006 BOOLEAN,
profile0x0011 BOOLEAN,
profile0x0012 BOOLEAN,
...}
profile0x0103 BOOLEAN,
    profile0x0104 BOOLEAN
},
    maxNumberROHC-ContextSessions ENUMERATED {
        cs2, cs4, cs8, cs12, cs16, cs24, cs32,
        cs48, cs64, cs128, cs256, cs512, cs1024,
        cs16384, spare2, spare1} DEFAULT cs16,
    ...
}
PDCP-Parameters-v1130 ::= SEQUENCE {
    pdcp-SN-Extension-r11 ENUMERATED [supported] OPTIONAL,
    supportRoHCContextContinue-r11 ENUMERATED [supported] OPTIONAL
}
PhyLayerParameters ::= SEQUENCE {
    ue-TxAntennaSelectionSupported BOOLEAN,
    ue-SpecificRefSigsSupported BOOLEAN
}
PhyLayerParameters-v920 ::= SEQUENCE {
    enhancedDualLayerFDD-r9 ENUMERATED [supported] OPTIONAL,
    enhancedDualLayerFDD-r9 ENUMERATED [supported] OPTIONAL
}
PhyLayerParameters-v9d0 ::= SEQUENCE {
    tm5-FDD-r9 ENUMERATED [supported] OPTIONAL,
    tm5-TDD-r9 ENUMERATED [supported] OPTIONAL
}
PhyLayerParameters-v1020 ::= SEQUENCE {
    twoAntennaPortsForPUCCH-r10 ENUMERATED [supported] OPTIONAL,
    tm9-With-8Tx-FDD-r10 ENUMERATED [supported] OPTIONAL,
    pmi-Disabling-r10 ENUMERATED [supported] OPTIONAL,
    crossCarrierScheduling-r10 ENUMERATED [supported] OPTIONAL,
    simultaneousPUCCH-PUSCH-r10 ENUMERATED [supported] OPTIONAL,
    multiClusterPUSCH-WithinCC-r10 ENUMERATED [supported] OPTIONAL,
    nonContiguousUL-RA-WithinCC-List-r10 NonContiguousUL-RA-WithinCC-List-r10 OPTIONAL
}
PhyLayerParameters-v1130 ::= SEQUENCE {
    crs-InterfHandl-r11 ENUMERATED [supported] OPTIONAL,
    ePDCCH-r11 ENUMERATED [supported] OPTIONAL,
    multiACK-CSI-Reporting-r11 ENUMERATED [supported] OPTIONAL,
    ss-CCI-InterfHandl-r11 ENUMERATED [supported] OPTIONAL,
    tdd-SpecialSubframe-r11 ENUMERATED [supported] OPTIONAL,
    txDiv-PUCCH1b-ChSelect-r11 ENUMERATED [supported] OPTIONAL,
    u1-CoMP-r11 ENUMERATED [supported] OPTIONAL
}
PhyLayerParameters-v1170 ::= SEQUENCE {
    interBandTDD-CA-WithDifferentConfig-r11 BIT STRING (SIZE (2)) OPTIONAL
}
PhyLayerParameters-v1250 ::= SEQUENCE {
    e-HARQ-Pattern-FDD-r12 ENUMERATED [supported] OPTIONAL,
    enhanced4TxCodebook-r12 ENUMERATED [supported] OPTIONAL,
    tdd-FDD-CA-PCellDuplex-r12 BIT STRING (SIZE (2)) OPTIONAL,
    phy-TDD-ReConfig-TDD-PCell-r12 ENUMERATED [supported] OPTIONAL,
    phy-TDD-ReConfig-FDD-PCell-r12 ENUMERATED [supported] OPTIONAL,
    pusch-FeedbackMode-r12 ENUMERATED [supported] OPTIONAL,
    pusch-SRS-PowerControl-SubframeSet-r12 ENUMERATED [supported] OPTIONAL,
    csi-SubframeSet-r12 ENUMERATED [supported] OPTIONAL,
    noResourceRestrictionForTTIBundling-r12 ENUMERATED [supported] OPTIONAL,
    discoverySignalsInDeactSCell-r12 ENUMERATED [supported] OPTIONAL,
    naics-Capability-List-r12 NAICS-Capability-List-r12 OPTIONAL
}
PhyLayerParameters-v1280 ::= SEQUENCE {
    alternativeTBS-Indices-r12 ENUMERATED [supported] 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
}

RF-Parameters-v1130 ::= SEQUENCE {
  supportedBandCombination-v1130 SupportedBandCombination-v1130 OPTIONAL
}

RF-Parameters-v1180 ::= SEQUENCE {
  freqBandRetrieval-r11 ENUMERATED {supported} OPTIONAL,
  requestedBands-r11 SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicator-r11
  OPTIONAL,
  supportedBandCombinationAdd-r11 SupportedBandCombinationAdd-r11 OPTIONAL
}

RF-Parameters-v11d0 ::= SEQUENCE {
  supportedBandCombinationAdd-v11d0 SupportedBandCombinationAdd-v11d0 OPTIONAL
}

RF-Parameters-v1250 ::= SEQUENCE {
  supportedBandListEUTRA-v1250 SupportedBandListEUTRA-v1250 OPTIONAL,
  supportedBandCombination-v1250 SupportedBandCombination-v1250 OPTIONAL,
  supportedBandCombinationAdd-v1250 SupportedBandCombinationAdd-v1250 OPTIONAL,
  freqBandPriorityAdjustment-r12 ENUMERATED {supported} OPTIONAL
}

RF-Parameters-v1270 ::= SEQUENCE {
  supportedBandCombination-v1270 SupportedBandCombination-v1270 OPTIONAL,
  supportedBandCombinationAdd-v1270 SupportedBandCombinationAdd-v1270 OPTIONAL
}

RF-Parameters-v12b0 ::= SEQUENCE {
  maxLayersMIMO-Indication-r12 ENUMERATED {supported} OPTIONAL
}

SupportedBandCombination-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-r10

SupportedBandCombinationExt-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParametersExt-r10

SupportedBandCombination-v1090 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1090

SupportedBandCombination-v1010 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1010

SupportedBandCombination-v1130 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1130
SupportedBandCombination-v1250 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1250

SupportedBandCombination-v1270 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1270

SupportedBandCombinationAdd-r11 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-r11

SupportedBandCombinationAdd-v11d0 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v10i0

SupportedBandCombinationAdd-v1250 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1250

SupportedBandCombinationAdd-v1270 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1270

BandCombinationParameters-r10 ::= SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-r10

BandCombinationParametersExt-r10 ::= SEQUENCE {
  supportedBandwidthCombinationSet-r10 SupportedBandwidthCombinationSet-r10 OPTIONAL
}

BandCombinationParameters-v1090 ::= SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v1090

BandCombinationParameters-v10i0 ::= SEQUENCE {
  bandParameterList-v10i0 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v10i0 OPTIONAL
}

BandCombinationParameters-v1130 ::= SEQUENCE {
  multipleTimingAdvance-r11 ENUMERATED {supported} OPTIONAL,
  simultaneousRx-Tx-r11 ENUMERATED {supported} OPTIONAL,
  bandParameterList-r11 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v1130 OPTIONAL,
  ...
}

BandCombinationParameters-r11 ::= SEQUENCE {
  bandParameterList-r11 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-r11,
  supportedBandwidthCombinationSet-r11 SupportedBandwidthCombinationSet-r10 OPTIONAL,
  multipleTimingAdvance-r11 ENUMERATED {supported} OPTIONAL,
  simultaneousRx-Tx-r11 ENUMERATED {supported} OPTIONAL,
  bandInfoEUTRA-r11 BandInfoEUTRA,
  ...
}

BandCombinationParameters-v1250 ::= SEQUENCE {
  dc-Support-r12 SEQUENCE {
    asynchronous-r12 ENUMERATED {supported} OPTIONAL,
    supportedCellGrouping-r12 CHOICE {
      threeEntries-r12 BIT STRING (SIZE(3)),
      fourEntries-r12 BIT STRING (SIZE(7)),
      fiveEntries-r12 BIT STRING (SIZE(15))
    } OPTIONAL,
    supportedNAICS-2CRS-AP-r12 BIT STRING (SIZE (1..maxNAICS-Entries-r12)) OPTIONAL,
    commSupportedBandsPerBC-r12 BIT STRING (SIZE (1..maxBands)) OPTIONAL,
    ...
  }
}

BandCombinationParameters-v1270 ::= SEQUENCE {
  bandParameterList-v1270 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v1270 OPTIONAL
}

SupportedBandwidthCombinationSet-r10 ::= BIT STRING (SIZE (1..maxBandwidthCombSet-r10))

BandParameters-r10 ::= SEQUENCE {
  bandEUTRA-r10 FreqBandIndicator,
  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
}

BandParameters-v1130 ::= SEQUENCE {
  supportedCSI-Proc-r11       ENUMERATED (n1, n3, n4)
}

BandParameters-r11 ::= SEQUENCE {
  bandEUTRA-r11             FreqBandIndicator-r11,
  bandParametersUL-r11      BandParametersUL-r10     OPTIONAL,
  bandParametersDL-r11      BandParametersDL-r10     OPTIONAL,
  supportedCSI-Proc-r11     ENUMERATED (n1, n3, n4)     OPTIONAL
}

BandParameters-v1270 ::= SEQUENCE {
  bandParametersDL-v1270  SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersDL-v1270
}

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-MIMO-ParametersDL-v1270 ::= SEQUENCE {
  intraBandContiguousCC-InfoList-r12   SEQUENCE (SIZE (1..maxServCell-r10)) OF IntraBandContiguousCC-Info-r12
}

IntraBandContiguousCC-Info-r12 ::= SEQUENCE {
  fourLayerTM3-TM4-perCC-r12   ENUMERATED {supported}    OPTIONAL,
  supportedMIMO-CapabilityDL-r12  MIMO-CapabilityDL-r10    OPTIONAL,
  supportedCSI-Proc-r12     ENUMERATED (n1, n3, n4)     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

SupportedBandListEUTRA-v1250 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v1250

SupportedBandEUTRA ::= SEQUENCE {
  bandEUTRA             FreqBandIndicator,
  halfDuplex            BOOLEAN
}

SupportedBandEUTRA-v9e0 ::= SEQUENCE {
  bandEUTRA-v9e0    FreqBandIndicator-v9e0    OPTIONAL
}

SupportedBandEUTRA-v1250 ::= SEQUENCE {web application}
dl-256QAM-r12 ENUMERATED [supported] OPTIONAL,
ul-64QAM-r12 ENUMERATED [supported] OPTIONAL
}

MeasParameters ::= SEQUENCE {
  bandListEUTRA BandListEUTRA
}

MeasParameters-v1020 ::= SEQUENCE {
  bandCombinationListEUTRA-r10 BandCombinationListEUTRA-r10
}

MeasParameters-v1130 ::= SEQUENCE {
  rsgMeasWideband-r11 ENUMERATED {supported} OPTIONAL
}

MeasParameters-v11a0 ::= SEQUENCE {
  benefitsFromInteruption-r11 ENUMERATED {true} OPTIONAL
}

MeasParameters-v1250 ::= SEQUENCE {
  timerT312-r12 ENUMERATED [supported] OPTIONAL,
  alternativeTimeToTrigger-r12 ENUMERATED [supported] OPTIONAL,
  incMonEA-r12 ENUMERATED [supported] OPTIONAL,
  incMonUTRA-r12 ENUMERATED [supported] OPTIONAL,
  extendedMaxMeasId-r12 ENUMERATED [supported] OPTIONAL,
  extendedRSRQ-LowerRange-r12 ENUMERATED [supported] OPTIONAL,
  rsrq-OnAllSymbols-r12 ENUMERATED [supported] OPTIONAL,
  crs-DiscoverySignalsMeas-r12 ENUMERATED [supported] OPTIONAL,
  csi-RS-DiscoverySignalsMeas-r12 ENUMERATED [supported] OPTIONAL
}

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-v9h0 ::= 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,
  srvcc-FromUTRA-FDD-ToGERAN-r9 ENUMERATED [supported] OPTIONAL,
  srvcc-FromUTRA-TDD128-ToUTRA-TDD128-r9 ENUMERATED [supported] OPTIONAL,
  srvcc-FromUTRA-TDD128-ToGERAN-r9 ENUMERATED [supported] OPTIONAL
}

IRAT-ParametersUTRA-v9l0 ::= SEQUENCE {
  mfb1-UTRA-r9 ENUMERATED [supported]
}

SupportedBandListUTRA-FDD ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-FDD

SupportedBandUTRA-FDD ::= ENUMERATED {
  bandI, bandII, bandIII, bandIV, bandV, bandVI,
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-Mobil1XRTT-r9 ENUMERATED {supported}   OPTIONAL
}

IRAT-ParametersCDMA2000-1XRTT-v1020 ::= SEQUENCE {
  e-CSFB-1XRTT-r9      ENUMERATED {supported},
  e-CSFB-ConcPS-Mobil1XRTT-r9 ENUMERATED {supported}   OPTIONAL
}
e-CSFB-dual-1XRTT-r10 ENUMERATED {supported}

IRAT-ParametersCDMA2000-v1130 ::= SEQUENCE {
  cdma2000-NW-Sharing-r11 ENUMERATED {supported} OPTIONAL
}

SupportedBandList1XRTT ::= SEQUENCE { SIZE (1..maxCDMA-BandClass) } OF BandclassCDMA2000

CSG-ProximityIndicationParameters-r9 ::= SEQUENCE {
  intraFreqProximityIndication-r9 ENUMERATED {supported} OPTIONAL,
  interFreqProximityIndication-r9 ENUMERATED {supported} OPTIONAL,
  utran-ProximityIndication-r9 ENUMERATED {supported} OPTIONAL
}

NeighborCellSI-AcquisitionParameters-r9 ::= SEQUENCE {
  intraFreqSI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL,
  interFreqSI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL,
  utran-SI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL
}

SON-Parameters-r9 ::= SEQUENCE {
  rach-Report-r9 ENUMERATED {supported} OPTIONAL
}

UE-BasedNetwPerfMeasParameters-r10 ::= SEQUENCE {
  loggedMeasurementsIdle-r10 ENUMERATED {supported} OPTIONAL,
  standaloneGNSS-Location-r10 ENUMERATED {supported} OPTIONAL
}

UE-BasedNetwPerfMeasParameters-v1250 ::= SEQUENCE {
  loggedMBSFNMeasurements-r12 ENUMERATED {supported}
}

OTDOA-PositioningCapabilities-r10 ::= SEQUENCE {
  otdoa-UE-Assisted-r10 ENUMERATED {supported},
  interFreqRSTD-Measurement-r10 ENUMERATED {supported} OPTIONAL
}

Other-Parameters-r11 ::= SEQUENCE {
  inDeviceCoexInd-r11 ENUMERATED {supported} OPTIONAL,
  powerPrefInd-r11 ENUMERATED {supported} OPTIONAL,
  ue-Rx-TxTimeDiffMeasurements-r11 ENUMERATED {supported} OPTIONAL
}

Other-Parameters-v11d0 ::= SEQUENCE {
  inDeviceCoexInd-UL-CA-r11 ENUMERATED {supported} OPTIONAL
}

MBMS-Parameters-r11 ::= SEQUENCE {
  mbms-SCell-r11 ENUMERATED {supported} OPTIONAL,
  mbms-NonServingCell-r11 ENUMERATED {supported} OPTIONAL
}

MBMS-Parameters-v1250 ::= SEQUENCE {
  mbms-AsyncDC-r12 ENUMERATED {supported} OPTIONAL
}

WLAN-IW-Parameters-r12 ::= SEQUENCE {
  wlan-IW-RAN-Rules-r12 ENUMERATED {supported} OPTIONAL,
  wlan-IW-ANDSF-Policies-r12 ENUMERATED {supported} OPTIONAL
}

NAICS-Capability-List-r12 ::= SEQUENCE { SIZE (1..maxNAICS-Entries-r12) } OF NAICS-Capability-Entry-r12

NAICS-Capability-Entry-r12 ::= SEQUENCE {
  numberOfNAICS-CapableCC-r12 INTEGER {1..5},
  numberOfAggregatedPRB-r12 ENUMERATED {
    n50, n75, n100, n125, n150, n175, n200, n225, n250, n275, n300, n350,
    n400, n450, n500, spare},
  ...
}

SL-Parameters-r12 ::= SEQUENCE {
  commSimultaneousTx-r12 ENUMERATED {supported} OPTIONAL,
commSupportedBands-r12  FreqBandIndicatorListEUTRA-r12  OPTIONAL,
discSupportedBands-r12  SupportedBandInfoList-r12  OPTIONAL,
discScheduledResourceAlloc-r12  ENUMERATED {supported}  OPTIONAL,
disc-UE-SelectedResourceAlloc-r12  ENUMERATED {supported}  OPTIONAL,
disc-SLS-r12  ENUMERATED {supported}  OPTIONAL,
discSupportedProc-r12  ENUMERATED {n50, n400}  OPTIONAL
}

SupportedBandInfoList-r12 ::=  SEQUENCE (SIZE (1..maxBands)) OF SupportedBandInfo-r12

SupportedBandInfo-r12 ::=  SEQUENCE {
support-r12  ENUMERATED {supported}  OPTIONAL
}

FreqBandIndicatorListEUTRA-r12 ::=  SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicator-r11
-- ASN1STOP
<table>
<thead>
<tr>
<th>UE-EUTRA-Capability field descriptions</th>
<th>FDD/ TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>accessStratumRelease</td>
<td>Set to rel12 in this version of the specification.</td>
</tr>
<tr>
<td>alternativeTBS-Indices</td>
<td>Indicates whether the UE supports alternative TBS indices for hNB 26 and 33 as specified in TS 36.213 [23].</td>
</tr>
<tr>
<td>alternativeTimeToTrigger</td>
<td>Indicates whether the UE supports alternativeTimeToTrigger.</td>
</tr>
<tr>
<td>bandCombinationListEUTRA</td>
<td>One entry corresponding to each supported band combination listed in the same order as in supportedBandCombination.</td>
</tr>
<tr>
<td>BandCombinationParameters-v1090, BandCombinationParameters-v100, BandCombinationParameters-v1270</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>BandCombinationParameters-v1130</td>
<td>The field is applicable to each supported CA bandwidth class combination (i.e. CA configuration in TS 36.101 [42, Section 5.6A.1]) indicated in the corresponding band combination. If included, the UE shall include the same number of entries, and listed in the same order, as in BandCombinationParameters-r10.</td>
</tr>
<tr>
<td>bandEUTRA</td>
<td>E-UTRA band as defined in TS 36.101 [42]. In case the UE includes bandEUTRA-v9e0 or bandEUTRA-v1090, the UE shall set the corresponding entry of bandEUTRA (i.e. without suffix) or bandEUTRA-r10 respectively to maxFBI.</td>
</tr>
<tr>
<td>bandListEUTRA</td>
<td>One entry corresponding to each supported E-UTRA band listed in the same order as in supportedBandListEUTRA.</td>
</tr>
<tr>
<td>bandParametersUL, bandParametersDL</td>
<td>Indicates the supported parameters for the band. Each of CA-MIMO-ParametersUL and CA-MIMO-ParametersDL can be included only once for one band in a single band combination entry.</td>
</tr>
<tr>
<td>benefitsFromInterruption</td>
<td>Indicates whether the UE power consumption would benefit from being allowed to cause interruptions to serving cells when performing measurements of deactivated SCell carriers for measCycleSCell of less than 640ms, as specified in TS 36.133 [16].</td>
</tr>
<tr>
<td>CA-BandwidthClass</td>
<td>The CA bandwidth class supported by the UE as defined in TS 36.101 [42, Table 5.6A-1]. The UE explicitly includes all the supported CA bandwidth class combinations in the band combination signalling. Support for one CA bandwidth class does not implicitly indicate support for another CA bandwidth class.</td>
</tr>
<tr>
<td>cdma2000-NW-Sharing</td>
<td>Indicates whether the UE supports network sharing for CDMA2000.</td>
</tr>
<tr>
<td>commSimultaneousTx</td>
<td>Indicates whether the UE supports simultaneous transmission of EUTRA and sidelink communication (on different carriers) in all bands for which the UE indicated sidelink support in a band combination (using commSupportedBandsPerBC).</td>
</tr>
<tr>
<td>commSupportedBands</td>
<td>Indicates the bands on which the UE supports sidelink communication, by an independent list of bands i.e. separate from the list of supported E-UTRA band, as indicated in supportedBandListEUTRA.</td>
</tr>
<tr>
<td>commSupportedBandsPerBC</td>
<td>Indicates, for a particular band combination, the bands on which the UE supports simultaneous reception of EUTRA and sidelink communication. If the UE indicates support simultaneous transmission (using commSimultaneousTx), it also indicates, for a particular band combination, the bands on which the UE supports simultaneous transmission of EUTRA and sidelink communication. The first bit refers to the first band included in commSupportedBands, with value 1 indicating sidelink is supported.</td>
</tr>
<tr>
<td>crossCarrierScheduling</td>
<td>Yes</td>
</tr>
<tr>
<td>crs-DiscoverySignalsMeas</td>
<td>Indicates whether the UE supports CRS based discovery signals measurement, and PDSCH/EPDCCH RE mapping with zero power CSI-RS configured for discovery signals.</td>
</tr>
<tr>
<td>crs-InterfHandl</td>
<td>Indicates whether the UE supports CRS interference handling.</td>
</tr>
<tr>
<td>csi-RS-DiscoverySignalsMeas</td>
<td>Indicates whether the UE supports CSI-RS based discovery signals measurement. If this field is included, the UE shall also include crs-DiscoverySignalsMeas. FFS</td>
</tr>
</tbody>
</table>
**UE-EUTRA-Capability field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>csi-SubframeSet</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports REL-12 DL CSI subframe set configuration, REL-12 DL CSI subframe set dependent CSI measurement/feedback, configuration of up to 2 CSI-IM resources for a CSI process with no more than 4 CSI-IM resources for all CSI processes of one frequency if the UE supports tm10, configuration of two ZP-CI-RS for tm1 to tm9, PDSCH RE mapping with two ZP-CI-RS configurations, and EPDCCH RE mapping with two ZP-CI-RS configurations if the UE supports EPDCCH. This field is only applicable for UEs supporting TDD.</td>
<td></td>
</tr>
</tbody>
</table>

**dc-Support**
Including this field indicates that the UE supports synchronous DC and power control mode 1. Including this field for a band combination entry comprising of single band entry indicates that the UE supports intra-band contiguous DC. Including this field for a band combination entry comprising of two or more band entries, indicates that the UE supports DC for these bands and that the serving cells corresponding to a band entry shall belong to one cell group (i.e. MCG or SCG). Including field asynchronous indicates that the UE supports asynchronous DC and power control mode 2. Including this field for a TDD/FDD band combination indicates that the UE supports TDD/FDD DC for this band combination. 

**deviceType**
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.

**discoverySignalsInDeactSCell**
Indicates whether the UE supports the behaviour on DL signals and physical channels when SCell is deactivated and discovery signals measurement is configured as specified in TS 36.211 [17, 6.11A]. This field is included only if UE supports carrier aggregation and includes crs-DiscoverySignalsMeas.

**discScheduledResourceAlloc**
Indicates whether the UE supports transmission of discovery announcements based on network scheduled resource allocation.

**disc-UE-SelectedResourceAlloc**
Indicates whether the UE supports transmission of discovery announcements based on UE autonomous resource selection.

**disc-SLSS**
Indicates whether the UE supports Sidelink Synchronization Signal (SLSS) transmission and reception for sidelink discovery.

**discSupportedBands**
Indicates the bands on which the UE supports sidelink discovery. One entry corresponding to each supported E-UTRA band, listed in the same order as in supportedBandListEUTRA.

**discSupportedProc**
Indicates the number of processes supported by the UE for sidelink discovery.

**dl-256QAM**
Indicates whether the UE supports 256QAM in DL on the band.

**dtm**
Indicates whether the UE supports DTM in GERAN.

**e-CSFB-1XRTT**
Indicates whether the UE supports enhanced CS fallback to CDMA2000 1xRTT or not.

**e-CSFB-ConcPS-Mob1XRTT**
Indicates whether the UE supports concurrent enhanced CS fallback to CDMA2000 1xRTT and PS handover/ redirection to CDMA2000 HRPD.

**e-CSFB-dual-1XRTT**
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.

**e-HARQ-Pattern-FDD**
Indicates whether the UE supports enhanced HARQ pattern for TTI bundling operation for FDD.

**Enhanced-4TxCodebook**
Indicates whether the UE supports enhanced 4Tx codebook.

**enhancedDualLayerTDD**
Indicates whether the UE supports enhanced dual layer (PDSCH transmission mode 8) for TDD or not.

**ePDCCH**
Indicates whether the UE can receive DCI on UE specific search space on Enhanced PDCCH.

**e-RedirectionUTRA**
Indicates the use of emergency E-UTRA paging on Emergency PDCCH.
<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>e-RedirectionUTRA-TDD</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports enhanced redirection to UTRA TDD to multiple carrier frequencies both with and without using related SIB provided by RRCConnectionRelease or not.</td>
<td></td>
</tr>
<tr>
<td><strong>extendedMaxMeasId</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports extended number of measurement identities as defined by maxMeasId-r12.</td>
<td></td>
</tr>
<tr>
<td><strong>extended-RLC-LI-Field</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports 15 bit RLC length indicator.</td>
<td></td>
</tr>
<tr>
<td><strong>extendedRSRQ-LowerRange</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports the extended RSRQ lower value range from -34dB to -19.5dB in measurement configuration and reporting as specified in TS 36.133 [16].</td>
<td></td>
</tr>
<tr>
<td><strong>featureGroupIndicators, featureGroupIndRel9Add, featureGroupIndRel10</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>The definitions of the bits in the bit string are described in Annex B.1 (for featureGroupIndicators and featureGroupIndRel9Add) and in Annex C.1.(for featureGroupIndRel10)</td>
<td></td>
</tr>
<tr>
<td><strong>fourLayerTM3-TM4</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports 4-layer spatial multiplexing for TM3 and TM4.</td>
<td></td>
</tr>
<tr>
<td><strong>fourLayerTM3-TM4-perCC</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports 4-layer spatial multiplexing for TM3 and TM4 for the component carrier.</td>
<td></td>
</tr>
<tr>
<td><strong>freqBandPriorityAdjustment</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports the prioritization of frequency bands in multiBandInfoList over the band in freqBandIndicator as defined by freqBandIndicatorPriority-r12.</td>
<td></td>
</tr>
<tr>
<td><strong>freqBandRetrieval</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports reception of requestedFrequencyBands.</td>
<td></td>
</tr>
<tr>
<td><strong>halfDuplex</strong></td>
<td>-</td>
</tr>
<tr>
<td>If halfDuplex is set to true, only half duplex operation is supported for the band, otherwise full duplex operation is supported.</td>
<td></td>
</tr>
<tr>
<td><strong>incMonEUTRA</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports increased number of E-UTRA carrier monitoring in RRC_IDLE and RRC_CONNECTED, as specified in TS 36.133 [16].</td>
<td></td>
</tr>
<tr>
<td><strong>incMonUTRA</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports increased number of UTRA carrier monitoring in RRC_IDLE and RRC_CONNECTED, as specified in TS 36.133 [16].</td>
<td></td>
</tr>
<tr>
<td><strong>inDeviceCoexInd</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports in-device coexistence indication as well as autonomous denial functionality.</td>
<td></td>
</tr>
<tr>
<td><strong>inDeviceCoexInd-UL-CA</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports UL CA related in-device coexistence indication. This field can be included only if inDeviceCoexInd is included. The UE supports inDeviceCoexInd-UL-CA in the same duplexing modes as it supports inDeviceCoexInd.</td>
<td></td>
</tr>
<tr>
<td><strong>interBandTDD-CA-WithDifferentConfig</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports inter-band TDD carrier aggregation with different UL/DL configuration combinations. The first bit indicates UE supports the configuration combination of SCell DL subframes are a subset of PCell and PSCell by SIB1 configuration and the configuration combination of SCell DL subframes are a superset of PCell and PSCell by SIB1 configuration; the second bit indicates UE supports the configuration combination of SCell DL subframes are neither superset nor subset of PCell and PSCell by SIB1 configuration. This field is included only if UE supports inter-band TDD carrier aggregation.</td>
<td></td>
</tr>
<tr>
<td><strong>interFreqBandList</strong></td>
<td>-</td>
</tr>
<tr>
<td>One entry corresponding to each supported E-UTRA band listed in the same order as in supportedBandListEUTRA.</td>
<td></td>
</tr>
<tr>
<td><strong>interFreqNeedForGaps</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates need for measurement gaps when operating on the E-UTRA band given by the entry in bandListEUTRA or on the E-UTRA band combination given by the entry in bandCombinationListEUTRA and measuring on the E-UTRA band given by the entry in interFreqBandList.</td>
<td></td>
</tr>
<tr>
<td><strong>interFreqProximityIndication</strong></td>
<td>-</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>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports inter-frequency RSTD measurements for OTDOA positioning [54].</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><strong>interFreqSI-AcquisitionForHO</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports, upon configuration of si-RequestForHO by the network, acquisition and reporting of relevant information using autonomous gaps by reading the SI from a neighbouring inter-frequency cell.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>interRAT-BandList</strong></td>
<td>-</td>
</tr>
<tr>
<td>One entry corresponding to each supported band of another RAT listed in the same order as in the interRAT-Parameters.</td>
<td>-</td>
</tr>
<tr>
<td><strong>interRAT-NeedForGaps</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates need for DL measurement gaps when operating on the E-UTRA band given by the entry in bandListEUTRA or on the E-UTRA band combination given by the entry in bandCombinationListEUTRA and measuring on the inter-RAT band given by the entry in the interRAT-BandList.</td>
<td>-</td>
</tr>
<tr>
<td><strong>interRAT-PS-HO-ToGERAN</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports inter-RAT PS handover to GERAN or not.</td>
<td>-</td>
</tr>
<tr>
<td><strong>intraBandContiguousCC-InfoList</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates, per serving carrier of which the corresponding bandwidth class includes multiple serving carriers (i.e. bandwidth class B, C, D and so on), the maximum number of supported layers for spatial multiplexing in DL and the maximum number of CSI processes supported. The number of entries is equal to the number of component carriers in the corresponding bandwidth class. The UE shall support the setting indicated in each entry of the list regardless of the order of entries in the list. The UE shall include the field only if it supports 4-layer spatial multiplexing in transmission mode 3/4 for a subset of component carriers in the corresponding bandwidth class, or if the maximum number of supported layers for at least one component carrier is higher than supportedMIMO-CapabilityDL-r10 in the corresponding bandwidth class, or if the number of CSI processes for at least one component carrier is higher than supportedCSI-Proc-r11 in the corresponding band. This field may also be included for bandwidth class A but in such a case without including any sub-fields in IntraBandContiguousCC-Info-r12 (see NOTE 6).</td>
<td>-</td>
</tr>
<tr>
<td><strong>intraFreqProximityIndication</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports proximity indication for intra-frequency E-UTRAN CSG member cells.</td>
<td>-</td>
</tr>
<tr>
<td><strong>intraFreqSI-AcquisitionForHO</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports, upon configuration of si-RequestForHO by the network, acquisition and reporting of relevant information using autonomous gaps by reading the SI from a neighbouring intra-frequency cell.</td>
<td>-</td>
</tr>
<tr>
<td><strong>loggedMBSFNMeasurements</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports logged measurements for MBSFN. A UE indicating support for logged measurements for MBSFN shall also indicate support for logged measurements in Idle mode.</td>
<td>-</td>
</tr>
<tr>
<td><strong>loggedMeasurementsIdle</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports logged measurements in Idle mode.</td>
<td>-</td>
</tr>
<tr>
<td><strong>logicalChannelSR-ProhibitTimer</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports the logicalChannelSR-ProhibitTimer as defined in TS 36.321 [6].</td>
<td>-</td>
</tr>
<tr>
<td><strong>longDRX-Command</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports Long DRX Command MAC Control Element.</td>
<td>-</td>
</tr>
<tr>
<td><strong>maxLayersMIMO-Indication</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports the network configuration of maxLayersMIMO. If the UE supports fourLayerTM3-TM4 or intraBandContiguousCC-InfoList, UE supports the configuration of maxLayersMIMO for these two cases regardless of indicating maxLayersMIMO-Indication.</td>
<td>-</td>
</tr>
<tr>
<td><strong>maxNumberROHC-ContextSessions</strong></td>
<td>-</td>
</tr>
<tr>
<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>
<td>-</td>
</tr>
<tr>
<td><strong>mbms-AsyncDC</strong></td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE in RRC_CONNECTED supports MBMS reception on a frequency indicated in an MBMSInterestIndication message, where (according to supportedBandCombination) the carriers that are or can be configured as serving cells in the MCG and the SCG are not synchronized. If this field is included, the UE shall also include mbms-SCell and mbms-NonServingCell. The field indicates that the UE supports the feature for xDD if mbms-SCell and mbms-NonServingCell are supported for xDD.</td>
<td>-</td>
</tr>
</tbody>
</table>
### UE-EUTRA-Capability field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>FDD/TDD diff</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>mbms-SCell</td>
<td>Yes</td>
<td>Indicates whether the UE in RRC_CONNECTED supports MBMS reception on a frequency indicated in an MBMSInterestIndication message, when an SCell is configured on that frequency (regardless of whether the SCell is activated or deactivated).</td>
</tr>
<tr>
<td>mbms-NonServingCell</td>
<td>Yes</td>
<td>Indicates whether the UE in RRC_CONNECTED supports MBMS reception on a frequency indicated in an MBMSInterestIndication message, where (according to supportedBandCombination and to network synchronization properties) a serving cell may be additionally configured. If this field is included, the UE shall also include the mbms-SCell field.</td>
</tr>
<tr>
<td>mbms-UTRA</td>
<td></td>
<td>Indicates if the UE supports the signalling requirements of multiple radio frequency bands in a UTRA FDD cell, as defined in TS 25.307 [65].</td>
</tr>
<tr>
<td>mbms-NonServingCell</td>
<td>Yes</td>
<td>The number of supported layers for spatial multiplexing in DL. The field may be absent for category 0 and category 1 UE in which case the number of supported layers is 1.</td>
</tr>
<tr>
<td>mbms-NonServingCell</td>
<td>Yes</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>mbms-NonServingCell</td>
<td></td>
<td>Indicates whether the UE supports MBMS reception on a frequency indicated in an MBMSInterestIndication message, where (according to supportedBandCombination and to network synchronization properties) a serving cell may be additionally configured. If this field is included, the UE shall also include the mbms-SCell field.</td>
</tr>
<tr>
<td>multiACK-CSIreporting</td>
<td>Yes</td>
<td>Indicates whether the UE supports multi-cell HARQ ACK and periodic CSI reporting and SR on PUCCH format 3.</td>
</tr>
<tr>
<td>multiClusterPUSCH-WithinCC</td>
<td>Yes</td>
<td>Indicates whether the UE supports the mechanisms defined for cells broadcasting NS-PmaxList.</td>
</tr>
<tr>
<td>multiNS-Pmax</td>
<td></td>
<td>Indicates whether the UE supports multiple timing advances for each band combination listed in supportedBandCombination. If the band combination comprised of more than one band entry (i.e., inter-band or intra-band non-contiguous band combination), the field indicates that the same or different timing advances on different band entries are supported. If the band combination comprised of one band entry (i.e., intra-band contiguous band combination), the field indicates that the same or different timing advances across component carriers of the band entry are supported.</td>
</tr>
<tr>
<td>naics-Capability-List</td>
<td></td>
<td>Indicates that UE supports NAICS, i.e. receiving assistance information from serving cell and using it to cancel or suppress interference of neighbouring cell(s) for at least one band combination. If not present, UE does not support NAICS for any band combination. The field numberOfNAICS-CapableCC indicates the number of component carriers where the NAICS processing is supported and the field numberOfAggregatedPRB indicates the maximum aggregated bandwidth across these of component carriers (expressed as a number of PRBs) with the restriction that NAICS is only supported over the full carrier bandwidth. The UE shall indicate the combination of (numberOfNAICS-CapableCC, numberOfNAICS-CapableCC) for every supported numberOfNAICS-CapableCC, e.g. if a UE supports (x CC, y PRBs) and (x-n CC, y-m PRBs) where n&gt;=1 and m&gt;=0, the UE shall indicate both.</td>
</tr>
<tr>
<td>NonContiguousUL-RA-WithinCC-List</td>
<td>No</td>
<td>One entry corresponding to each supported E-UTRA band listed in the same order as in supportedBandListEUTRA.</td>
</tr>
<tr>
<td>Field Description</td>
<td>FDD/TDD diff</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>noResourceRestrictionForTTIBundling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicate whether the UE supports TTI bundling operation without resource allocation restriction.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>otdoa-UE-Assisted</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports UE-assisted OTDOA positioning [54].</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pdcp-SN-Extension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports 15 bit length of PDCP sequence number.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>phy-TDD-ReConfig-FDD-PCell</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports TDD UL/DL reconfiguration for TDD serving cell(s) via monitoring PDCCH with eIMTA-RNTI on a FDD PCell, and HARQ feedback according to UL and DL HARQ reference configurations. This bit can only be set to supported only if the UE supports FDD PCell and phy-TDD-ReConfig-TDD-PCell is set to supported.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>phy-TDD-ReConfig-TDD-PCell</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports TDD UL/DL reconfiguration for TDD serving cell(s) via monitoring PDCCH with eIMTA-RNTI on a TDD PCell, and HARQ feedback according to UL and DL HARQ reference configurations, and PUCCH format 3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pmi-Disabling</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports power preference indication.</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>pusch-FeedbackMode</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports PUSCH feedback mode 3-2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pusch-SRS-PowerControl-SubframeSet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports subframe set dependent UL power control for PUSCH and SRS. This field is only applicable for UEs supporting TDD.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rach-Report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports delivery of rachReport.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>requestedBands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates the frequency bands requested by E-UTRAN.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rsrqMeasWideband</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE can perform RSRQ measurements with wider bandwidth.</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>rsrq-OnAllSymbols</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE can perform RSRQ measurement on all OFDM symbols and also support the extended RSRQ upper value range from -3dB to 2.5dB in measurement configuration and reporting as specified in TS 36.133 [16].</td>
<td></td>
<td></td>
</tr>
<tr>
<td>simultaneousPUCCH-PUSCH</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports simultaneous reception and transmission on different bands for each band combination listed in supportedBandCombination. This field is only applicable for inter-band TDD band combinations. A UE indicating support of simultaneousRx-Tx and dc-Support-r12 shall support different UL/DL configurations between PCell and PSCell.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>srvcc-FromUTRA-FDD-ToGERAN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether UE supports SRVCC handover from UTRA FDD PS HS to GERAN CS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>srvcc-FromUTRA-FDD-ToUTRA-FDD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether UE supports SRVCC handover from UTRA FDD PS HS to UTRA FDD CS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>srvcc-FromUTRA-TDD128-ToGERAN</td>
<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>
<td></td>
</tr>
<tr>
<td>srvcc-FromUTRA-TDD128-ToUTRA-TDD128</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether UE supports SRVCC handover from UTRA TDD 1.28Mcps PS HS to UTRA TDD 1.28Mcps CS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ss-CCH-InterHand</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports synchronisation signal and common channel interference handling.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>standaloneGNSS-Location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE is equipped with a standalone GNSS receiver that may be used to provide detailed location information in RRC measurement report and logged measurements.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>supportedBandCombination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Includes the supported CA band combinations, if any, and may include all the supported non-CA bands.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>supportedBandCombinationAdd-r11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Includes additional supported CA band combinations in case maximum number of CA band combinations of supportedBandCombination is exceeded.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SupportedBandCombinationAdd-v11d0, SupportedBandCombinationAdd-v1250, SupportedBandCombinationAdd-v1270</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If included, the UE shall include the same number of entries, and listed in the same order, as in SupportedBandCombinationAdd-r11.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE-EUTRA-Capability field descriptions</td>
<td>FDD/ TDD diff</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td><strong>SupportedBandCombinationExt,</strong> SupportedBandCombination-v1090, SupportedBandCombination-v1010, SupportedBandCombination-v1130, SupportedBandCombination-v1250, SupportedBandCombination-v1270</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>If included, the UE shall include the same number of entries, and listed in the same order, as in supportedBandCombination-r10.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SupportedBandGERAN**  
GERAN band as defined in TS 45.005 [20].  
No  

**SupportedBandList1XRTT**  
One entry corresponding to each supported CDMA2000 1xRTT band class.  
-  

**SupportedBandListEUTRA**  
Includes the supported E-UTRA bands. This field shall include all bands which are indicated in BandCombinationParameters.  
-  

**SupportedBandListEUTRA-v9e0, SupportedBandListEUTRA-v1250**  
If included, the UE shall include the same number of entries, and listed in the same order, as in supportedBandListEUTRA (i.e., without suffix).  
-  

**SupportedBandListGERAN**  
No  

**SupportedBandListHRPD**  
One entry corresponding to each supported CDMA2000 HRPD band class.  
-  

**SupportedBandUTRA-FDD**  
UTRA band as defined in TS 25.101 [17].  
-  

**SupportedBandUTRA-TDD128**  
UTRA band as defined in TS 25.102 [18].  
-  

**SupportedBandUTRA-TDD384**  
UTRA band as defined in TS 25.102 [18].  
-  

**SupportedBandUTRA-TDD768**  
UTRA band as defined in TS 25.102 [18].  
-  

**supportedBandwidthCombinationSet**  
The supportedBandwidthCombinationSet indicated for a band combination is applicable to all bandwidth classes indicated by the UE in this band combination.  
Field encoded as a bit map, where bit N is set to "1" if UE support Bandwidth Combination Set N for this band combination, see 36.101 [42]. The leading / leftmost bit (bit 0) corresponds to the Bandwidth Combination Set 0, the next bit corresponds to the Bandwidth Combination Set 1 and so on. The UE shall neither include the field for a non-CA band combination, nor for a CA band combination for which the UE only supports Bandwidth Combination Set 0.  
-  

**supportedCellGrouping**  
This field indicates for which mapping of serving cells to cell groups (i.e., MCG or SCG) the UE supports asynchronous DC. This field is only present for a band combination with more than two band entries where the UE supports asynchronous DC. If this field is not present but asynchronous operation is supported, the UE supports all possible mappings of serving cells to cell groups for the band combination. The bitmap size is selected based on the number of entries in the combinations, i.e., in case of three entries, the bitmap corresponding to threeEntries is selected and so on.  
A bit in the bit string set to 1 indicates that the UE supports asynchronous DC for the cell grouping option represented by the concerned bit position. Each bit position represents a different cell grouping option, as illustrated by a table, see NOTE 5. A cell grouping option is represented by a number of bits, each representing a particular band entry in the band combination with the left-most bit referring to the band listed first in the band combination, etc. Value 0 indicates that the carriers of the corresponding band entry are mapped to a first cell group, while value 1 indicates that the carriers of the corresponding band entry are mapped to a second cell group.  
It is noted that the mapping table does not include entries with all bits set to the same value (0 or 1) as this does not represent a DC scenario (i.e., indicating that the UE supports that all carriers of the corresponding band entry are in one cell group).  
-  

**supportedCSI-Proc**  
Indicates the maximum number of CSI processes supported on a component carrier within a band. Value n1 corresponds to 1 CSI process, value n3 corresponds to 3 CSI processes, and value n4 corresponds to 4 CSI processes. If this field is included, the UE shall include the same number of entries listed in the same order as in BandParameters. If the UE supports at least 1 CSI process on any component carrier, then the UE shall include this field in all bands in all band combinations.  
-
<table>
<thead>
<tr>
<th>Field Description</th>
<th>FDD/ TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>supportedNAICS-2CRS-AP</td>
<td>-</td>
</tr>
<tr>
<td>If included, the UE supports NAICS for the band combination. The UE shall include a bitmap of the same length, and in the same order, as in naics-Capability-List, to indicate 2 CRS AP NAICS capability of the band combination. The first/ leftmost bit points to the first entry of naics-Capability-List, the second bit points to the second entry of naics-Capability-List, and so on. For band combinations with a single component carrier, UE is only allowed to indicate ${\text{numberOfNAICS-CapableCC}, \text{numberOfAggregatedPRB}} = {1, 100}$ if NAICS is supported.</td>
<td>-</td>
</tr>
<tr>
<td>supportRohcContextContinue</td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports ROHC context continuation operation where the UE does not reset the current ROHC context upon handover.</td>
<td>-</td>
</tr>
<tr>
<td>tdd-SpecialSubframe</td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports TDD special subframe defined in TS 36.211 [21].</td>
<td>-</td>
</tr>
<tr>
<td>tdd-FDD-CA-PCellDuplex</td>
<td>-</td>
</tr>
<tr>
<td>The presence of this field indicates that the UE supports TDD/FDD CA in any supported band combination including at least one FDD band with $\text{bandParametersUL}$ and at least one TDD band with $\text{bandParametersUL}$. The first bit is set to &quot;1&quot; if UE supports the TDD PCell. The second bit is set to &quot;1&quot; if UE supports FDD PCell. This field is included only if the UE supports band combination including at least one FDD band with $\text{bandParametersUL}$ and at least one TDD band with $\text{bandParametersUL}$. If this field is included, the UE shall set at least one of the bits as &quot;1&quot;. If this field is included with DC, then it is applicable within a CG, and the presence of this field indicates the capability of the UE to support TDD/FDD CA with at least one FDD band and at least one TDD band in the same CG, with the value indicating the support for TDD/FDD PCell (PSCell).</td>
<td>-</td>
</tr>
<tr>
<td>timerT312</td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports T312.</td>
<td>-</td>
</tr>
<tr>
<td>tm5-FDD</td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports the PDSCH transmission mode 5 in FDD.</td>
<td>-</td>
</tr>
<tr>
<td>tm5-TDD</td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports the PDSCH transmission mode 5 in TDD.</td>
<td>-</td>
</tr>
<tr>
<td>tm8-With-8Tx-FDD</td>
<td>No</td>
</tr>
<tr>
<td>twoAntennaPortsForPUCCH</td>
<td>No</td>
</tr>
<tr>
<td>txDiv-PUCCH1b-ChSelect</td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports transmit diversity for PUCCH format 1b with channel selection.</td>
<td>-</td>
</tr>
<tr>
<td>ue-Category</td>
<td>-</td>
</tr>
<tr>
<td>UE category as defined in TS 36.306 [5]. Set to values 1 to 12 in this version of the specification.</td>
<td>-</td>
</tr>
<tr>
<td>ue-CategoryDL</td>
<td>-</td>
</tr>
<tr>
<td>UE DL category as defined in TS 36.306 [5]. For ASN.1 compatibility, a UE indicating DL category 0 shall also indicate any of the categories (1..5) in ue-Category (without suffix), which is ignored by the eNB. The field ue-CategoryDL is set to values 0, 4, 6, 7, 9 to 16 in this version of the specification.</td>
<td>-</td>
</tr>
<tr>
<td>ue-CategoryUL</td>
<td>-</td>
</tr>
<tr>
<td>UE UL category as defined in TS 36.306 [5]. The field $\text{ue-CategoryUL-r12}$ is set to values 0, 3, 5, 7, 8 and 13 in this version of the specification.</td>
<td>-</td>
</tr>
<tr>
<td>ue-Rx-TxTimeDiffMeasurements</td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports Rx - Tx time difference measurements.</td>
<td>-</td>
</tr>
<tr>
<td>ue-SpecificRefsSigsSupported</td>
<td>No</td>
</tr>
<tr>
<td>TRUE indicates that the UE is capable of supporting UE transmit antenna selection as described in TS 36.213 [23, 8.7].</td>
<td>Yes</td>
</tr>
<tr>
<td>ul-CoMP</td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports UL Coordinated Multi-Point operation.</td>
<td>-</td>
</tr>
<tr>
<td>utran-ProximityIndication</td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports proximity indication for UTRAN CSG member cells.</td>
<td>-</td>
</tr>
<tr>
<td>utran-64QAM</td>
<td>-</td>
</tr>
<tr>
<td>Indicates whether the UE supports 64QAM in UL on the band. This field is only present when the field $\text{ue-CategoryUL}$ is set to 5, 8 or 13. If the field is present for one band, the field shall be present for all bands including downlink only bands.</td>
<td>-</td>
</tr>
<tr>
<td>utran-SI-AcquisitionForHO</td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports, upon configuration of $\text{si-RequestForHO}$ by the network, acquisition and reporting of relevant information using autonomous gaps by reading the SI from a neighbouring UMTS cell.</td>
<td>-</td>
</tr>
</tbody>
</table>
**UE-EUTRA-Capability** field descriptions

<table>
<thead>
<tr>
<th></th>
<th>FDD/ TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>voiceOverPS-UTRA-FDD</td>
<td>Indicates whether UE supports IMS voice according to GSMA IR.58 profile in UTRA FDD.</td>
</tr>
<tr>
<td>voiceOverPS-UTRA-TDD128</td>
<td>Indicates whether UE supports IMS voice in UTRA TDD 1.28Mcps.</td>
</tr>
<tr>
<td>wlan-IW-RAN-Rules</td>
<td>Indicates whether the UE supports RAN-assisted WLAN interworking based on access network selection and traffic steering rules.</td>
</tr>
<tr>
<td>wlan-IW-ANDSF-Policies</td>
<td>Indicates whether the UE supports RAN-assisted WLAN interworking based on ANDSF policies.</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). Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a capability for which it indicates support within the capability signalling.

**NOTE 3:** The **BandCombinationParameters** for the same band combination can be included more than once.

**NOTE 4:** UE CA and measurement capabilities indicate the combinations of frequencies that can be configured as serving frequencies.

**NOTE 5:** The grouping of the cells to the first and second cell group, as indicated by **supportedCellGrouping**, is shown in the table below. The leading / leftmost bit of **supportedCellGrouping** corresponds to the Bit String Position 1.

<table>
<thead>
<tr>
<th>Bit String Position</th>
<th>Cell grouping option (0= first cell group, 1= second cell group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>00001</td>
</tr>
<tr>
<td>2</td>
<td>00010</td>
</tr>
<tr>
<td>3</td>
<td>00011</td>
</tr>
<tr>
<td>4</td>
<td>00100</td>
</tr>
<tr>
<td>5</td>
<td>00101</td>
</tr>
<tr>
<td>6</td>
<td>00110</td>
</tr>
<tr>
<td>7</td>
<td>00111</td>
</tr>
<tr>
<td>8</td>
<td>01000</td>
</tr>
<tr>
<td>9</td>
<td>01001</td>
</tr>
<tr>
<td>10</td>
<td>01010</td>
</tr>
<tr>
<td>11</td>
<td>01011</td>
</tr>
<tr>
<td>12</td>
<td>01100</td>
</tr>
<tr>
<td>13</td>
<td>01101</td>
</tr>
<tr>
<td>14</td>
<td>01110</td>
</tr>
<tr>
<td>15</td>
<td>01111</td>
</tr>
</tbody>
</table>
NOTE 6: UE includes the intraBandContiguousCC-InfoList-r12 also for bandwidth class A because of the presence conditions in BandCombinationParameters-v1270. For example, if UE supports CA_1A_41D band combination, if UE includes the field intraBandContiguousCC-InfoList-r12 for band 41, the UE includes intraBandContiguousCC-InfoList-r12 also for band 1.

— UE-RadioPagingInfo

The UE-RadioPagingInfo IE contains information needed for paging of category 0 UE.

**UE-RadioPagingInfo information element**

```asn1
UE-RadioPagingInfo-r12 ::= SEQUENCE {
    ue-Category-v1250     INTEGER (0)   OPTIONAL,
    ...
}
```

— 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},
    ...
}
```

**UE-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>
— 

**VisitedCellInfoList**

The IE **VisitedCellInfoList** includes the mobility history information of maximum of 16 most recently visited cells or time spent outside E-UTRA. The most recently visited cell is stored first in the list. The list includes cells visited in RRC_IDLE and RRC_CONNECTED states.

**VisitedCellInfoList information element**

```
-- ASN1START
VisitedCellInfoList-r12 ::= SEQUENCE { SIZE (1..maxCellHistory-r12) } OF VisitedCellInfo-r12
VisitedCellInfo-r12 ::= SEQUENCE {
    visitedCellId-r12     CHOICE {
        cellGlobalId-r12      CellGlobalIdEUTRA,
        pci-arfcn-r12       SEQUENCE {
            physCellId-r12       PhysCellId,
            carrierFreq-r12       ARFCN-ValueEUTRA-r9
        }  OPTIONAL,
        timeSpent-r12      INTEGER (0..4095),
    }
}  OPTIONAL,
-- ASN1STOP
```

**VisitedCellInfoList field descriptions**

**timeSpent**

This field indicates the duration of stay in the cell or outside E-UTRA approximated to the closest second. If the duration of stay exceeds 4095s, the UE shall set it to 4095s.

—

**WLAN-OffloadConfig**

The IE **WLAN-OffloadConfig** includes information for traffic steering between E-UTRAN and WLAN. The fields are applicable to both RAN-assisted WLAN interworking based on access network selection and traffic steering rules and RAN-assisted WLAN interworking based on ANDSF policies unless stated otherwise in the field description.

**WLAN-OffloadConfig information element**

```
-- ASN1START
WLAN-OffloadConfig-r12 ::= SEQUENCE {
    thresholdRSRP-r12      SEQUENCE {
        thresholdRSRP-Low-r12     RSRP-Range,
        thresholdRSRP-High-r12     RSRP-Range
    }  OPTIONAL, -- Need OR
    thresholdRSRQ-r12      SEQUENCE {
        thresholdRSRQ-Low-r12     RSRQ-Range,
        thresholdRSRQ-High-r12     RSRQ-Range
    }  OPTIONAL, -- Need OR
    thresholdRSRQ-OnAllSymbolsWithWB-r12  SEQUENCE {
        thresholdRSRQ-OnAllSymbolsWithWB-Low-r12  RSRQ-Range,
        thresholdRSRQ-OnAllSymbolsWithWB-High-r12  RSRQ-Range
    }  OPTIONAL, -- Need OP
    thresholdRSRQ-OnAllSymbols-r12  SEQUENCE {
        thresholdRSRQ-OnAllSymbolsLow-r12     RSRQ-Range,
        thresholdRSRQ-OnAllSymbolsHigh-r12     RSRQ-Range
    }  OPTIONAL, -- Need OP
    thresholdRSRQ-WB-r12  SEQUENCE {
        thresholdRSRQ-WB-Low-r12    RSRQ-Range,
        thresholdRSRQ-WB-High-r12    RSRQ-Range
    }  OPTIONAL, -- Need OP
    thresholdChannelUtilization-r12  SEQUENCE {
        thresholdChannelUtilizationLow-r12  INTEGER (0..255),
        thresholdChannelUtilizationHigh-r12  INTEGER (0..255)
    }  OPTIONAL, -- Need OR
    thresholdBackhaul-Bandwidth-r12  SEQUENCE {
        thresholdBackhaulDL-BandwidthLow-r12  WLAN-backhaulRate-r12,
        thresholdBackhaulDL-BandwidthHigh-r12  WLAN-backhaulRate-r12,
        thresholdBackhaulUL-BandwidthLow-r12  WLAN-backhaulRate-r12,
        thresholdBackhaulUL-BandwidthHigh-r12  WLAN-backhaulRate-r12,
    }
-- ASN1STOP
```
thresholdBackhaulUL-BandwidthHigh-r12  WLAN-backhaulRate-r12

}  OPTIONAL, -- Need OR
thresholdBeaconRSSI-r12  SEQUENCE {
thresholdBeaconRSSI-Low-r12  INTEGER (0..255),
thresholdBeaconRSSI-High-r12  INTEGER (0..255)
}  OPTIONAL, -- Need OR
offloadPreferenceIndicator-r12  BIT STRING (SIZE (16))  OPTIONAL, -- Need OR
t-SteeringWLAN-r12  T-Reselection  OPTIONAL, -- Need OR

...
**WLAN-OffloadConfig field descriptions**

**offloadPreferenceIndicator**
Indicates the offload preference indicator. Parameter: OPI in TS 24.312 [66]. Only applicable to RAN-assisted WLAN interworking based on ANDSF policies.

**thresholdBackhaulDLBandwidth-High**
Indicates the backhaul available downlink bandwidth threshold used by the UE for traffic steering to WLAN. Parameter: ThreshBackhaulRateDLWLAN, High in TS 36.304 [4]. Value in kilobits/second. Value $n$ corresponds to $n$ kbps.

**thresholdBackhaulDLBandwidth-Low**
Indicates the backhaul available downlink bandwidth threshold used by the UE for traffic steering to E-UTRAN. Parameter: ThreshBackhaulRateDLWLAN, Low in TS 36.304 [4]. Value in kilobits/second. Value $n$ corresponds to $n$ kbps.

**thresholdBackhaulULBandwidth-High**
Indicates the backhaul available uplink bandwidth threshold used by the UE for traffic steering to WLAN. Parameter: ThreshBackhaulRateULWLAN, High in TS 36.304 [4]. Value in kilobits/second. Value $n$ corresponds to $n$ kbps.

**thresholdBackhaulULBandwidth-Low**
Indicates the backhaul available uplink bandwidth threshold used by the UE for traffic steering to E-UTRAN. Parameter: ThreshBackhaulRateULWLAN, Low in TS 36.304 [4]. Value in kilobits/second. Value $n$ corresponds to $n$ kbps.

**thresholdBeaconRSSI-High**
Indicates the Beacon RSSI threshold used by the UE for traffic steering to WLAN. Parameter: ThreshBeaconRSSIWLAN, High in TS 36.304 [4]. Value 0 corresponds to -128dBm, 1 corresponds to -127dBm and so on.

**thresholdBeaconRSSI-Low**
Indicates the Beacon RSSI threshold used by the UE for traffic steering to E-UTRAN. Parameter: ThreshBeaconRSSIWLAN, Low in TS 36.304 [4]. Value 0 corresponds to -128dBm, 1 corresponds to -127dBm and so on.

**thresholdChannelUtilization-High**
Indicates the WLAN channel utilization (BSS load) threshold used by the UE for traffic steering to E-UTRAN. Parameter: ThreshChUtilWLAN, High in TS 36.304 [4].

**thresholdChannelUtilization-Low**
Indicates the WLAN channel utilization (BSS load) threshold used by the UE for traffic steering to WLAN. Parameter: ThreshChUtilWLAN, Low in TS 36.304 [4].

**thresholdRSRP-High**
Indicates the RSRP threshold (in dBm) used by the UE for traffic steering to E-UTRAN. Parameter: ThreshServingOffloadWLAN, HighP in TS 36.304 [4].

**thresholdRSRP-Low**
Indicates the RSRP threshold (in dBm) used by the UE for traffic steering to WLAN. Parameter: ThreshServingOffloadWLAN, LowP in TS 36.304 [4].

**thresholdRSRQ-High**
Indicates the RSRQ threshold (in dB) used by the UE for traffic steering to E-UTRAN. Parameter: ThreshServingOffloadWLAN, HighQ in TS 36.304 [4]. The UE shall only apply one of threshold values of thresholdRSRQ-OnAllSymbolsWithWB-High, thresholdRSRQ-OnAllSymbolsHigh and thresholdRSRQ-High as present in wlan-OffloadConfigCommon and forward this to upper layer. NOTE 1.

**thresholdRSRQ-Low**
Indicates the RSRQ threshold (in dB) used by the UE for traffic steering to WLAN. Parameter: ThreshServingOffloadWLAN, LowQ in TS 36.304 [4]. The UE shall only apply one of threshold values of thresholdRSRQ-OnAllSymbolsWithWB-Low, thresholdRSRQ-OnAllSymbolsLow and thresholdRSRQ-Low as present in wlan-OffloadConfigCommon and forward this to upper layer. NOTE 1.

**t-SteeringWLAN**
Indicates the timer value during which the rules should be fulfilled before starting traffic steering between E-UTRAN and WLAN. Parameter: TsteeringWLAN in TS 36.304 [4]. Only applicable to RAN-assisted WLAN interworking based on access network selection and traffic steering rules.

NOTE 1: Within SIB17, E-UTRAN includes the fields corresponding to same RSRQ types as included in SIB1. E.g., if E-UTRAN includes $q$-QualMinRSRQ-OnAllSymbols in SIB1 it also includes thresholdRSRQ-OnAllSymbols in SIB17. Within the RRCConnectionReconfiguration message E-UTRAN only includes thresholdRSRQ, setting the value according to the RSRQ type used for E-UTRAN. The UE shall apply the RSRQ fields (RSRQ threshold, high and low) corresponding to one RSRQ type i.e. the same as it applies for E-UTRAN.
6.3.7 MBMS information elements

– MBMS-NotificationConfig

The IE MBMS-NotificationConfig specifies the MBMS notification related configuration parameters, that are applicable for all MBSFN areas.

**MBMS-NotificationConfig information element**

---

**MBMS-NotificationConfig** field descriptions

- **notificationOffset**
  Indicates, together with the notificationRepetitionCoeff, the radio frames in which the MCCH information change notification is scheduled i.e. the MCCH information change notification is scheduled in radio frames for which: SFN mod notification repetition period = notificationOffset.

- **notificationRepetitionCoeff**
  Actual change notification repetition period common for all MCCHs that are configured= shortest modification period/ notificationRepetitionCoeff. The ‘shortest modification period’ corresponds with the lowest value of mcch-ModificationPeriod of all MCCHs that are configured. Value n2 corresponds to coefficient 2, and so on.

- **notificationSF-Index**
  Indicates the subframe used to transmit MCCH change notifications on PDCCH.
  FDD: Value 1, 2, 3, 4, 5 and 6 correspond with subframe #1, #2, #3 #6, #7, and #8 respectively.
  TDD: Value 1, 2, 3, 4, and 5 correspond with subframe #3, #4, #7, #8, and #9 respectively.

– MBSFN-Areald

The IE MBSFN-Areald identifies an MBSFN area by means of a locally unique value at lower layers i.e. it concerns parameter Nid-MBSFN in TS 36.211 [21, 6.10.2.1].

**MBSFN-Areald information element**

---

– 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**

---
MCCH field descriptions

**mcch-ModificationPeriod**
Defines periodically appearing boundaries, i.e. radio frames for which SFN mod mcch-ModificationPeriod = 0. The contents of different transmissions of MCCH information can only be different if there is at least one such boundary in-between them.

**mcch-Offset**
Indicates, together with the mcch-RepetitionPeriod, the radio frames in which MCCH is scheduled i.e. MCCH is scheduled in radio frames for which: SFN mod mcch-RepetitionPeriod = mcch-Offset.

**mcch-RepetitionPeriod**
Defines the interval between transmissions of MCCH information, in radio frames, Value rf32 corresponds to 32 radio frames, rf64 corresponds to 64 radio frames and so on.

**non-MBSFNregionLength**
Indicates how many symbols from the beginning of the subframe constitute the non-MBSFN region. This value applies in all subframes of the MBSFN area used for PMCH transmissions as indicated in the MSI. The values s1 and s2 correspond with 1 and 2 symbols, respectively: see TS 36.211 [21, Table 6.7-1].

**notificationIndicator**
Indicates which PDCCH bit is used to notify the UE about change of the MCCH applicable for this MBSFN area. Value 0 corresponds with the least significant bit as defined in TS 36.212 [22, Section 5.3.3.1] and so on.

**sf-AllocInfo**
Indicates the subframes of the radio frames indicated by the mcch-RepetitionPeriod and the mcch-Offset, that may carry MCCH. Value “1” indicates that the corresponding subframe is allocated. The following mapping applies:
FDD: The first/ leftmost bit defines the allocation for subframe #1 of the radio frame indicated by mcch-RepetitionPeriod and mcch-Offset, the second bit for #2, the third bit for #3, the fourth bit for #6, the fifth bit for #7 and the sixth bit for #8.
TDD: The first/leftmost bit defines the allocation for subframe #3 of the radio frame indicated by mcch-RepetitionPeriod and mcch-Offset, the second bit for #4, third bit for #7, fourth bit for #8, fifth bit for #9. Uplink subframes are not allocated. The last bit is not used.

**signallingMCS**
Indicates the Modulation and Coding Scheme (MCS) applicable for the subframes indicated by the field sf-AllocInfo and for each (P)MCH that is configured for this MBSFN area, for the first subframe allocated to the (P)MCH within each MCH scheduling period (which may contain the MCH scheduling information provided by MAC). Value n2 corresponds with the value 2 for parameter \( I_{MCS} \) 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**

```
-- 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. E-UTRAN allocates uplink subframes only if `eimta-MainConfig` is configured.

`oneFrame`
"1" denotes that the corresponding subframe is allocated for MBSFN. The following mapping applies:
- **FDD**: The first/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. E-UTRAN allocates uplink subframes only if `eimta-MainConfig` is configured. 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, while IE `PMCH-InfoListExt` includes additional PMCHs, i.e. extends the PMCH list using the general principles specified in 5.1.2. The information provided for an individual PMCH includes the configuration parameters of the sessions that are carried by the concerned PMCH. For all PMCH that E-UTRAN includes in `PMCH-InfoList`, the list of ongoing sessions has at least one entry.

**PMCH-InfoList information element**

```
-- ASN1START
PMCH-InfoList-r9 ::= SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF PMCH-Info-r9
PMCH-InfoListExt-r12 ::= SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF PMCH-InfoExt-r12
PMCH-Info-r9 ::= SEQUENCE {
pmc-Config-r9      PMCH-Config-r9,
mbms-SessionInfoList-r9   MBMS-SessionInfoList-r9,
...
}
PMCH-InfoExt-r12 ::= SEQUENCE {
pmc-Config-r12      PMCH-Config-r12,
mbms-SessionInfoList-r12   MBMS-SessionInfoList-r9,
...
}
MBMS-SessionInfoList-r9 ::= SEQUENCE (SIZE (0..maxSessionPerPMCH)) OF MBMS-SessionInfo-r9
MBMS-SessionInfo-r9 ::= SEQUENCE {
tmgi-r9        TMGI-r9,
sessionId-r9      OCTET STRING (SIZE (1)) OPTIONAL, -- Need OR
logicalChannelIdentity-r9   INTEGER (0..maxSessionPerPMCH-1),
...
}
PMCH-Config-r9 ::= SEQUENCE {
sf-AllocEnd-r9      INTEGER (0..1535),
dataMCS-r9       INTEGER (0..28),
mch-SchedulingPeriod-r9   ENUMERATED {
rf8, rf16, rf32, rf64, rf128, rf256, rf512, rf1024),
...
}
PMCH-Config-r12 ::= SEQUENCE {
sf-AllocEnd-r12      INTEGER (0..1535),
dataMCS-r12 CHOICE {
...

-- ASN1END
```
6.3.8 Sidelink information elements

--- SL-CommConfig

The IE *SL-CommConfig* specifies the dedicated configuration information for sidelink communication. In particular it concerns the transmission resource configuration for sidelink communication on the primary frequency.

--- SL-CommConfig information element

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>commTxResources-r12</td>
<td>Choice of configurations for the transmission resources in primary frequency</td>
</tr>
<tr>
<td>release</td>
<td>Specifies the release of the configuration</td>
</tr>
<tr>
<td>setup</td>
<td>Specifies the setup of the configuration</td>
</tr>
<tr>
<td>scheduled-r12</td>
<td>Specifies the scheduled subframe(s) of the configuration</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>sl-RNTI-r12</td>
<td>Indicates the C-RNTI, MAC-MainConfigSL-r12, or SL-CommResourcePool-r12. The selection of which to use is up to the UE implementation.</td>
</tr>
<tr>
<td>mcs</td>
<td>Indicates the Modulation and Coding Scheme as defined in TS 36.212 [23, 14.2.1]. If not configured, the selection of Modulation and Coding Scheme is up to the UE implementation.</td>
</tr>
<tr>
<td>sc-CommTxConfig-r12</td>
<td>Indicates the configuration for the case E-UTRAN schedules the transmission resources based on sidelink specific BSR from the UE.</td>
</tr>
<tr>
<td>scheduled</td>
<td>Indicates the configuration for the case the UE selects the transmission resources from a pool of resources configured by E-UTRAN.</td>
</tr>
</tbody>
</table>

**SL-CommResourcePool**

The IE `SL-CommResourcePool` specifies the configuration information for an individual pool of resources for sidelink communication. The IE covers the configuration of both the sidelink control information and the data.

**-- ASN1START**

```asn1
SL-CommTxPoolList-r12 ::=  SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-CommResourcePool-r12
SL-CommRxPoolList-r12 ::=  SEQUENCE (SIZE (1..maxSL-RxPool-r12)) OF SL-CommResourcePool-r12
SL-CommResourcePool-r12 ::=  SEQUENCE {
  sc-CP-Len-r12     SL-CP-Len-r12,
  sc-Period-r12     SL-PeriodComm-r12,
  sc-TF-ResourceConfig-r12   SL-TF-ResourceConfig-r12,
  data-CP-Len-r12   SL-CP-Len-r12,
  dataHoppingConfig-r12   SL-HoppingConfigComm-r12,
  ue-SelectedResourceConfig-r12   SEQUENCE {
    -- Pool for normal usage
    commTxPoolNormalDedicated-r12 SEQUENCE {
      poolToDoReleaseList-r12   SL-TxPoolToReleaseList-r12 OPTIONAL, -- Need ON
      poolToAddModList-r12   SL-CommTxPoolToAddModList-r12 OPTIONAL -- Need ON
    }
    -- Pool for dedicated usage
    commTxPoolDedicated-r12 SEQUENCE {
      poolIdentity-r12     SL-TxPoolIdentity-r12,
      pool-r12       SL-CommResourcePool-r12
    }
  }
  MAC-MainConfigSL-r12 ::=   SEQUENCE {
    periodic-BSR-TimerSL     PeriodicBSR-Timer-r12   OPTIONAL, -- Need ON
    retx-BSR-TimerSL      RetxBSR-Timer-r12
  }
-- ASN1STOP
```
data-TF-ResourceConfig-r12 SL-TF-ResourceConfig-r12,
trpt-Subset-r12 SL-TRPT-Subset-r12 OPTIONAL -- Need OP
}
rxParametersNCell-r12 SEQUENCE {
tdd-Config-r12 TDD-Config OPTIONAL, -- Need OP
syncConfigIndex-r12 INTEGER (0..15) OPTIONAL, -- Need OR
}
rxParameters-r12 SEQUENCE {
sc-TxParameters-r12 SL-TxParameters-r12,
dataRxParameters-r12 SL-TxParameters-r12
}
...

SL-TRPT-Subset-r12 ::= BIT STRING (SIZE (3..5))

**SL-CommResourcePool field descriptions**

**sc-Period**
Indicates the period over which resources are allocated in a cell for SC and over which scheduled and UE selected data transmissions occur, see PSCCH period in TS 36.213 [23]. Value in number of subframes. Value sf40 corresponds to 40 subframes, sf80 corresponds to 80 subframes and so on. E-UTRAN configures values sf40, sf80, sf160 and sf320 for FDD and for TDD config 1 to 5, values sf70, sf140 and sf280 for TDD config 0, and finally values sf60, sf120 and sf240 for TDD config 6.

**syncConfigIndex**
Indicates the synchronisation configuration that is associated with a reception pool, by means of an index to the corresponding entry of commSyncConfig in SystemInformationBlockType18.

**tdd-Config**
TDD configuration associated with the reception pool of the cell indicated by syncConfigIndex. Absence of the field indicates the same duplex mode as the cell providing this field and the same UL/DL configuration as indicated by subframeAssignment in SystemInformationBlockType1 in case of TDD.

**trpt-Subset**
Indicates the subset of T-RPT available (see TS 36.213 [23, 14.1.1.1.1]). Consists of a bitmap which is used to indicate the set of available ‘k’ values to be used for sidelink communication (see TS 36.213 [23, 14.1.1.3]). If T-RPT subset configuration is not signaled/ preconfigured then UE assumes the whole T-RPT set is available.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx</td>
<td>The field is mandatory present when included in commTxPoolNormalDedicated, commTxPoolNormalCommon or commTxPoolExceptional. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

**SL-CP-Len**

The IE SL-CP-Len indicates the cyclic prefix length, see TS 36.211 [21].

**SL-CP-Len information element**

```
-- ASN1START
SL-CP-Len-r12 ::= ENUMERATED {normal, extended}

-- ASN1STOP
```

**SL-DiscConfig**

The IE SL-DiscConfig specifies the dedicated configuration information for sidelink discovery.

**SL-DiscConfig information element**

```
-- ASN1START
SL-DiscConfig-r12 ::= SEQUENCE {
discTxResources-r12 CHOICE {
release NULL,
release
}

-- ASN1STOP
```
setup CHOICE {
  scheduled-r12 SEQUENCE {
    discTxConfig-r12 SL-DiscResourcePool-r12 OPTIONAL, -- Need ON
    discTF-IndexList-r12 SL-TF-IndexPairList-r12 OPTIONAL, -- Need ON
    discHoppingConfig-r12 SL-HoppingConfigDisc-r12 OPTIONAL -- Need ON
  },
  ue-Selected-r12 SEQUENCE {
    discTxPoolDedicated-r12 SEQUENCE {
      poolToReleaseList-r12 SL-TxPoolToReleaseList-r12 OPTIONAL, -- Need ON
      poolToAddModList-r12 SL-DiscTxPoolToAddModList-r12 OPTIONAL -- Need ON
    } OPTIONAL -- Need ON
  }
},...,

[[ discTF-IndexList-v1260 CHOICE {
  release NULL,
  setup SEQUENCE {
    discTF-IndexList-r12b SL-TF-IndexPairList-r12b
  }
} OPTIONAL -- Need ON
}}

SL-DiscTxPoolToAddModList-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-DiscTxPoolToAddMod-r12

SL-DiscTxPoolToAddMod-r12 ::= SEQUENCE {
  poolIdentity-r12 SL-TxPoolIdentity-r12,
  pool-r12 SL-DiscResourcePool-r12
}

SL-TF-IndexPairList-r12 ::= SEQUENCE (SIZE (1..maxSL-TF-IndexPair-r12)) OF SL-TF-IndexPair-r12

SL-TF-IndexPair-r12 ::= SEQUENCE {
  discSF-Index-r12 INTEGER (1.. 200) OPTIONAL, -- Need ON
  discPRB-Index-r12 INTEGER (1.. 50) OPTIONAL -- Need ON
}

SL-TF-IndexPairList-r12b ::= SEQUENCE (SIZE (1..maxSL-TF-IndexPair-r12)) OF SL-TF-IndexPair-r12b

SL-TF-IndexPair-r12b ::= SEQUENCE {
  discSF-Index-r12b INTEGER (0..209) OPTIONAL,  -- Need ON
  discPRB-Index-r12b INTEGER (0..49) OPTIONAL  -- Need ON
}

-- ASN1STOP

**SL-DiscConfig field descriptions**

**discTF-IndexList**
Indicates a list of time-frequency resource indices pair where each pair of indices corresponds to one discovery message. E-UTRAN only configures discTF-IndexList-r12b when configuring the UE with scheduled SL discovery Tx resources. When receiving discTF-IndexList-r12b, the UE shall only consider this field (and hence ignore discTF-IndexList-r12, if included or previously configured).

**discTxConfig**
Indicates the resources configuration used when E-UTRAN schedules Tx resources (i.e. the fields discSF-Index and discPRB-Index indicate the actual resources to be used).

**discTxResources**
Indicates the resources assigned to the UE for discovery announcements, which can either be a pool from which the UE may select or a set of resources specifically assigned for use by the UE.

**SL-TF-IndexPair**
A pair of indices, one for the time domain and one for the frequency domain, indicating the start of resources within the pool covered by discTxConfig, see TS 36.211 [21, 9.5.6] for one discovery message. The upper limits of discSF-Index and discPRB-Index are defined in TS 36.213 [23, 14.3.1].
The **IE **SL-DiscResourcePool** specifies the configuration information for an individual pool of resources for sidelink discovery.**

**SL-DiscResourcePool information element**

---

**discPeriod**
Indicates the period over which resources are allocated in a cell for discovery message transmission/reception, see PSDCH period in TS 36.213 [23]. Value in number of radio frames. Value rf32 corresponds to 32 radio frames, rf64 corresponds to 64 radio frames and so on.

**numRepetition**
Indicates the number of times **subframeBitmap** is repeated for mapping to subframes that occurs within a **discPeriod**. The highest value E-UTRAN uses is value 5 for FDD and TDD configuration 0, value 13 for TDD configuration 1, value 25 for TDD configuration 2, value 17 for TDD configuration 3, value 25 for TDD configuration 4, value 50 for TDD configuration 5 and value 7 for TDD configuration 6. E-UTRAN configures **numRepetition** and **subframeBitmap** such that the mapped subframes do not exceed the **discPeriod**.

**poolSelection**
Indicates the mechanism for selecting a (transmission) pool when multiple candidates are provided. E-UTRAN configures the same value (i.e. a pool selection method) for all candidate pools within one pool list (**discTxPoolCommon** or **discTxPoolDedicated**) but the pool selection method in different pool lists may or may not be the same.

**syncConfigIndex**
Indicates the synchronisation configuration that is associated with a reception pool, by means of an index to the corresponding entry of **discSyncConfig** in **SystemInformationBlockType19**.

**threshLow, threshHigh**
Specifies the thresholds used to select a resource pool in RSRP based pool selection. The E-UTRAN should configure **threshLow** and **threshHigh** such that the UE selects only one resource pool upon RSRP based pool selection.

**txProbability**
Indicates the probability of transmitting announcement in a discovery period when configured with a pool of resources, see TS 36.321 [6].
Conditional presence | Explanation
--- | ---
Tx | The field is mandatory present when included in discTxPoolDedicated or discTxPoolCommon. Otherwise the field is not present.

---

**SL-DiscTxPowerInfo**

The IE **SL-DiscTxPowerInfo** specifies power control parameters for one or more power classes.

**SL-DiscTxPowerInfo information element**

```asn1
SL-DiscTxPowerInfoList-r12 ::= SEQUENCE (SIZE (maxSL-DiscPowerClass-r12)) OF SL-DiscTxPowerInfo-r12
SL-DiscTxPowerInfo-r12 ::= SEQUENCE {
  discMaxTxPower-r12       P-Max,
  ...
}
```

**SL-DiscTxPowerInfo field descriptions**

*discMaxTxPower*

Indicates the P-Max parameter used to calculate the maximum transmit power a UE configured with the concerned range class, see TS 24.333 [70, 4.2.11]. The first entry in **SL-DiscTxPowerInfoList** corresponds to UE range class ‘short’, the second entry corresponds to ‘medium’ and the third entry corresponds to ‘long’.

---

**SL-HoppingConfig**

The IE **SL-HoppingConfig** indicates the hopping configuration used for sidelink.

**SL-HoppingConfig information element**

```asn1
SL-HoppingConfigComm-r12 ::= SEQUENCE {
  hoppingParameter-r12    INTEGER (0..504),
  numSubbands-r12      ENUMERATED {ns1, ns2, ns4},
  rb-Offset-r12      INTEGER (0..110)
}
SL-HoppingConfigDisc-r12 ::= SEQUENCE {
  a-r12         INTEGER (1..200),
  b-r12         INTEGER (1..10),
  c-r12         ENUMERATED {n1, n5}
}
```
### SL-HoppingConfig field descriptions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a</strong></td>
<td>Per cell parameter: $N^{(1)}_{PSDCH}$ see TS 36.213 [23, 14.3.1].</td>
</tr>
<tr>
<td><strong>b</strong></td>
<td>Per UE parameter: $N^{(2)}_{PSDCH}$ see TS 36.213 [23, 14.3.1].</td>
</tr>
<tr>
<td><strong>c</strong></td>
<td>Per cell parameter: $N^{(3)}_{PSDCH}$ see TS 36.213 [23, 14.3.1].</td>
</tr>
</tbody>
</table>

#### hoppingParameter

Affects the hopping performed as specified in TS 36.213 [23, 14.1.1.2 and 14.1.1.4]. In case value 504 is received, the value used by the UE is 510.

**numSubbands**

Parameter: $N_{num}$ see TS 36.211 [21, 9.3.6].

**rb-Offset**

Parameter: $N_{HPB}$, see TS 36.211 [21, 9.3.6].

---

#### SL-OffsetIndicator

The IE **SL-OffsetIndicator** indicates the offset of the pool of resources relative to SFN 0 of the cell from which it was obtained or, when out of coverage, relative to DFN 0.

**SL-OffsetIndicator information element**

```asn1
-- ASN1START
SL-OffsetIndicator-r12 ::=   CHOICE {
    small-r12        INTEGER (0..319),
    large-r12        INTEGER (0..10239)
}
SL-OffsetIndicatorSync-r12 ::=   INTEGER (0..39)
-- ASN1STOP
```

#### SL-OffsetIndicator field descriptions

**SL-OffsetIndicator**

In **sc-TF-ResourceConfig**, it indicates the offset of the first period of pool of resources within a SFN cycle. For **data-TF-ResourceConfig**, it corresponds to the **offsetIndicator** as defined in TS 36.213 [23, 14.1.3].

**SL-OffsetIndicatorSync**

Synchronisation resources are present in those SFN and subframes which satisfy the relation: $(SFN*10 + Subframe Number) \mod 40 = SL-OffsetIndicatorSync$.

---

#### SL-PeriodComm

The IE **SL-PeriodComm** indicates the period over which resources allocated in a cell for sidelink communication.

**SL-PeriodComm information element**

```asn1
-- ASN1START
SL-PeriodComm-r12 ::=     ENUMERATED {sf40, sf60, sf70, sf80, sf120, sf140,
                                  sf160, sf240, sf280, sf320, spare6, spare5,
                                  spare4, spare3, spare2, spare}
-- ASN1STOP
```
-- **SLSSID**

The IE **SLSSID** identifies a cell and is used by the receiving UE to detect asynchronous neighbouring cells, and by transmitting UEs to extend the synchronisation signals beyond the cell’s coverage area.

**SLSSID information element**

```asn1
-- ASN1START
SLSSID-r12 ::= INTEGER (0..167)
-- ASN1STOP
```

-- **SL-SyncConfig**

The IE **SL-SyncConfig** specifies the configuration information concerning reception of synchronisation signals from neighbouring cells as well as concerning the transmission of synchronisation signals for sidelink communication and sidelink discovery.

**SL-SyncConfig information element**

```asn1
-- ASN1START
SL-SyncConfigList-r12 ::= SEQUENCE (SIZE (1..maxSL-SyncConfig-r12)) OF SL-SyncConfig-r12

SL-SyncConfig-r12 ::= SEQUENCE {
    syncCP-Len-r12           SL-CP-Len-r12,
    syncOffsetIndicator-r12  SL-OffsetIndicatorSync-r12,
    slssid-r12               SLSSID-r12,
    txParameters-r12         SEQUENCE {
        syncTxParameters-r12  SL-TxParameters-r12,
        syncTxThreshIC-r12    RSRP-RangeSL-r12,
        syncInfoReserved-r12  BIT STRING (SIZE (19)) OPTIONAL -- Need OR
    },
    rxParamsNCell-r12        SEQUENCE {
        physCellId-r12       PhysCellId,
        discSyncWindow-r12   ENUMERATED {w1, w2} OPTIONAL -- Need OR
    },
    ...
}
-- ASN1STOP
**SL-SyncConfig field descriptions**

**discSyncWindow**
Indicates the synchronization window over which the UE expects that SLSS or discovery resources indicated by the pool configuration (see TS 36.213 [23, 14.4]). The value \( w1 \) denotes 5 milliseconds. The value \( w2 \) denotes the length corresponding to normal cyclic prefix divided by 2.

**syncInfoReserved**
Reserved for future use.

**syncOffsetIndicator**
E-UTRAN should ensure \( \text{syncOffsetIndicator} \) is set to the same value as \( \text{syncOffsetIndicator1} \) or \( \text{syncOffsetIndicator2} \) in preconfigSync within SL-Preconfiguration, if configured.

**syncTxThreshIC**
Indicates the threshold used while in coverage. In case the RSRP measurement of the cell chosen for transmission of sidelink communication/ discovery announcements, is below the level indicated by this field, the UE may transmit SLSS (i.e. become synchronisation reference) when performing the corresponding sidelink transmission..

**txParameters**
Includes parameters relevant only for transmission. E-UTRAN includes the field in one entry per list, as included in \( \text{comSyncConfig} \) or \( \text{discSyncConfig} \).

---

**SL-TF-ResourceConfig**

The IE \( \text{SL-TF-ResourceConfig} \) specifies a set of time/ frequency resources used for sidelink.

---

**SL-TF-ResourceConfig information element**

```
-- ASN1START

SL-TF-ResourceConfig-r12 ::= SEQUENCE {
  prb-Num-r12       INTEGER (1..100),
  prb-Start-r12     INTEGER (0..99),
  prb-End-r12       INTEGER (0..99),
  offsetIndicator-r12           SL-OffsetIndicator-r12,  
  subframeBitmap-r12  SubframeBitmapSL-r12
}

SubframeBitmapSL-r12 ::= CHOICE {
  bs4-r12         BIT STRING (SIZE (4)),
  bs8-r12         BIT STRING (SIZE (8)),
  bs12-r12        BIT STRING (SIZE (12)),
  bs16-r12        BIT STRING (SIZE (16)),
  bs30-r12        BIT STRING (SIZE (30)),
  bs40-r12        BIT STRING (SIZE (40)),
  bs42-r12        BIT STRING (SIZE (42))
}

-- ASN1STOP
```

---

**SL-TF-ResourceConfig field descriptions**

**prb-Start, prb-End, prb-Num**
Sidelink transmissions on a sub-frame can occur on PRB with index greater than or equal to \( \text{prb-Start} \) and less than \( \text{prb-Start} + \text{prb-Num} \), and on PRB with index greater than \( \text{prb-End} + \text{prb-Num} \) and less than or equal to \( \text{prb-End} \). Even for neighbouring cells, \( \text{prb-Start} \) and \( \text{prb-End} \) are relative to PRB #0 of the cell from which it was obtained. See TS36.213 [23, 14.1.3, 14.2.3, 14.3.3].

**subframeBitmap**
Indicates the subframe bitmap indicating resources used for sidelink. E-UTRAN configures value \( \text{bs40} \) for FDD and the following values for TDD: value \( \text{bs42} \) for configuration0, value \( \text{bs16} \) for configuration1, value \( \text{bs8} \) for configuration2, value \( \text{bs12} \) for configuration3, value \( \text{bs8} \) for configuration4, value \( \text{bs4} \) for configuration5 and value \( \text{bs30} \) for configuration6.

---

**SL-TxParameters**

The IE \( \text{SL-TxParameters} \) identifies a set of parameters configured for sidelink transmission, used for communication, discovery and synchronisation.

---

**SL-TxParameters information element**

```
-- ASN1START
```
SL-TxParameters-r12 ::= SEQUENCE {
    alpha-r12        Alpha-r12,
    p0-r12         P0-SL-r12
}

P0-SL-r12 ::= INTEGER (-126..31)

-- ASN1STOP

SL-TxParameters field descriptions

alpha
Parameter(s): $\alpha_{\text{PSSCH,1}}, \alpha_{\text{PSSCH,2}}, \alpha_{\text{PSCCH,1}}, \alpha_{\text{PSCCH,2}}, \alpha_{\text{PSDCH}}, \alpha_{\text{PSSS}}$ See TS 36.213 [23, 14.1.1.5, 14.2.1.2, 14.3.1, 14.4] 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. This field applies for sidelink power control.

p0
Parameter: $O_{\text{PSSCH,1}} P, O_{\text{PSSCH,2}} P, O_{\text{PSCCH,1}} P, O_{\text{PSCCH,2}} P, O_{\text{PSDCH}} P, P_{\text{PSSS}}$ see TS 36.213 [23, 14.1.1.5, 14.2.1.2, 14.3.1, 14.4], unit dBm.

–

SL-TxPoolIdentity

The IE SL-TxPoolIdentity identifies an individual pool entry configured for sidelink transmission, used for communication and discovery.

SL-TxPoolIdentity information element

-- ASN1START

SL-TxPoolIdentity-r12 ::= INTEGER (1.. maxSL-TxPool-r12)

-- ASN1STOP

–

SL-TxPoolToReleaseList

The IE SL-TxPoolToReleaseList is used to release one or more individual pool entries used for sidelink transmission, for communication and discovery.

SL-TxPoolToReleaseList information element

-- ASN1START

SL-TxPoolToReleaseList-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-TxPoolIdentity-r12

-- ASN1STOP

6.4 RRC multiplicity and type constraint values

–

Multiplicity and type constraint definitions

-- ASN1START

maxBandComb-r10 INTEGER ::= 128 -- Maximum number of band combinations.
maxBandComb-r11 INTEGER ::= 256 -- Maximum number of additional 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
maxCellHistory-r12 INTEGER ::= 36 -- Maximum number of visited EUTRA cells reported
maxCellInfoGERAN-r9 INTEGER ::= 32 -- Maximum number of GERAN cells for which system in--
maxCellInfoUTEtra-r9 INTEGER ::= 16 -- Maximum number of UTRA cells for which system information can be provided as redirection assistance

maxCombiDc-r11 INTEGER ::= 128 -- Maximum number of reported UL CA combinations

maxCSI-IM-r11 INTEGER ::= 3 -- Maximum number of CSI-IM configurations (per carrier frequency)

maxCSI-IM-r12 INTEGER ::= 4 -- Maximum number of CSI-IM configurations (per carrier frequency)

maxCSI-Proc-r11 INTEGER ::= 4 -- Maximum number of CSI processes (per carrier frequency)

maxCSI-RS-NZP-r11 INTEGER ::= 3 -- Maximum number of CSI RS resource configurations using non-zero Tx power (per carrier frequency)

maxCSI-RS-ZP-r11 INTEGER ::= 4 -- Maximum number of CSI RS resource configurations using zero Tx power (per carrier frequency)

maxCqi-ProcExt-r11 INTEGER ::= 3 -- Maximum number of additional periodic CQI configurations (per carrier frequency)

maxFreqUTEra-TDD-r10 INTEGER ::= 6 -- Maximum number of UTRA TDD carrier frequencies for which system information can be provided as redirection assistance

maxCellInter INTEGER ::= 16 -- Maximum number of neighbouring inter-frequency cells listed in SIB type 5

maxCellIntra INTEGER ::= 16 -- Maximum number of neighbouring intra-frequency cells listed in SIB type 4

maxCellListGERAN INTEGER ::= 3 -- Maximum number of lists of GERAN cells

maxCellMeas INTEGER ::= 32 -- Maximum number of entries in each of the cell lists in a measurement object

maxCellReport INTEGER ::= 8 -- Maximum number of reported cells/CSI-RS resources

maxCSI-RS-Meas-r12 INTEGER ::= 96 -- Maximum number of entries in the CSI-RS list in a measurement object

maxDRB INTEGER ::= 11 -- Maximum number of Data Radio Bearers

maxDS-Duration-r12 INTEGER ::= 5 -- Maximum number of subframes in a discovery signals occasion

maxDS-ZTP-CISI-RS-r12 INTEGER ::= 5 -- Maximum number of zero transmission power CSI-RS for a serving cell concerning discovery signals

maxEArfcn INTEGER ::= 65535 -- Maximum value of EUTRA carrier frequency

maxEArfcn-Plus1 INTEGER ::= 65536 -- Lowest value extended EArfcn range

maxEArfcn16 INTEGER ::= 262143 -- Highest value extended EArfcn range

maxEPDCCch-Set-r11 INTEGER ::= 2 -- Maximum number of EPDCCCH sets

maxFBI INTEGER ::= 64 -- Maximum value of frequency band indicator

maxFBI-Plus1 INTEGER ::= 65 -- Lowest value extended FBI range

maxFreq INTEGER ::= 256 -- Highest value extended FBI range

maxFreqIDC-r11 INTEGER ::= 32 -- Maximum number of carrier frequencies that are affected by the IDC problems

maxFreqMBMS-r11 INTEGER ::= 5 -- Maximum number of carrier frequencies for which an MBMS capable UE may indicate an interest

maxGERAN-SI INTEGER ::= 10 -- Maximum number of GERAN SI blocks that can be provided as part of NACC information

maxGNFG INTEGER ::= 16 -- Maximum number of GERAN neighbour freq groups

maxLogMeasReport-r10 INTEGER ::= 520 -- Maximum number of logged measurement entries that can be reported by the UE in one message

maxMBFN-Allocations INTEGER ::= 8 -- Maximum number of MBFN frame allocations with different offset

maxMBFN-Frame INTEGER ::= 8

maxMBSFN-Area INTEGER ::= 32

maxMBSFN-Area-1 INTEGER ::= 7

maxMeasId INTEGER ::= 32

maxMeasId-Plus1 INTEGER ::= 33

maxMultiBands INTEGER ::= 32

maxNC-Fmax-r10 INTEGER ::= 8 -- Maximum number of NS and P-Max values per band

maxNAICS-Entries-r12 INTEGER ::= 8 -- Maximum number of supported NAICS combination(s)

maxNeighborCell-r12 INTEGER ::= 8 -- Maximum number of neighbouring cells in NAICS configuration (per carrier frequency)

maxObjectId INTEGER ::= 32

maxP-a-PerNeighborCell-r12 INTEGER ::= 3 -- Maximum number of power offsets for a neighbour cell in NAICS configuration

maxPageRec INTEGER ::= 16

maxPhysCellIdRange-r9 INTEGER ::= 4 -- Maximum number of physical cell identity ranges

maxPIMN-r11 INTEGER ::= 6 -- Maximum number of PIMNs

maxPNoffset INTEGER ::= 511 -- Maximum number of CDMA2000 PNoffsets

maxPMCH-PerMBSFN INTEGER ::= 15

maxRAT-Capabilities INTEGER ::= 8 -- Maximum number of interworking RATs (incl EUTRA)

maxRE-MapQCL-r11 INTEGER ::= 4 -- Maximum number of PDSCH RE Mapping configurations (per carrier frequency)
maxReportConfigId INTEGER ::= 32
maxRSTD-Freq-r10 INTEGER ::= 3 -- Maximum number of frequency layers for RSTD measurement
maxSAI-MBMS-r11 INTEGER ::= 64 -- Maximum number of MBMS service area identities -- broadcast per carrier frequency
maxSCell-r10 INTEGER ::= 4 -- Maximum number of SCells
maxSTAG-r11 INTEGER ::= 3 -- Maximum number of MBMS service area identities
maxServCell-r10 INTEGER ::= 5 -- Maximum number of Serving cells
maxServiceCount INTEGER ::= 16 -- Maximum number of MBMS services that can be included -- in an MBMS counting request and response
maxServiceCount-1 INTEGER ::= 15
maxSessionPerPMCH INTEGER ::= 29
maxSessionPerPMCH-1 INTEGER ::= 28
maxSIB INTEGER ::= 32 -- Maximum number of SIBs
maxSIB-1 INTEGER ::= 31
maxSI-Message INTEGER ::= 32 -- Maximum number of SI messages
maxSimultaneousBands-r10 INTEGER ::= 64 -- Maximum number of simultaneously aggregated bands
maxSubframePatternIDC-r11 INTEGER ::= 8 -- Maximum number of subframe reservation patterns -- that the UE can simultaneously recommend to the -- E-UTRAN for use.
maxUTRA-FDD-Carrier INTEGER ::= 16 -- Maximum number of UTRA FDD carrier frequencies
maxUTRA-TDD-Carrier INTEGER ::= 16 -- Maximum number of UTRA TDD carrier frequencies
maxWLAN-Id-r12 INTEGER ::= 16 -- Maximum number of WLAN identifiers

-- ASN1STOP

NOTE: The value of maxDRB aligns with SA2.

End of EUTRA-RRC-Definitions

-- ASN1START
END
-- ASN1STOP

6.5 PC5 RRC messages

NOTE: The messages included in this section reflect the current status of the discussions. Additional messages may be included at a later stage.

6.5.1 General message structure

-- PC5-RRC-Definitions

This ASN.1 segment is the start of the PC5 RRC PDU definitions.

-- ASN1START
PC5-RRC-Definitions DEFINITIONS AUTOMATIC TAGS ::= BEGIN IMPORTS TDD-ConfigSL-r12 FROM EUTRA-RRC-Definitions;
-- ASN1STOP
The **SBCCH-SL-BCH-Message** class is the set of RRC messages that may be sent from the UE to the UE via SL-BCH on the SBCCH logical channel.

**SBCCH-SL-BCH-Message ::= SEQUENCE {
  message     SBCCH-SL-BCH-MessageType
}
SBCCH-SL-BCH-MessageType ::= MasterInformationBlock-SL**

### 6.5.2 Message definitions

**MasterInformationBlock-SL**

The **MasterInformationBlock-SL** includes the information transmitted by a UE transmitting SLSS, i.e. acting as synchronisation reference, via SL-BCH.

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

**MasterInformationBlock-SL ::= SEQUENCE {
  sl-Bandwidth-r12     ENUMERATED {
    n6, n15, n25, n50, n75, n100},
  tdd-ConfigSL-r12     TDD-ConfigSL-r12,
  directFrameNumber-r12    BIT STRING (SIZE (10)),
  directSubframeNumber-r12   INTEGER (0..9),
  inCoverage-r12      BOOLEAN,
  reserved-r12      BIT STRING (SIZE (19))
}**

**directFrameNumber**
Indicates the frame number in which SLSS and SL-BCH are transmitted. The subframe in the frame corresponding to **directFrameNumber** is indicated by **directSubframeNumber**.

**inCoverage**
Value **TRUE** indicates that the UE transmitting the **MasterInformationBlock-SL** is in E-UTRAN coverage.

**sl-Bandwidth**
Parameter: transmission bandwidth configuration. n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on.
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.

```asn1
BEGIN
IMPORTS
    AbsoluteTimeInfo-r10,
    AreaConfiguration-r10,
    AreaConfiguration-v1130,
    CarrierFreqGERAN,
    CellIdentity,
    ConnEstFailReport-r11,
    SpeedStateScaleFactors,
    C-RNTI,
    LoggingDuration-r10,
    LoggingInterval-r10,
    LogMeasInfo-r10,
    MeasCSI-RS-Id-r12,
    MeasId,
    MeasId-v1250,
    MeasIdToAddModList,
    MeasIdToAddModListExt-r12,
    MeasObjectToAddModList,
    MeasObjectToAddModList-v9e0,
    MeasScaleFactor-r12,
    MobilityStateParameters,
    NeighCellConfig,
    PhysCellId,
    PhysCellIdCDMA2000,
    PhysCellIdGERAN,
    PhysCellIdUTRA-FDD,
    PhysCellIdUTRA-TDD,
    PLMN-Identity,
    PLMN-IdentityList3-r11,
    QuantityConfig,
    ReportConfigToAddModList,
    RLF-Report-r9,
    TargetMBSFN-AreaList-r12,
    TraceReference-r10,
    VisitedCellInfoList-r12,
    maxCellMeas,
    maxCSI-RS-Meas-r12,
    maxMeasId,
    maxMeasId-r12
FROM EUTRA-RRC-Definitions;
```

– **VarConnEstFailReport**

The UE variable `VarConnEstFailReport` includes the connection establishment failure information.
VarConnEstFailReport UE variable

```asciidoc
VarConnEstFailReport-r11 ::= SEQUENCE {
      connEstFailReport-r11     ConnEstFailReport-r11,
      plmn-Identity-r11     PLMN-Identity
}
```

VarLogMeasConfig

The UE variable VarLogMeasConfig includes the configuration of the logging of measurements to be performed by the UE while in RRC_IDLE, covering intra-frequency, inter-frequency, inter-RAT mobility and MBSFN related measurements. If MBSFN logging is configured, the UE performs logging of measurements while in both RRC_IDLE and RRC_CONNECTED. Otherwise, the UE performs logging of measurements only while in RRC_IDLE.

VarLogMeasConfig UE variable

```asciidoc
VarLogMeasConfig-r10 ::= SEQUENCE {
      areaConfiguration-r10   AreaConfiguration-r10  OPTIONAL,
      loggingDuration-r10    LoggingDuration-r10,
      loggingInterval-r10    LoggingInterval-r10
}
VarLogMeasConfig-r11 ::= SEQUENCE {
      areaConfiguration-r10   AreaConfiguration-r10  OPTIONAL,
      areaConfiguration-v1130   AreaConfiguration-v1130 OPTIONAL,
      loggingDuration-r10    LoggingDuration-r10,
      loggingInterval-r10    LoggingInterval-r10
}
VarLogMeasConfig-r12 ::= SEQUENCE {
      areaConfiguration-r10   AreaConfiguration-r10  OPTIONAL,
      areaConfiguration-v1130   AreaConfiguration-v1130 OPTIONAL,
      loggingDuration-r10    LoggingDuration-r10,
      loggingInterval-r10    LoggingInterval-r10,
      targetMBSFN-AreaList-r12  TargetMBSFN-AreaList-r12 OPTIONAL
}
```

VarLogMeasReport

The UE variable VarLogMeasReport includes the logged measurements information.

VarLogMeasReport UE variable

```asciidoc
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
}
VarLogMeasReport-r11 ::= SEQUENCE {
      traceReference-r10     TraceReference-r10,
      traceRecordingSessionRef-r10   OCTET STRING (SIZE (2)),
      tce-Id-r10     OCTET STRING (SIZE (1)),
      plmn-IdentityList-r11    PLMN-IdentityList3-r11,
      absoluteTimeInfo-r10    AbsoluteTimeInfo-r10,
      logMeasInfoList-r10     LogMeasInfoList2-r10
}
```
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**

```
VarMeasConfig ::=     SEQUENCE {
    -- Measurement identities
    measIdList       MeasIdToAddModList     OPTIONAL,
    measIdListExt-r12     MeasIdToAddModListExt-r12   OPTIONAL,
    -- Measurement objects
   _measObjectList      MeasObjectToAddModList    OPTIONAL,
    measObjectList-v910     MeasObjectToAddModList-v9e0   OPTIONAL,
    -- Reporting configurations
    reportConfigList     ReportConfigToAddModList   OPTIONAL,
    -- Other parameters
    quantityConfig      QuantityConfig      OPTIONAL,
    measScaleFactor-r12     MeasScaleFactor-r12     OPTIONAL,
    s-Measure       INTEGER (-140..-44)     OPTIONAL,
    speedStatePars      CHOICE {
        release        NULL,
        setup        SEQUENCE {
            mobilityStateParameters    MobilityStateParameters,
            timeToTrigger-SF     SpeedStateScaleFactors
        }                  OPTIONAL,
        allowInterruptions-r11   BOOLEAN        OPTIONAL
    }
}
```

**VarMeasReportList UE variable**

```
VarMeasReportList ::=    SEQUENCE (SIZE (1..maxMeasId)) OF VarMeasReport
VarMeasReportList-r12 ::=   SEQUENCE (SIZE (1..maxMeasId-r12)) OF VarMeasReport
VarMeasReport ::=     SEQUENCE {
    -- List of measurement that have been triggered
    measId        MeasId,
    measId-v1250      MeasId-v1250     OPTIONAL,
    cellsTriggeredList     CellsTriggeredList    OPTIONAL,
    csi-RS-TriggeredList-r12   CSI-RS-TriggeredList-r12  OPTIONAL,
    numberOfReportsSent     INTEGER
}
```

**CellsTriggeredList UE variable**

```
CellsTriggeredList ::=    SEQUENCE (SIZE (1..maxCellMeas)) OF CHOICE {
    physCellIdEUTRA    PhysCellIdEUTRA,
    physCellIdUTRA     PhysCellIdUTRA-FDD,
    fdd                 PhysCellIdUTRA-FDD,
}
---

**VarMobilityHistoryReport**

The UE variable *VarMobilityHistoryReport* includes the mobility history information.

-- ASN1START

VarMobilityHistoryReport-r12 ::= VisitedCellInfoList-r12

-- ASN1STOP

---

**VarRLF-Report**

The UE variable *VarRLF-Report* includes the radio link failure information or handover failure information.

**VarRLF-Report UE variable**

-- ASN1START

VarRLF-Report-r10 ::= SEQUENCE {
  rlf-Report-r10       RLF-Report-r9,
  plmn-Identity-r10      PLMN-Identity
}

VarRLF-Report-r11 ::= SEQUENCE {
  rlf-Report-r10      RLF-Report-r9,
  plmn-IdentityList-r11    PLMN-IdentityList3-r11
}

-- ASN1STOP

---

**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.

```asn1
maxLogMeas-r10 INTEGER ::= 4060 -- Maximum number of logged measurement entries that can be stored by the UE
```

— End of EUTRA-UE-Variables

```asn1
END
```

### 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 RRCConnectionReestablishment or 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 MobilityControl Info or reception of MobilityFromEUTRAC command message including CellChangeOrder</td>
<td>Criterion for successful completion of handover within E-UTRA, handover to E-UTRA or cell change order is met (the criterion is specified in the target RAT in case of inter-RAT)</td>
<td>In case of cell change order from E-UTRA or intra E-UTRA handover, initiate the RRC connection re-establishment procedure; In case of handover to E-UTRA, perform the actions defined in the specifications applicable for the source RAT.</td>
</tr>
<tr>
<td>T305</td>
<td>Access barred while performing RRC connection establishment for mobile originating signalling</td>
<td>Upon entering RRC_CONNECTED and upon cell re-selection</td>
<td>Inform upper layers about barring alleviation as specified in 5.3.3.7</td>
</tr>
<tr>
<td>T306</td>
<td>Access barred while performing RRC connection establishment for mobile originating CS fallback.</td>
<td>Upon entering RRC_CONNECTED and upon cell re-selection</td>
<td>Inform upper layers about barring alleviation as specified in 5.3.3.7</td>
</tr>
<tr>
<td>T307</td>
<td>Reception of RRCConnectionReconfiguration message including MobilityControlInfoSCG</td>
<td>Successful completion of random access on the PCell, upon initiating re-establishment and upon SCG release</td>
<td>Inform E-UTRAN about the SCG change failure by initiating the SCG failure information procedure as specified in 5.6.13.</td>
</tr>
<tr>
<td>T310</td>
<td>Upon detecting physical layer problems for the PCell i.e. upon receiving N310 consecutive out-of-sync indications from lower layers</td>
<td>Upon receiving N311 consecutive in-sync indications from lower layers for the PCell, upon triggering the handover procedure and upon initiating the connection re-establishment procedure</td>
<td>If security is not activated: go to RRC_IDLE else: initiate the connection re-establishment procedure</td>
</tr>
<tr>
<td>T311</td>
<td>Upon initiating the RRC connection re-establishment procedure</td>
<td>Selection of a suitable E-UTRA cell or a cell using another RAT.</td>
<td>Enter RRC_IDLE</td>
</tr>
<tr>
<td>T312</td>
<td>Upon triggering a measurement report for a measurement identity for which T312 has been configured, while T310 is running</td>
<td>Upon receiving N311 consecutive in-sync indications from lower layers, upon triggering the handover procedure, upon initiating the connection re-establishment procedure, and upon the expiry of T310</td>
<td>If security is not activated: go to RRC_IDLE else: initiate the connection re-establishment procedure</td>
</tr>
</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 “out-of-sync” indications for the PCell received from lower layers</td>
</tr>
<tr>
<td>N311</td>
<td>Maximum number of consecutive “in-sync” indications for the PCell received from lower layers</td>
</tr>
<tr>
<td>N313</td>
<td>Maximum number of consecutive “out-of-sync” indications for the PSCell received from lower layers</td>
</tr>
<tr>
<td>N314</td>
<td>Maximum number of consecutive “in-sync” indications for the PSCell received from lower layers</td>
</tr>
</tbody>
</table>
8 Protocol data unit abstract syntax

8.1 General

The RRC PDU contents in clause 6 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 a PDPC SDU from the PDCP layer, the first bit of the PDPC 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.

![RRC level padding diagram](Figure 8.5-1: RRC level padding)

9 Specified and default radio configurations

Specified and default configurations are configurations of which the details are specified in the standard. Specified configurations are fixed while default configurations can be modified using dedicated signalling.

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></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>v920</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>
</tr>
</tbody>
</table>

9.1.1.5 SBCCH 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.

9.1.1.6 STCH configuration

Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>discardTimer</td>
<td>Undefined</td>
<td>Up to UE implementation</td>
<td></td>
</tr>
<tr>
<td>pdcp-SN-Size</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>maxCID</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>profiles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td></td>
<td>Uni-directional UM RLC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>UM window size is set to 0</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>sn-FieldLength</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>logicalChannelIdentity</td>
<td>Undefined</td>
<td>Selected by the transmitting UE, up to UE implementation</td>
<td></td>
</tr>
<tr>
<td>Logical channel configuration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>priority</td>
<td>Undefined</td>
<td>Selected by the transmitting UE, up to UE implementation</td>
<td></td>
</tr>
<tr>
<td>prioritisedBitRate</td>
<td>Undefined</td>
<td>Selected by the transmitting UE, up to UE implementation</td>
<td></td>
</tr>
<tr>
<td>bucketSizeDuration</td>
<td>Undefined</td>
<td>Selected by the transmitting UE, up to UE implementation</td>
<td></td>
</tr>
<tr>
<td>logicalChannelGroup</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC configuration</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</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. If UE is to apply default configuration while it is configured with some critically extended fields, the UE shall apply the original version with only default values. For the following fields, introduced in a protocol version later than v8.5.0, the default corresponds with "value not applicable":

- codeBookSubsetRestriction-v920;
- pmi-RI-Report;

**NOTE 1:** Value "N/A“ indicates that the UE does not apply a specific value (i.e. upon switching to a default configuration, E-UTRAN can not assume the UE keeps the previously configured value). This implies that E-UTRAN needs to configure a value before invoking the related functionality.

**NOTE 2:** In general, the signalling should preferably support a "release" option for fields introduced after v8.5.0. The "value not applicable" should be used restrictively, mainly limited to for fields which value is relevant only if another field is set to a value other than its default.

### 9.2.1 SRB configurations

#### 9.2.1.1 SRB1

Parameters
### 9.2.1.2 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 CHOICE</td>
<td>am</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ul-RLC-Config</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;t-PollRetransmit</td>
<td>ms45</td>
<td>infinity</td>
<td></td>
</tr>
<tr>
<td>&gt;pollPDU</td>
<td>infinity</td>
<td>infinity</td>
<td></td>
</tr>
<tr>
<td>&gt;pollByte</td>
<td>infinity</td>
<td>infinity</td>
<td></td>
</tr>
<tr>
<td>&gt;maxRetxThreshold</td>
<td>t4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dl-RLC-Config</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;t-Reordering</td>
<td>ms35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;t-StatusProhibit</td>
<td>ms0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logical channel configuration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>priority</td>
<td>1</td>
<td>Highest priority</td>
<td></td>
</tr>
<tr>
<td>prioritisedBitRate</td>
<td>infinity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bucketSizeDuration</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>logicalChannelGroup</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</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>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>maxHARQ-tx</td>
<td>n5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>periodicBSR-Timer</td>
<td>infinity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>retxBSR-Timer</td>
<td>sf2560</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ttiBundling</td>
<td>FALSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>drx-Config</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>phr-Config</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.3 Default semi-persistent scheduling configuration

| SPS-Config               |             |                        |     |
|                         | release     |                        |     |

### 9.2.4 Default physical channel configuration

#### Parameters

| SPS-Config               |             |                        |     |
|                         | release     |                        |     |
### 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>

### 9.3 Sidelink pre-configured parameters

#### 9.3.1 Specified parameters

This section only list parameters which value is specified in the standard.

Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>preconfigSync</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;syncTxParameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;alpha</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>preconfigComm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;sc-TxParameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;alpha</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;dataTxParameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;alpha</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9.3.2 Pre-configurable parameters

This ASN.1 segment is the start of the E-UTRA definitions of pre-configured sidelink parameters.

NOTE 1: Upper layers are assumed to provide a set of pre-configured parameters that are valid at the current UE location if any, see TS 24.334 [69, 10.2].

```asn1
EUTRA-Sidelink-Preconf DEFINITIONS AUTOMATIC TAGS ::= BEGIN
IMPORTS
  AdditionalSpectrumEmission,
  ARFCN-ValueEUTRA-r9,
  FilterCoefficient,
  maxSL-TxPool-r12,
  P-Max,
  SL-CP-Len-r12,
  SL-HoppingConfigComm-r12,
  SL-PeriodComm-r12,
  RSRP-RangeEUTRA3-r12,
  SL-TF-ResourceConfig-r12,
  SL-TRPT-Subset-r12,
  P0-SL-r12,
  TDD-ConfigSL-r12
FROM EUTRA-RRC-Definitions;
-- ASN1STOP
```

---

**SL-Preconfiguration**

The IE *SL-Preconfiguration* includes the sidelink pre-configured parameters.

---

**SL-Preconfiguration** information elements

```asn1
SL-Preconfiguration-r12 ::= SEQUENCE {
  preconfigGeneral-r12    SL-PreconfigGeneral-r12,
  preconfigSync-r12      SL-PreconfigSync-r12,
  preconfigComm-r12     SL-PreconfigCommPoolList4-r12,
  ...
}
```

```asn1
SL-PreconfigGeneral-r12 ::= SEQUENCE {
  -- PDCP configuration
  rohc-Profiles-r12     SEQUENCE {
    profile0x0001-r12     BOOLEAN,
    profile0x0002-r12     BOOLEAN,
    profile0x0004-r12     BOOLEAN,
    ...
  }
  -- Physical configuration
  carrierFreq-r12      ARFCN-ValueEUTRA-r9,
  maxTxPower-r12       P-Max,
  additionalSpectrumEmission-r12  AdditionalSpectrumEmission,
  sl-bandwidth-r12     ENUMERATED {n6, n15, n25, n50, n75, n100},
  tdd-ConfigSL-r12     TDD-ConfigSL-r12,
  reserved-r12         BIT STRING (SIZE (19)),
  ...
}
```

```asn1
SL-PreconfigSync-r12 ::= SEQUENCE {
  syncCP-Len-r12      SL-CP-Len-r12,
  syncOffsetIndicator1-r12  SL-OffsetIndicatorSync-r12,
  syncOffsetIndicator2-r12  SL-OffsetIndicatorSync-r12,
  ...
}
```
syncTxParameters-r12     P0-SL-r12,
syncTxThreshOocC-r12     RSRP-RangeSL3-r12,
filterCoefficient-r12    FilterCoefficient,
syncRefMinHyst-r12      ENUMERATED {dB0, dB3, dB6, dB9, dB12},
syncRefDiffHyst-r12      ENUMERATED {dB0, dB3, dB6, dB9, dB12, dBinf},
...
}
SL-PreconfigCommPoolList4-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-PreconfigCommPool-
r12
SL-PreconfigCommPool-r12 ::=  SEQUENCE {
  -- This IE is same as SL-CommResourcePool with rxParametersNCell absent
  sc-CP-Len-r12      SL-CP-Len-r12,
  sc-Period-r12      SL-PeriodComm-r12,
  sc-TF-ResourceConfig-r12   SL-TF-ResourceConfig-r12,
  sc-TxParameters-r12     P0-SL-r12,
  data-CP-Len-r12      SL-CP-Len-r12,
  data-TF-ResourceConfig-r12   SL-TF-ResourceConfig-r12,
  dataHoppingConfig-r12    SL-HoppingConfigComm-r12,
  dataTxParameters-r12    P0-SL-r12,
  trpt-Subset-r12      SL-TRPT-Subset-r12,
  ...
}
END
-- ASN1STOP

### SL-Preconfiguration field descriptions

#### carrierFreq
Indicates the carrier frequency for sidelink operation. In case of FDD it is uplink carrier frequency and the
 corresponding downlink frequency can be determined from the default TX-RX frequency separation defined in TS
36.101 [42, table 5.7.3-1].

#### preconfigComm
Indicates a list of resource pools. The first resource pool in the list is used for both reception and transmission of
 sidelink communication. The other resource pools, if present, are only used for reception of sidelink communication.

#### syncRefDiffHyst
Hysteresis when evaluating a SyncRef UE using relative comparison. Value $dB0$ corresponds to 0 dB, $dB3$ to 3 dB
and so on, value $dBinf$ corresponds to infinite dB.

#### syncRefMinHyst
Hysteresis when evaluating a SyncRef UE using absolute comparison. Value $dB0$ corresponds to 0 dB, $dB3$ to 3 dB
and so on.

NOTE 1: The network may configure one or more of the reception only resource pools in preconfigComm to cover
reception from in coverage UEs using scheduled resource allocation. For such a resource pool the
network should set all bits of subframeBitmap to 1 and offsetIndicator to indicate the subframe
immediately following the sidelink control information.

NOTE 2: The network should ensure that the resources defined by the first entry in preconfigComm (used for
transmission by an out of coverage UE) do not overlap with those of the pool(s) covering scheduled
transmissions by in coverage UEs. Furthermore, the network should ensure that for none of the entries in
preconfigComm the resources defined by sc-TF-ResourceConfig overlap.

## 10 Radio information related interactions between network nodes

### 10.1 General

This section specifies RRC messages that are transferred between network nodes. These RRC messages may be
transferred to or from the UE via another Radio Access Technology. Consequently, these messages have similar
characteristics as the RRC messages that are transferred across the E-UTRA radio interface, i.e. the same transfer
syntax and protocol extension mechanisms apply.
10.2 Inter-node RRC messages

10.2.1 General

This section specifies RRC messages that are sent either across the X2- or the S1-interface, either to or from the eNB, i.e. a single 'logical channel' is used for all RRC messages transferred across network nodes. The information could originate from or be destined for another RAT.

---

**EUTRA-InterNodeDefinitions**

This ASN.1 segment is the start of the E-UTRA inter-node PDU definitions.

```asn1
--ASNISTART
EUTRA-InterNodeDefinitions DEFINITIONS AUTOMATIC TAGS ::= BEGIN
IMPORTS
   AntennaInfoCommon,
   AntennaInfoDedicated-v10i10,
   ARFCN-ValueEUTRA,
   ARFCN-ValueEUTRA-v9e0,
   ARFCN-ValueEUTRA-r9,
   CellIdentity,
   C-RNTI,
   DL-DCCH-Message,
   DRB-Identity,
   DRB-ToReleaseList,
   InDeviceCoexIndication-r11,
   MasterInformationBlock,
   maxFreq,
   maxDRB,
   maxSCell-r10,
   maxServCell-r10,
   MBMSInterestIndication-r11,
   MeasConfig,
   MeasGapConfig,
   OtherConfig-r9,
   PhysCellId,
   P-Max,
   PowerCoordinationInfo-r12,
   SidelinkUEInformation-r12,
   SL-CommConfig-r12,
   SL-DiscConfig-r12,
   RadioResourceConfigDedicated,
   RSRP-Range,
   RSRQ-Range,
   RSRQ-Range-v1250,
   SCellToAddModList-r10,
   SCG-ConfigPartSCG-r12,
   SecurityAlgorithmConfig,
   SCellIndex-r10,
   SCellToReleaseList-r10,
   ServCellIndex-r10,
   ShortMAC-I,
   SystemInformationBlockType1,
   SystemInformationBlockType-v90-IEs,
   SystemInformationBlockType2,
   UEAssistanceInformation-r11,
   UECapabilityInformation,
   UE-CapabilityRAT-ContainerList,
   UE-RadioPagingInfo-r12,
   WLAN-OffloadConfig-r12
FROM EUTRA-RRC-Definitions;
--ASNISTOP
```
10.2.2 Message definitions

- **HandoverCommand**

This message is used to transfer the handover command generated by the target eNB.

Direction: target eNB to source eNB/ source RAN

**HandoverCommand message**

```
HandoverCommand ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1       CHOICE{
      handoverCommand-r8     HandoverCommand-r8-IEs,
      spare7 NULL,
      spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}
HandoverCommand-r8-IEs ::= SEQUENCE {
  handoverCommandMessage    OCTET STRING (CONTAINING DL-DCCH-Message),
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
```

*HandoverCommand field descriptions*

**handoverCommandMessage**

Contains the entire DL-DCCH-Message including the *RRCConnectionReconfiguration* message used to perform handover within E-UTRAN or handover to E-UTRAN, generated (entirely) by the target eNB.

**NOTE:** The source BSC, in case of inter-RAT handover from GERAN to E-UTRAN, expects that the HandoverCommand message includes DL-DCCH-Message only. Thus, criticalExtensionsFuture, spare1-spare7 and nonCriticalExtension should not be used regardless whether the source RAT is E-UTRAN, UTRAN or GERAN.

- **HandoverPreparationInformation**

This message is used to transfer the E-UTRA RRC information used by the target eNB during handover preparation, including UE capability information.

Direction: source eNB/ source RAN to target eNB

**HandoverPreparationInformation message**

```
HandoverPreparationInformation ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1       CHOICE{
      handoverPreparationInformation-r8 HandoverPreparationInformation-r8-IEs,
      spare7 NULL,
      spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}
HandoverPreparationInformation-r8-IEs ::= SEQUENCE {
  ue-RadioAccessCapabilityInfo  UE-CapabilityRAT-ContainerList,
  as-Config       AS-Config     OPTIONAL,   -- Cond HO
```
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
NOTE 2

ue-SupportedEARFCN
Includes UE supported EARFCN of the handover target E-UTRA cell if the target E-UTRA cell belongs to multiple frequency bands.
NOTE 1: The source typically sets the `ue-ConfigRelease` to the release corresponding with the current dedicated radio configuration. The source may however also consider the common radio resource configuration e.g. in case interoperability problems would appear if the UE temporary continues extensions of this part of the configuration in a target PCell not supporting them.

NOTE 2: The following table indicates per source RAT whether RAT capabilities are included or not.

<table>
<thead>
<tr>
<th>Source RAT</th>
<th>E-UTRA capabilities</th>
<th>UTRA capabilities</th>
<th>GERAN capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTRAN</td>
<td>Included</td>
<td>May be included, ignored by eNB if received</td>
<td>May be included</td>
</tr>
<tr>
<td>GERAN CS</td>
<td>Excluded</td>
<td>May be included, ignored by eNB if received</td>
<td>Included</td>
</tr>
<tr>
<td>GERAN PS</td>
<td>Excluded</td>
<td>May be included, ignored by eNB if received</td>
<td>Included</td>
</tr>
<tr>
<td>E-UTRAN</td>
<td>Included</td>
<td>May be included</td>
<td>May be included</td>
</tr>
</tbody>
</table>

**Conditional presence**

<table>
<thead>
<tr>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>HO</code></td>
</tr>
<tr>
<td><code>HO2</code></td>
</tr>
<tr>
<td><code>HO3</code></td>
</tr>
</tbody>
</table>

---

**SCG-Config**

This message is used to transfer the SCG radio configuration generated by the SeNB.

Direction: Secondary eNB to master eNB

**SCG-Config message**

```
-- ASN1START

SCG-Config-r12 ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE{
      scg-Config-r12  SCG-Config-r12-IEs,
      spare7 NULL,
      spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {}
  }
}

SCG-Config-r12-IEs ::= SEQUENCE {
  scg-RadioConfig-r12  SCG-ConfigPartSCG-r12 OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP
```

**SCG-Config field descriptions**

**scg-RadioConfig-r12**

Includes the change of the dedicated SCG configuration and, upon addition of an SCG cell, the common SCG configuration. The SeNB only includes a new SCG cell in response to a request from MeNB, but may include release of an SCG cell release or release of the SCG part of an SCG/Split DRB without prior request from MeNB. The SeNB does not use this field to initiate release of the SCG.
SCG-ConfigInfo

This message is used by MeNB to request the SeNB to perform certain actions e.g. to establish, modify or release an SCG, and it may include additional information e.g. to assist the SeNB with assigning the SCG configuration.

Direction: Master eNB to secondary eNB

SCG-ConfigInfo message

```asn1
-- ASN1START

SCG-ConfigInfo-r12 ::= SEQUENCE { criticalExtensions CHOICE { c1 CHOICE { scg-ConfigInfo-r12 SCG-ConfigInfo-r12-IEs, spare7 NULL, spare6 NULL, spare5 NULL, spare4 NULL, spare3 NULL, spare2 NULL, spare1 NULL }, criticalExtensionsFuture SEQUENCE {} } }

SCG-ConfigInfo-r12-IEs ::= SEQUENCE { radioResourceConfigDedMCG-r12 RadioResourceConfigDedicated OPTIONAL, sCellToAddModListMCG-r12 SCellToAddModList-r10 OPTIONAL, measGapConfig-r12 MeasGapConfig OPTIONAL, powerCoordinationInfo-r12 PowerCoordinationInfo-r12 OPTIONAL, scg-RadioConfig-r12 SCG-ConfigPartSCG-r12 OPTIONAL, eutra-CapabilityInfo-r12 OCTET STRING (CONTAINING UECapabilityInformation) OPTIONAL, scg-ConfigRestrictInfo-r12 SCG-ConfigRestrictInfo-r12 OPTIONAL, mmSsIrIndication-r12 OCTET STRING (CONTAINING MBMSIrIndication-r11) OPTIONAL, measResultServCellListSCG-r12 MeasResultServCellListSCG-r12 OPTIONAL, drb-ToAddModListSCG-r12 DRB-InfoListSCG-r12 OPTIONAL, drb-ToReleaseListSCG-r12 DRB-ToReleaseList OPTIONAL, sCellToAddModListSCG-r12 SCellToAddModListSCG-r12 OPTIONAL, sCellToReleaseListSCG-r12 SCellToReleaseList-r10 OPTIONAL, p-Max-r12 P-Max OPTIONAL, nonCriticalExtension SEQUENCE {} OPTIONAL }

DRB-InfoListSCG-r12 ::= SEQUENCE ($\text{SIZE (1..maxDRB)}$) OF DRB-InfoSCG-r12

DRB-InfoSCG-r12 ::= SEQUENCE { eps-BearerIdentity-r12 INTEGER (0..15) OPTIONAL, -- Cond DRB-Setup, drb-Identity-r12 DRB-Identity, drb-Type-r12 ENUMERATED (split, scg) OPTIONAL, -- Cond DRB-Setup, ... }

SCellToAddModListSCG-r12 ::= SEQUENCE ($\text{SIZE (1..maxSCell-r10)}$) OF Cell-ToAddMod-r12

Cell-ToAddMod-r12 ::= SEQUENCE { sCellIndex-r12 SCellIndex-r10, cellIdentification-r12 SEQUENCE { physCellId-r12 PhysCellId, dl-CarrierFreq-r12 ARFCN-ValueEUTRA-r9 } OPTIONAL, -- Cond SCellAdd, measResultCellToAdd-r12 SEQUENCE { rsrpResult-r12 RSRP-Range, rsrqResult-r12 RSRQ-Range } OPTIONAL, -- Cond SCellAdd2, ... }

MeasResultServCellListSCG-r12 ::= SEQUENCE ($\text{SIZE (1..maxServCell-r10)}$) OF MeasResultServCellSCG-r12

MeasResultServCellSCG-r12 ::= SEQUENCE { servCellId-r12 ServCellIndex-r10, measResultSCell-r12 SEQUENCE { rsrpResultSCell-r12 RSRP-Range, rsrqResultSCell-r12 RSRQ-Range } }, ...

-- ASN1END
```
SCG-ConfigInfo field descriptions

- **drb-ToAddModListSCG**
  Includes DRBs the SeNB is requested to establish or modify (DRB type change).

- **drb-ToReleaseListSCG**
  Includes DRBs the SeNB is requested to release.

- **maxSCH-TB-BitsDL-r12**
  Indicates the maximum DL-SCH/UL-SCH TB bits that may be scheduled in a TTI. Specified as a percentage of the value defined for the applicable UE category.

- **measGapConfig**
  Includes the current measurement gap configuration.

- **measResultServCellListSCG**
  Includes measurement results of SCG (serving) cells.

- **radioResourceConfigDedMCG**
  Includes the current dedicated MCG radio resource configuration.

- **sCellToAddModListMCG**
  Includes the current MCG SCell configuration.

- **sCellToAddModListSCG**
  Includes SCG cells the SeNB is requested to establish. Measurement results may be provided for these cells.

- **sCellToReleaseListSCG**
  Includes SCG cells the SeNB is requested to release.

- **scg-RadioConfig**
  Includes the current dedicated SCG configuration.

- **scg-ConfigRestrictInfo**
  Includes fields for which MeNB explicitly indicates the restriction to be observed by SeNB.

- **p-Max**
  Cell specific value i.e. as broadcast by PCell.

<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 in case DRB establishment is requested; otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>SCellAdd</strong></td>
<td>The field is mandatory present in case SCG cell establishment is requested; otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>SCellAdd2</strong></td>
<td>The field is optional present in case SCG cell establishment is requested; 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**

```
UERadioAccessCapabilityInformation ::= SEQUENCE {
  criticalExtensions         CHOICE {
    c1                      CHOICE {
      ueRadioAccessCapabilityInformation-r8Null,
      ueRadioAccessCapabilityInformation-r8-IEs,
      spare7 NULL,
      spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
  },
}
```
criticalExtensionsFuture SEQUENCE {} }

UERadioAccessCapabilityInformation-r8-IEs ::= SEQUENCE {
  ue-RadioAccessCapabilityInfo OCTET STRING (CONTAINING UECapabilityInformation),
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP

**UERadioAccessCapabilityInformation** field descriptions

**ue-RadioAccessCapabilityInfo**
Including E-UTRA, GERAN, and CDMA2000-1xRTT Bandclass radio access capabilities (separated). UTRA radio access capabilities are not included.

---

**UERadioPagingInformation**

This message is used to transfer radio paging information required for a category 0 UE, covering both upload to and download from the EPC.

Direction: eNB to/ from EPC

**UERadioPagingInformation message**

-- ASN1START

UEadioPagingInformation ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE{
      ueRadioPagingInformation-r12 UERadioPagingInformation-r12-IEs,
      spare7 NULL,
      spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {} })

UERadioPagingInformation-r12-IEs ::= SEQUENCE {
  ue-RadioPagingInfo-r12 OCTET STRING (CONTAINING UE-RadioPagingInfo-r12),
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP

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

-- ASN1START

AS-Config ::= SEQUENCE {
  sourceMeasConfig MeasConfig,
  sourceRadioResourceConfig RadioResourceConfigDedicated,
  sourceSecurityAlgorithmConfig SecurityAlgorithmConfig,
  sourceUE-Identity C-RNTI,
  sourceMasterInformationBlock MasterInformationBlock,
  sourceSystemInformationBlockType1 SystemInformationBlockType1(WITH COMPONENTS

---
The AS-Config re-uses information elements primarily created to cover the radio interface signalling requirements. Consequently, the information elements may include some parameters that are not relevant for the target eNB e.g. the SFN as included in the MasterInformationBlock.

**AS-Config field descriptions**

**antennaInfoCommon**
This field provides information about the number of antenna ports in the source PCell.

**sourceDL-CarrierFreq**
Provides the parameter Downlink EARFCN in the source PCell, see TS 36.101 [42]. If the source eNB provides AS-Config-v9e0, it sets sourceDL-CarrierFreq (i.e. without suffix) to maxEARFCN.

**sourceOtherConfig**
Provides other configuration in the source PCell.

**sourceMasterInformationBlock**
MasterInformationBlock transmitted in the source PCell.

**sourceMeasConfig**
Measurement configuration in the source cell. The measurement configuration for all measurements existing in the source eNB when handover is triggered shall be included. See 10.5.

**sourceSL-CommConfig**
This field covers the sidelink communication configuration.

**sourceSL-DiscConfig**
This field covers the sidelink discovery configuration.

**sourceRadioResourceConfig**
Radio configuration in the source PCell. The radio resource configuration for all radio bearers existing in the source PCell when handover is triggered shall be included. See 10.5.

**sourceSCellConfigList**
Radio resource configuration (common and dedicated) of the SCells configured in the source eNB.

**sourceSecurityAlgorithmConfig**
This field provides the AS integrity protection (SRBs) and AS ciphering (SRBs and DRBs) algorithm configuration used in the source PCell.

**sourceSystemInformationBlockType1**
SystemInformationBlockType1 transmitted in the source PCell.

**sourceSystemInformationBlockType2**
SystemInformationBlockType2 transmitted in the source PCell.
AS-Context

The IE AS-Context is used to transfer local E-UTRAN context required by the target eNB.

**AS-Context** information element

```asn1
AS-Context ::= SEQUENCE {
  reestablishmentInfo     ReestablishmentInfo   OPTIONAL -- Cond HO
}
```

**AS-Context-v1130** information element

```asn1
AS-Context-v1130 ::= SEQUENCE {
  idc-Indication-r11      OCTET STRING (CONTAINING InDeviceCoexIndication-r11) OPTIONAL, -- Cond HO2
  mbmsInterestIndication-r11    OCTET STRING (CONTAINING MBMSInterestIndication-r11) OPTIONAL, -- Cond HO2
  powerPrefIndication-r11     OCTET STRING (CONTAINING UEAssistanceInformation-r11) OPTIONAL, -- Cond HO2
  ...,
  [
    sidelinkUEInformation-r12    OCTET STRING (CONTAINING SidelinkUEInformation-r12) OPTIONAL -- Cond HO2
  ]
}
```

**ReestablishmentInfo** field descriptions

- **idc-Indication**
  Including information used for handling the IDC problems.

- **reestablishmentInfo**
  Including information needed for the RRC connection re-establishment.

### Conditional presence

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</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>

**AS-Context** field descriptions

- **idc-Indication**
  Including information used for handling the IDC problems.

**ReestablishmentInfo**

The **ReestablishmentInfo** IE contains information needed for the RRC connection re-establishment.

**ReestablishmentInfo** information element

```asn1
ReestablishmentInfo ::= SEQUENCE {
  sourcePhysCellId     PhysCellId,
  targetCellShortMAC-I    ShortMAC-I,
  additionalReestabInfoList   AdditionalReestabInfoList    OPTIONAL,
  ...
}
```

**AdditionalReestabInfoList**

```asn1
AdditionalReestabInfoList ::= SEQUENCE ( SIZE (1..maxReestabInfo) ) OF AdditionalReestabInfo
```

**AdditionalReestabInfo**

```asn1
AdditionalReestabInfo ::= SEQUENCE{
  cellIdentity      CellIdentity,
  key-eNodeB-Star     Key-eNodeB-Star,
  shortMAC-I       ShortMAC-I
}
```

**Key-eNodeB-Star**

```asn1
Key-eNodeB-Star ::= BIT STRING (SIZE (256))
```

---

**ETSI**
ReestablishmentInfo field descriptions

AdditionalReestabInfoList
Contains a list of shortMAC-I and KeNB* for cells under control of the target eNB, required for potential re-establishment by the UE in these cells to succeed.

Key-eNodeB-Star
Parameter KeNB*: See TS 33.401 [32, 7.2.8.4]. If the cell identified by cellIdentity belongs to multiple frequency bands, the source eNB selects the DL-EARFCN for the KeNB* calculation using the same logic as UE uses when selecting the DL-EARFCN in IDLE as defined in section 6.2.2. This parameter is only used for X2 handover, and for S1 handover, it shall be ignored by target eNB.

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**

```asciidoc
-- ASN1START
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,
  dl-CarrierFreq-r10 ARFCN-ValueEUTRA,
  -- available measurement results
  rsrpResult-r10 RSRP-Range OPTIONAL,
  rsrqResult-r10 RSRQ-Range OPTIONAL,
  ...,
  [ [ dl-CarrierFreq-v1090 ARFCN-ValueEUTRA-v9e0 OPTIONAL ] ],
  [ [ rsrqResult-v1250 RSRQ-Range-v1250 OPTIONAL ] ]
}
-- ASN1STOP
```
### RRM-Config field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>candidateCellInfoList</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>dl-CarrierFreq</td>
<td>The source includes dl-CarrierFreq-v1090 if and only if dl-CarrierFreq-r10 is set to maxEARFCN.</td>
</tr>
<tr>
<td>ue-InactiveTime</td>
<td>Duration while UE has not received or transmitted any user data. Thus the timer is still running in case e.g., UE measures the neighbour cells for the HO purpose. Value s1 corresponds to 1 second, s2 corresponds to 2 seconds and so on. Value min1 corresponds to 1 minute, value min1s20 corresponds to 1 minute and 20 seconds, value min1s40 corresponds to 1 minute and 40 seconds and so on. Value hr1 corresponds to 1 hour, hr1min30 corresponds to 1 hour and 30 minutes and so on.</td>
</tr>
</tbody>
</table>

### 10.4 Inter-node RRC multiplicity and type constraint values

#### Multiplicity and type constraints definitions

```asn1
maxReestabInfo INTEGER ::= 32 -- Maximum number of KeNB* and shortMAC-I forwarded
  -- at handover for re-establishment preparation
```

#### End of EUTRA-InterNodeDefinitions

---

### 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 black list cells) that a UE shall be able to store within a MeasObjectEUTRA. NOTE.</td>
<td>32</td>
</tr>
<tr>
<td>#minBlackCellRangesperMeasObjectEUTRA</td>
<td>The minimum number of blacklist cell PCI ranges that a UE shall be able to store within a MeasObjectEUTRA</td>
<td>32</td>
</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 black list 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 = 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><strong>RRC Connection Control Procedures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RRC connection establishment</td>
<td>RRCConnectionSetup</td>
<td>RRCConnectionSetupComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection release</td>
<td>RRCConnectionRelease</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-configuration (radio resource configuration)</td>
<td>RRCConnectionReconfiguration</td>
<td>RRCConnectionReconfigurationComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-configuration (measurement configuration)</td>
<td>RRCConnectionReconfiguration</td>
<td>RRCConnectionReconfigurationComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-configuration (intra-LTE mobility)</td>
<td>RRCConnectionReconfiguration</td>
<td>RRCConnectionReconfigurationComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection reconfiguration (SCell addition/release)</td>
<td>RRCConnectionReconfiguration</td>
<td>RRCConnectionReconfigurationComplete</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>RRC connection reconfiguration (SCG establishment/release, SCG cell addition/release)</td>
<td>RRCConnectionReconfiguration</td>
<td>RRCConnectionReconfigurationComplete</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-establishment</td>
<td>RRCConnectionReestablishment</td>
<td>RRCConnectionReestablishmentComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Initial security activation</td>
<td>SecurityModeCommand</td>
<td>SecurityModeCommandComplete/SecurityModeCommandFailure</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Initial security activation + RRC connection reconfiguration (RB establishment)</td>
<td>SecurityModeCommand, RRCConnectionReconfiguration</td>
<td>RRCConnectionReconfigurationComplete</td>
<td>20</td>
<td>The two DL messages are transmitted in the same TTI</td>
</tr>
<tr>
<td>Paging</td>
<td>Paging</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td><strong>Inter RAT mobility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handover to E-UTRA</td>
<td>RRCConnectionReconfiguration (sent by other RAT)</td>
<td>RRCConnectionReconfigurationComplete</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>NA</td>
<td>The performance of this procedure is specified in [16]</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>NA</td>
<td></td>
</tr>
<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>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>
<tr>
<td>MBMS interest indication</td>
<td></td>
<td>MBMSInterestIndication</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>In-device coexistence indication</td>
<td></td>
<td>InDeviceCoexIndication</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>UE assistance information</td>
<td></td>
<td>UEAssistanceInformation</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>SCG failure information</td>
<td></td>
<td>SCGFailureInformation</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Sidelink UE information</td>
<td></td>
<td>SidelinkUEInformation</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

11.3 Void
Annex A (informative):
Guidelines, mainly on use of ASN.1

Editor's note No agreements have been reached concerning the extension of RRC PDUs so far. Any statements in this section about the protocol extension mechanism should be considered as FFS.

A.1 Introduction
The following clauses contain guidelines for the specification of RRC protocol data units (PDUs) with ASN.1.

A.2 Procedural specification

A.2.1 General principles
The procedural specification provides an overall high level description regarding the UE behaviour in a particular scenario.

It should be noted that most of the UE behaviour associated with the reception of a particular field is covered by the applicable parts of the PDU specification. The procedural specification may also include specific details of the UE behaviour upon reception of a field, but typically this should be done only for cases that are not easy to capture in the PDU section e.g. general actions, more complicated actions depending on the value of multiple fields.

Likewise, the procedural specification need not specify the UE requirements regarding the setting of fields within the messages that are send to E-UTRAN i.e. this may also be covered by the PDU specification.

A.2.2 More detailed aspects
The following more detailed conventions should be used:
- Bullets:
  - Capitals should be used in the same manner as in other parts of the procedural text i.e. in most cases no capital applies since the bullets are part of the sentence starting with 'The UE shall:'
  - All bullets, including the last one in a sub-clause, should end with a semi-colon i.e. an ';'
- Conditions
  - Whenever multiple conditions apply, a semi-colon should be used at the end of each conditions with the exception of the last one, i.e. as in 'if cond1; or cond2:

A.3 PDU specification

A.3.1 General principles

A.3.1.1 ASN.1 sections
The RRC PDU contents are formally and completely described using abstract syntax notation (ASN.1), see X.680 [13], X.681 (02/2002) [14].

The complete ASN.1 code is divided into a number of ASN.1 sections in the specifications. In order to facilitate the extraction of the complete ASN.1 code from the specification, each ASN.1 section begins with a text paragraph.
consisting entirely of an ASN.1 start tag, which consists of a double hyphen followed by a single space and the text string "ASN1START" (in all upper case letters). Each ASN.1 section ends with a text paragraph consisting entirely of an ASN.1 stop tag, which consists of a double hyphen followed by 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). The acronym is set off with a hyphen (ue-Identity, not ueIdentity), in order to facilitate a consistent search pattern with corresponding type identifiers.

- Identifiers that are likely to be keywords of some language, especially widely used languages, such as C++ or Java, should be avoided to the extent possible.

- Identifiers, other than PDU identifiers, longer than 25 characters should be avoided where possible. It is recommended to use abbreviations, which should be done in a consistent manner i.e. use 'Meas' instead of 'Measurement' for all occurrences. Examples of typical abbreviations are given in table A.3.1.2.1-1 below.

- For future extension: When an extension is introduced a suffix is added to the identifier of the concerned ASN.1 field and/ or type. A suffix of the form ",-rX" is used, with X indicating the release, for ASN.1 fields or types introduced in a later release (i.e. a release later than the original/ first release of the protocol) as well as for ASN.1 fields or types for which a revision is introduced in a later release replacing a previous version, e.g., Foo-r9 for the Rel-9 version of the ASN.1 type Foo. A suffix of the form ",-rXb" is used for the first revision of a field that it appears in the same release (X) as the original version of the field, "Xc" for a second intra-release revision and so on. A suffix of the form ",-vXYZ" is used for ASN.1 fields or types that only are an extension of a corresponding earlier field or type (see sub-clause A.4), e.g., AnElement-v10b0 for the extension of the ASN.1 type AnElement introduced in version 10.11.0 of the specification. A number 0...9, 10, 11, etc. is used to represent the first part of the version number, indicating the release of the protocol. Lower case letters a, b, c, etc. are used to represent the second (and third) part of the version number if they are greater than 9. In the procedural specification, in field descriptions as well as in headings suffixes are not used, unless there is a clear need to distinguish the extension from the original field.

- More generally, in case there is a need to distinguish different variants of an ASN.1 field or IE, a suffix should be added at the end of the identifiers e.g. MeasObjectUTRA, ConfigCommon. When there is no particular need to distinguish the fields (e.g. because the field is included in different IEs), a common field identifier name may be used. This may be attractive e.g. in case the procedural specification is the same for the different variants.
Table A.3.1.2-1: Examples of typical abbreviations used in ASN.1 identifiers

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Abbreviated word</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comm</td>
<td>Communication</td>
</tr>
<tr>
<td>Conf</td>
<td>Confirmation</td>
</tr>
<tr>
<td>Config</td>
<td>Configuration</td>
</tr>
<tr>
<td>Disc</td>
<td>Discovery</td>
</tr>
<tr>
<td>DL</td>
<td>Downlink</td>
</tr>
<tr>
<td>Ext</td>
<td>Extension</td>
</tr>
<tr>
<td>Freq</td>
<td>Frequency</td>
</tr>
<tr>
<td>Id</td>
<td>Identity</td>
</tr>
<tr>
<td>Ind</td>
<td>Indication</td>
</tr>
<tr>
<td>Info</td>
<td>Information</td>
</tr>
<tr>
<td>Meas</td>
<td>Measurement</td>
</tr>
<tr>
<td>Neigh</td>
<td>Neighbour(ing)</td>
</tr>
<tr>
<td>Param(s)</td>
<td>Parameter(s)</td>
</tr>
<tr>
<td>Persist</td>
<td>Persistent</td>
</tr>
<tr>
<td>Phys</td>
<td>Physical</td>
</tr>
<tr>
<td>Proc</td>
<td>Process</td>
</tr>
<tr>
<td>Reestab</td>
<td>Reestablishment</td>
</tr>
<tr>
<td>Req</td>
<td>Request</td>
</tr>
<tr>
<td>Rx</td>
<td>Reception</td>
</tr>
<tr>
<td>Sched</td>
<td>Scheduling</td>
</tr>
<tr>
<td>Sync</td>
<td>Synchronisation</td>
</tr>
<tr>
<td>Thresh</td>
<td>Threshold</td>
</tr>
<tr>
<td>Tx/ Transm</td>
<td>Transmission</td>
</tr>
<tr>
<td>UL</td>
<td>Uplink</td>
</tr>
</tbody>
</table>

NOTE: The table A.3.1.2-1 is not exhaustive. Additional abbreviations may be used in ASN.1 identifiers when needed.

A.3.1.3 Text references using ASN.1 identifiers

A text reference into the RRC PDU contents description from other parts of the specification is made using the ASN.1 field or type identifier of the referenced element. The ASN.1 field and type identifiers used in text references should be in the *italic font* style. The "do not check spelling and grammar" attribute in Word should be set. Quotation marks (i.e., "") should not be used around the ASN.1 field or type identifier.

A reference to an RRC PDU type should be made using the corresponding ASN.1 type identifier followed by the word "message", e.g., a reference to the *RRCConnectionRelease* message.

A reference to a specific part of an RRC PDU, or to a specific part of any other ASN.1 type, should be made using the corresponding ASN.1 field identifier followed by the word "field", e.g., a reference to the *prioritisedBitRate* field in the example below.

```asn1
LogicalChannelConfig ::=   SEQUENCE {
  ul-SpecificParameters    SEQUENCE {
    priority       Priority,
    prioritisedBitRate     PrioritisedBitRate,
    bucketSizeDuration     BucketSizeDuration,
    logicalChannelGroup     INTEGER (0..3)
  }  OPTIONAL
}
```

NOTE: All the ASN.1 start tags in the ASN.1 sections, used as examples in this annex to the specification, are deliberately distorted, in order not to include them when the ASN.1 description of the RRC PDU contents is extracted from the specification.

A reference to a specific type of information element should be made using the corresponding ASN.1 type identifier preceded by the acronym "IE", e.g., a reference to the IE *LogicalChannelConfig* in the example above.
References to a specific type of information element should only be used when those are generic, i.e., without regard to the particular context wherein the specific type of information element is used. If the reference is related to a particular context, e.g., an RRC PDU type (message) wherein the information element is used, the corresponding field identifier in that context should be used in the text reference.

A reference to a specific value of an ASN.1 field should be made using the corresponding ASN.1 value without using quotation marks around the ASN.1 value, e.g., 'if the status field is set to value true'.

A.3.2 High-level message structure

Within each logical channel type, the associated RRC PDU (message) types are alternatives within a CHOICE, as shown in the example below.

```asn1
DL-DCCH-Message ::= SEQUENCE {
  message     DL-DCCH-MessageType
}
DL-DCCH-MessageType ::= CHOICE {
  c1      CHOICE {
    dlInformationTransfer     DLInformationTransfer,
    handoverFromEUTRAPreparationRequest  HandoverFromEUTRAPreparationRequest,
    mobilityFromEUTRACommand    MobilityFromEUTRACommand,
    rrcConnectionReconfiguration   RRCConnectionReconfiguration,
    rrcConnectionRelease     RRCConnectionRelease,
    securityModeCommand      SecurityModeCommand,
    ueCapabilityEnquiry      UECapabilityEnquiry,
    spare1 NULL
  },
  messageClassExtension SEQUENCE {}
}
```

A nested two-level CHOICE structure is used, where the alternative PDU types are alternatives within the inner level `c1` CHOICE.

Spare alternatives (i.e., `spare1` in this case) may be included within the `c1` CHOICE to facilitate future extension. The number of such spare alternatives should not extend the total number of alternatives beyond an integer-power-of-two number of alternatives (i.e., eight in this case).

Further extension of the number of alternative PDU types is facilitated using the `messageClassExtension` alternative in the outer level CHOICE.

A.3.3 Message definition

Each PDU (message) type is specified in an ASN.1 section similar to the one shown in the example below.

```asn1
RRCConnectionReconfiguration ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1         CHOICE{
      rrcConnectionReconfiguration-r8  RRCConnectionReconfiguration-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  },
  messageClassExtension SEQUENCE {}
}
```

Further extension of the number of alternative PDU types is facilitated using the `messageClassExtension` alternative in the outer level CHOICE.
Hooks for **critical** and **non-critical** extension should normally be included in the PDU type specification. How these hooks are used is further described in sub-clause A.4.

Critical extensions are characterised by a redefinition of the PDU contents and need to be governed by a mechanism for protocol version agreement between the encoder and the decoder of the PDU, such that the encoder is prevented from sending a critically extended version of the PDU type, which is not comprehended by the decoder.

Critical extension of a PDU type is facilitated by a two-level CHOICE structure, where the alternative PDU contents are alternatives within the inner level \( c1 \) CHOICE. Spare alternatives (i.e., \( \text{spare3} \) down to \( \text{spare1} \) in this case) may be included within the \( c1 \) CHOICE. The number of spare alternatives to be included in the original PDU specification should be decided case by case, based on the expected rate of critical extension in the future releases of the protocol.

Further critical extension, when the spare alternatives from the original specifications are used up, is facilitated using the **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 {}
    }
}
```

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
}
```

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.
The field description table has one column. The header row shall contain the ASN.1 type identifier of the PDU type.

The following rows are used to provide field descriptions. Each row shall include a first paragraph with a field identifier (in bold and italic font style) referring to the part of the PDU to which it applies. The following paragraphs at the same row may include (in regular font style), e.g., semantic description, references to other specifications and/or specification of value units, which are relevant for the particular part of the PDU.

The parts of the PDU contents that do not require a field description shall be omitted from the field description table.

### A.3.4 Information elements

Each IE (information element) type is specified in an ASN.1 section similar to the one shown in the example below.

```
-- /example/ ASN1START
PRACH-ConfigSIB ::= SEQUENCE {
    rootSequenceIndex     INTEGER (0..1023),
    prach-ConfigInfo     PRACH-ConfigInfo
}
PRACH-Config ::= SEQUENCE {
    rootSequenceIndex     INTEGER (0..1023),
    prach-ConfigInfo     PRACH-ConfigInfo     OPTIONAL -- Need ON
}
PRACH-ConfigInfo ::= SEQUENCE {
    prach-ConfigIndex     ENUMERATED {ffs},
    highSpeedFlag      ENUMERATED {ffs},
    zeroCorrelationZoneConfig   ENUMERATED {ffs}
}
-- ASN1STOP
```

IEs should be introduced whenever there are multiple fields for which the same set of values apply. IEs may also be defined for other reasons, e.g., to break down a ASN.1 definition into smaller pieces.

A group of closely related IE type definitions, like the IEs PRACH-ConfigSIB and PRACH-Config in this example, are preferably placed together in a common ASN.1 section. The IE type identifiers should in this case have a common base, defined as the generic type identifier. It may be complemented by a suffix to distinguish the different variants. The "PRACH-Config" is the generic type identifier in this example, and the "SIB" suffix is added to distinguish the variant. The sub-clause heading and generic references to a group of closely related IEs defined in this way should use the generic type identifier.

The same principle should apply if a new version, or an extension version, of an existing IE is created for critical or non-critical extension of the protocol (see sub-clause A.4). The new version, or the extension version, of the IE is included in the same ASN.1 section defining the original. A suffix is added to the type identifier, using the naming conventions defined in sub-clause A.3.1.2, indicating the release or version of the where the new version, or extension version, was introduced.

Local IE type definitions, like the IE PRACH-ConfigInfo in the example above, may be included in the ASN.1 section and be referenced in the other IE types defined in the same ASN.1 section. The use of locally defined IE types should be encouraged, as a tool to break up large and complex IE type definitions. It can improve the readability of the code. There may also be a benefit for the software implementation of the protocol end-points, as these IE types are typically provided by the ASN.1 compiler as independent data elements, to be used in the software implementation.

An IE type defined in a local context, like the IE PRACH-ConfigInfo, should not be referenced directly from other ASN.1 sections in the RRC specification. An IE type which is referenced in more than one ASN.1 section should be defined in a separate sub-clause, with a separate heading and a separate ASN.1 section (possibly as one in a set of
closely related IE types, like the IEs \textit{PRACH-ConfigSIB} and \textit{PRACH-Config} in the example above). Such IE types are also referred to as 'global IEs'.

\textbf{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.

\section*{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:

\begin{verbatim}
-- /example/ ASN1START
PreambleInfo ::=     SEQUENCE {  
    numberOfRA-Preambles    INTEGER (1..64)      DEFAULT 1,  
    ...  
}  
-- ASN1STOP
\end{verbatim}

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:

\begin{verbatim}
-- /example/ ASN1START
PRACH-Config ::=    SEQUENCE {  
    rootSequenceIndex     INTEGER (0..1023),  
    prach-ConfigInfo     PRACH-ConfigInfo     OPTIONAL -- Need ON  
}  
-- ASN1STOP
\end{verbatim}

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.

\section*{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):

\begin{verbatim}
-- /example/ ASN1START
LogicalChannelConfig ::=   SEQUENCE {  
    ul-SpecificParameters    SEQUENCE {  
        priority       INTEGER (0),  
        ...  
    }  
    OPTIONAL                 -- Cond UL  
}  
-- ASN1STOP
\end{verbatim}
When conditionally present fields are included in an ASN.1 section, the field description table after the ASN.1 section shall be followed by a *conditional presence* table. The conditional presence table specifies the conditions for including the fields with conditional presence in the particular ASN.1 section.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL</td>
<td>Specification of the conditions for including the field associated with the condition tag = &quot;UL&quot;. Semantics in case of optional presence under certain conditions may also be specified.</td>
</tr>
</tbody>
</table>

The conditional presence table has two columns. The first column (heading: "Conditional presence") contains the condition tag (in italic font style), which links the fields with a condition tag in the ASN.1 section to an entry in the table. The second column (heading: "Explanation") contains a text specification of the conditions and requirements for the presence of the field. The second column may also include semantics, in case of an optional presence of the field, under certain conditions i.e. using the same predefined tags as defined for optional fields in A.3.5.

Conditional presence should primarily be used when presence of a field depends on the presence and/or value of other fields within the same message. If the presence of a field depends on whether another feature/function has been configured, while this function can be configured independently e.g. by another message and/or at another point in time, the relation is best reflected by means of a statement in the field description table.

If the ASN.1 section does not include any fields with conditional presence, the conditional presence table shall not be included.

Whenever a field is only applicable in specific cases e.g. TDD, use of conditional presence should be considered.

### A.3.7 Guidelines on use of lists with elements of SEQUENCE type

Where an information element has the form of a list (the SEQUENCE OF construct in ASN.1) with the type of the list elements being a SEQUENCE data type, an information element shall be defined for the list elements even if it would not otherwise be needed.

For example, a list of PLMN identities with reservation flags is defined as in the following example:

```plaintext
-- /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:

```plaintext
-- /bad example/ ASN1START
PLMN-IdentityList ::= SEQUENCE (SIZE (1..6)) OF SEQUENCE {
    plmn-Identity PLMN-Identity,
    cellReservedForOperatorUse ENUMERATED {reserved, notReserved}
}
-- ASN1STOP
```
A.4 Extension of the PDU specifications

A.4.1 General principles to ensure compatibility

It is essential that extension of the protocol does not affect interoperability i.e. it is essential that implementations based on different versions of the RRC protocol are able to interoperate. In particular, this requirement applies for the following kind of protocol extensions:

- Introduction of new PDU types (i.e. these should not cause unexpected behaviour or damage).
- Introduction of additional fields in an extensible PDUs (i.e. it should be possible to ignore uncomprehended extensions without affecting the handling of the other parts of the message).
- Introduction of additional values of an extensible field of PDUs. If used, the behaviour upon reception of an uncomprehended value should be defined.

It should be noted that the PDU extension mechanism may depend on the logical channel used to transfer the message e.g. for some PDUs an implementation may be aware of the protocol version of the peer in which case selective ignoring of extensions may not be required.

The non-critical extension mechanism is the primary mechanism for introducing protocol extensions i.e. the critical extension mechanism is used merely when there is a need to introduce a 'clean' message version. Such a need appears when the last message version includes a large number of non-critical extensions, which results in issues like readability, overhead associated with the extension markers. The critical extension mechanism may also be considered when it is complicated to accommodate the extensions by means of non-critical extension mechanisms.

A.4.2 Critical extension of messages and fields

The mechanisms to critically extend a message are defined in A.3.3. There are both "outer branch" and "inner branch" mechanisms available. The "outer branch" consists of a CHOICE having the name criticalExtensions, with two values, c1 and criticalExtensionsFuture. The criticalExtensionsFuture branch consists of an empty SEQUENCE, while the c1 branch contains the "inner branch" mechanism.

The "inner branch" structure is a CHOICE with values of the form "MessageName-rX-IEs" (e.g., "RRCConnectionReconfiguration-r8-IEs") or "spareX", with the spare values having type NULL. The "-rX-IEs" structures contain the complete structure of the message IEs for the appropriate release; i.e., the critical extension branch for the Rel-10 version of a message includes all Rel-8 and Rel-9 fields (that are not obviated in the later version), rather than containing only the additional Rel-10 fields.

The following guidelines may be used when deciding which mechanism to introduce for a particular message, i.e. only an 'outer branch', or an 'outer branch' in combination with an 'inner branch' including a certain number of spares:

- For certain messages, e.g. initial uplink messages, messages transmitted on a broadcast channel, critical extension may not be applicable.
- An outer branch may be sufficient for messages not including any fields.
- The number of spares within inner branch should reflect the likelihood that the message will be critically extended in future releases (since each release with a critical extension for the message consumes one of the spare values). The estimation of the critical extension likelyhood may be based on the number, size and changeability of the fields included in the message.
- In messages where an inner branch extension mechanism is available, all spare values of the inner branch should be used before any critical extensions are added using the outer branch.

The following example illustrates the use of the critical extension mechanism by showing the ASN.1 of the original and of a later release

```
-- /example/  ASN1START
--- Original release

RRCMessage ::= SEQUENCE {
    rrc-TransactionIdentifier RRC-TransactionIdentifier,
```

---
It is important to note that critical extensions may also be used at the level of individual fields i.e. a field may be replaced by a critically extended version. When sending the extended version, the original version may also be included (e.g. original field is mandatory, EUTRAN is unaware if UE supports the extended version). In such cases, a UE supporting both versions may be required to ignore the original field. The following example illustrates the use of the critical extension mechanism by showing the ASN.1 of the original and of a later release.

--- /example/ ASN1START --- Original release

RRCMessage ::= SEQUENCE {
    rrc-TransactionIdentifier    RRC-TransactionIdentifier,
    criticalExtensions     CHOICE {
        c1         CHOICE{
            rrcMessage-r8      RRCMessage-r8-IEs,
            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 {}
        }
    }
}

--- /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

--- ASN1STOP

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NoField2rN</td>
<td>The field is optionally present, need ON, if field2-rN is absent. Otherwise the field is not present</td>
</tr>
</tbody>
</table>
Finally, it is noted that a critical extension may be introduced in the same release as the one in which the original field was introduced e.g. to correct an essential ASN.1 error. In such cases a UE capability may be introduced, to assist E-UTRAN in deciding whether or not to use the critically extension.

A.4.3 Non-critical extension of messages

A.4.3.1 General principles

The mechanisms to extend a message in a non-critical manner are defined in A.3.3. W.r.t. the use of extension markers, the following additional guidelines apply:

- When further non-critical extensions are added to a message that has been critically extended, the inclusion of these non-critical extensions in earlier critical branches of the message should be avoided when possible.
- The extension marker ("…") is the primary non-critical extension mechanism that is used unless a length determinant is not required. Examples of cases where a length determinant is not required:
  - at the end of a message,
  - at the end of a structure contained in a BIT STRING or OCTET STRING
- When an extension marker is available, non-critical extensions are preferably placed at the location (e.g. the IE) where the concerned parameter belongs from a logical/functional perspective (referred to as the 'default extension location')
  - It is desirable to aggregate extensions of the same release or version of the specification into a group, which should be placed at the lowest possible level.
  - In specific cases it may be preferable to place extensions elsewhere (referred to as the 'actual extension location') e.g. when it is possible to aggregate several extensions in a group. In such a case, the group should be placed at the lowest suitable level in the message. <TBD: ref to separate example>
  - In case placement at the default extension location affects earlier critical branches of the message, locating the extension at a following higher level in the message should be considered.
  - In case an extension is not placed at the default extension location, an IE should be defined. The IE's ASN.1 definition should be placed in the same ASN.1 section as the default extension location. In case there are intermediate levels in-between the actual and the default extension location, an IE may be defined for each level. Intermediate levels are primarily introduced for readability and overview. Hence intermediate levels need not always be introduced e.g. they may not be needed when the default and the actual extension location are within the same ASN.1 section. <TBD: ref to separate example>

A.4.3.2 Further guidelines

Further to the general principles defined in the previous section, the following additional guidelines apply regarding the use of extension markers:

- Extension markers within SEQUENCE
  - Extension markers are primarily, but not exclusively, introduced at the higher nesting levels
  - Extension markers are introduced for a SEQUENCE comprising several fields as well as for information elements whose extension would result in complex structures without it (e.g. re-introducing another list)
  - Extension markers are introduced to make it possible to maintain important information structures e.g. parameters relevant for one particular RAT
  - Extension markers are also used for size critical messages (i.e. messages on BCCH, PCCH and CCCH), although introduced somewhat more carefully
  - The extension fields introduced (or frozen) in a specific version of the specification are grouped together using double brackets.
- Extension markers within ENUMERATED
  - Spare values are used until the number of values reaches the next power of 2, while the extension marker caters for extension beyond that limit
  - A suffix of the form "vXYZ" is used for the identifier of each new value, e.g. "value-vXYZ".
- Extension markers within CHOICE:
  - Extension markers are introduced when extension is foreseen and when comprehension is not required by the receiver i.e. behaviour is defined for the case where the receiver cannot comprehend the extended value (e.g. ignoring an optional CHOICE field). It should be noted that defining the behaviour of a receiver upon receiving a not comprehended choice value is not required if the sender is aware whether or not the receiver supports the extended value.
  - A suffix of the form "vXYZ" is used for the identifier of each new choice value, e.g. "choice-vXYZ".

Non-critical extensions at the end of a message of a field contained in an OCTET or BIT STRING:
- When a nonCriticalExtension is actually used, a "Need" statement should not be provided for the field, which always is a group including at least one extension and a field facilitating further possible extensions. For simplicity, it is recommended not to provide a "Need" statement when the field is not actually used either.

Further, more general, guidelines:
- In case a need statement is not provided for a group, a "Need" statement is provided for all individual extension fields within the group i.e. including for fields that are not marked as OPTIONAL. The latter is to clarify the action upon absence of the whole group.

**A.4.3.3 Typical example of evolution of IE with local extensions**

The following example illustrates the use of the extension marker for a number of elementary cases (sequence, enumerated, choice). The example also illustrates how the IE may be revised in case the critical extension mechanism is used.

**NOTE** In case there is a need to support further extensions of release n while the ASN.1 of release (n+1) has been frozen, without requiring the release n receiver to support decoding of release (n+1) extensions, more advanced mechanisms are needed e.g. including multiple extension markers.

```
-- /example/ ASN1START

InformationElement1 ::= SEQUENCE {
  field1        ENUMERATED {
    value1, value2, value3, value4-v880,
    ..., value5-v960 },
  field2        CHOICE {
    field2a        BOOLEAN,
    field2b        InformationElement2b,
    ...,
    field2c-v960   InformationElement2c-r9 }
}, ...
[[ field3-r9    InformationElement3-r9 OPTIONAL  -- Need OR ]],
[[ field3-v9a0  InformationElement3-v9a0 OPTIONAL, -- Need OR
  InformationElement4 OPTIONAL  -- Need OR ]]
}

InformationElement1-r10 ::= SEQUENCE {
  field1        ENUMERATED {
    value1, value2, value3, value4-v880,
    value5-v960, value6-v1170, spare2, spare1, ... },
  field2        CHOICE {
    field2a        BOOLEAN,
    field2b        InformationElement2b,
    field2c-v960   InformationElement2c-r9,
    ...,
    field2d-v12b0  INTEGER (0..63) }
},
```
Some remarks regarding the extensions of InformationElement1 as shown in the above example:

- The InformationElement1 is initially extended with a number of non-critical extensions. In release 10 however, a critical extension is introduced for the message using this IE. Consequently, a new version of the IE InformationElement1 (i.e., InformationElement1-r10) is defined in which the earlier non-critical extensions are incorporated by means of a revision of the original field.

- The value4-v880 is replacing a spare value defined in the original protocol version for field1. Likewise value6-v1170 replaces spare3 that was originally defined in the r10 version of field1

- Within the critically extended release 10 version of InformationElement1, the names of the original fields/IEs are not changed, unless there is a real need to distinguish them from other fields/IEs. E.g., the field1 and InformationElement4 were defined in the original protocol version (release 8) and hence not tagged. Moreover, the field3-r9 is introduced in release 9 and not re-tagged; although, the InformationElement3 is also critically extended and therefore tagged InformationElement3-r10 in the release 10 version of InformationElement1.

A.4.3.4 Typical examples of non-critical extension at the end of a message

The following example illustrates the use of non-critical extensions at the end of the message or at the end of a field that is contained in a BIT or OCTET STRING i.e. when an empty sequence is used.

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-WithoutEM

The IE ParentIE-WithoutEM 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-WithoutEM information element

```
ParentIE-WithoutEM ::=     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

```
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)
}

-- 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 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**

-- /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>DLInformationTransfer</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>InDeviceCoexIndication</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>InterFreqRSTDMeasurementIndication</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>LoggedMeasurementsConfiguration</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MasterInformationBlock</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>MBMSCountingRequest</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MBMSCountingResponse</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MBMSInterestIndication</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MBSFNAreaConfiguration</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>MeasurementReport</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>RAN2 agreed that measurement configuration may be sent prior to security activation. But: In order to protect privacy of UEs MEASUREMENT REPORT is only be 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>SidelinkUEInformation</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>RNRReconfiguration</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RNRReconfigurationComplete</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCConnectionReconfiguration</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>The message shall not be sent unprotected before security activation if it is used to perform handover or to establish SRB2 and DRBs</td>
</tr>
<tr>
<td>RRCConnectionReconfigurationComplete</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>Unprotected, if sent as response to RRCConnectionReconfiguration which was sent before security activation</td>
</tr>
<tr>
<td>RRCConnectionReestablishment</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>This message is not protected by PDCP operation.</td>
</tr>
<tr>
<td>RRCConnectionReestablishmentComplete</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCConnectionReestablishmentReject</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>One reason to send this may be that the security context has been lost, therefore sent as unprotected.</td>
</tr>
<tr>
<td>RRCConnectionReestablishmentRequest</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>This message is not protected by PDCP operation. However a short MAC-I is included.</td>
</tr>
<tr>
<td>RRCConnectionReject</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td>Justification for P: If the RRC connection only for signalling not requiring DRBs or ciphered messages, or the signalling connection has to be released prematurely, this message is sent as unprotected.</td>
</tr>
<tr>
<td>RRCConnectionRelease</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCConnectionRequest</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>RRCConnectionSetup</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>RRCConnectionSetupComplete</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>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>
</tbody>
</table>
### A.7 Miscellaneous

The following miscellaneous conventions should be used:

- **References**: Whenever another specification is referenced, the specification number and optionally the relevant subclause, table or figure, should be indicated in addition to the pointer to the References section e.g. as follows: ‘see TS 36.212 [22, 5.3.3.1.6]’.

- **UE capabilities**: TS 36.306 [6] specifies that E-UTRAN should in general respect the UE’s capabilities. Hence there is no need to include statement clarifying that E-UTRAN, when setting the value of a certain configuration field, shall respect the related UE capabilities unless there is a particular need e.g. particularly complicated cases.

<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>SystemInformationBlockType1</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UEAssistanceInformation</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>UECapabilityEnquiry</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>UECapabilityInformation</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>SCGFailureInformation</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>UEInformationRequest</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>UEInformationResponse</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>In order to protect privacy of UEs UEInformationResponse is only be sent from the UE after successful security activation</td>
</tr>
<tr>
<td>ULHandoverPreparationTransfer (CDMA2000)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>This message should follow HandoverFromEUTRAPreparationRequest</td>
</tr>
<tr>
<td>ULInformationTransfer</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

**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>
<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 “Yes” 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 PUSCH: Mode 2-0 – UE selected subband CQI without PMI  
                                - Periodic CQI/PMI/RI reporting on PUSCH: Mode 2-1 – UE selected subband CQI with single PMI |       | 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         |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Yes, if UE supports SRVCC to EUTRAN from GERAN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Short DRX cycle</td>
<td>can only be set to 1 if the UE has set bit number 5 to 1.</td>
</tr>
<tr>
<td></td>
<td>Feature</td>
<td>Value</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>5</td>
<td>- Long DRX cycle</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>- DRX command MAC control element</td>
<td>No</td>
</tr>
<tr>
<td>6</td>
<td>- Prioritised bit rate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>- RLC UM</td>
<td>- can only be set to 0 if the UE does not support VoLTE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes, if UE supports VoLTE. Yes, if UE supports SRVCC to EUTRAN from GERAN.</td>
</tr>
<tr>
<td>8</td>
<td>- 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</td>
<td>- can only be set to 1 if the UE has set bit number 22 to 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes for FDD, if UE supports UTRA FDD</td>
</tr>
<tr>
<td></td>
<td>- EUTRA RRC_CONNECTED to UTRA FDD CELL_DCH PS handover, if the UE supports both UTRAN FDD and UTRAN TDD</td>
<td></td>
</tr>
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<td>9</td>
<td>- EUTRA RRC_CONNECTED to GERAN GSM_Dedicated handover</td>
<td>- related to SR-VCC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- can only be set to 1 if the UE has set bit number 23 to 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes, if UE supports SRVCC to EUTRAN from GERAN.</td>
</tr>
<tr>
<td>10</td>
<td>- EUTRA RRC_CONNECTED to GERAN (Packet_) Idle by Cell Change Order</td>
<td></td>
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<tr>
<td></td>
<td>- EUTRA RRC_CONNECTED to GERAN (Packet_) Idle by Cell Change Order with NACC (Network Assisted Cell Change)</td>
<td></td>
</tr>
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<td>11</td>
<td>- EUTRA RRC_CONNECTED to CDMA2000 1xRTT CS Active handover</td>
<td>- related to SR-VCC</td>
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<td></td>
<td></td>
<td>- can only be set to 1 if the UE has set bit number 24 to 1</td>
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<tr>
<td>12</td>
<td>- EUTRA RRC_CONNECTED to CDMA2000 HRPD Active handover</td>
<td>- can only be set to 1 if the UE has set bit number 26 to 1</td>
</tr>
<tr>
<td>13</td>
<td>- Inter-frequency handover (within FDD or TDD)</td>
<td>- can only be set to 1 if the UE has set bit number 25 to 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes, unless UE only supports band 13</td>
</tr>
<tr>
<td>14</td>
<td>- Measurement reporting event: Event A4 – Neighbour &gt; threshold</td>
<td></td>
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<td></td>
<td>- Measurement reporting event: Event A5 – Serving &lt; threshold1 &amp; Neighbour &gt; threshold2</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>- Measurement reporting event: Event B1 – Neighbour &gt; threshold for UTRAN FDD or UTRAN TDD, if the UE supports either only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1</td>
<td>- can only be set to 1 if the UE has set at least one of the bit number 22, 23, 24, 26 or 39 to 1.</td>
</tr>
<tr>
<td></td>
<td>- Measurement reporting event: Event B1 – Neighbour &gt; threshold for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively</td>
<td>- even if the UE sets bits 41, it shall still set bit 15 to 1 if measurement reporting event B1 is tested for all RATs supported by UE</td>
</tr>
<tr>
<td></td>
<td>- 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</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intra-frequency periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCells</td>
<td></td>
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<td>-----------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
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<td></td>
<td>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</td>
<td></td>
</tr>
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<td>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 either only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>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 UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively</td>
<td></td>
</tr>
<tr>
<td></td>
<td>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</td>
<td></td>
</tr>
<tr>
<td></td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Intra-frequency ANR features including:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intra-frequency periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCells</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inter-frequency periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intra-frequency periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Intra-frequency ANR features including:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>can only be set to 1 if the UE has set bit number 5 to 1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Inter-frequency ANR features including:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>can only be set to 1 if the UE has set bit number 5 and bit number 25 to 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes, unless UE only supports band 13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
19 Inter-RAT ANR features including:
- Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCells for GERAN, if the UE has set bit number 23 to 1
- Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON for UTRAN FDD or UTRAN TDD, if the UE supports either only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1
- Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively
- Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON for 1xRTT or HRPD, if the UE has set bit number 24 or 26 to 1, respectively
- Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 to 1
- Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI for GERAN, 1xRTT or HRPD, if the UE has set bit number 23, 24 or 26 to 1, respectively
- can only be set to 1 if the UE has set bit number 5 to 1 and the UE has set at least one of the bit number 22, 23, 24 or 26 to 1.
- even if the UE sets bits 33 to 37, it shall still set bit 19 to 1 if inter-RAT ANR features are tested for all RATs for which inter-RAT measurement reporting is indicated as tested

<table>
<thead>
<tr>
<th>20</th>
<th>If bit number 7 is set to 0:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- SRB1 and SRB2 for DCCH + 8x AM DRB</td>
</tr>
<tr>
<td></td>
<td>If bit number 7 is set to 1:</td>
</tr>
<tr>
<td></td>
<td>- SRB1 and SRB2 for DCCH + 8x AM DRB</td>
</tr>
<tr>
<td></td>
<td>- SRB1 and SRB2 for DCCH + 5x AM DRB + 3x UM DRB</td>
</tr>
<tr>
<td></td>
<td>NOTE: UE which indicate support for a DRB combination also support all subsets of the DRB combination. Therefore, release of DRB(s) never results in an unsupported DRB combination.</td>
</tr>
</tbody>
</table>

|    | - Regardless of what bit number 7 and bit number 20 is set to, UE shall support at least SRB1 and SRB2 for DCCH + 4x AM DRB |
|    | - Regardless of what bit number 20 is set to, if bit number 7 is set to 1, UE shall support at least SRB1 and SRB2 for DCCH + 4x AM DRB + 1x UM DRB |

<p>|    | Yes No |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| **21** | - Predefined intra- and inter-subframe frequency hopping for PUSCH with N\(_{sb}\) > 1  
   - Predefined inter-subframe frequency hopping for PUSCH with N\(_{sb}\) > 1 | No |
| **22** | - 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  
   - UTRAN FDD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode, if the UE supports both UTRAN FDD and UTRAN TDD | Yes, if UE supports UTRA FDD |
|   | UTRAN FDD or UTRAN TDD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode | Yes |
| **23** | - GERAN measurements, reporting and measurement reporting event B2 in E-UTRA connected mode | Yes |
| **24** | - 1xRTT measurements, reporting and measurement reporting event B2 in E-UTRA connected mode | Yes, if UE supports enhanced 1xRTT CSFB for FDD  
   Yes, if UE supports enhanced 1xRTT CSFB for TDD |
| **25** | - Inter-frequency measurements and reporting in E-UTRA connected mode  
   NOTE: The UE setting this bit to 1 and indicating support for FDD and TDD frequency bands in the UE capability signalling implements and is tested for FDD measurements while the UE is in TDD, and for TDD measurements while the UE is in FDD. | Yes, unless UE only supports band 13 |
| **26** | - HRPD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode | Yes, if UE supports HRPD |
| **27** | - 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  
   - EUTRA RRC_CONNECTED to UTRA FDD CELL_DCH CS handover, if the UE supports both UTRAN FDD and UTRAN TDD | Yes, if UE supports VoLTE and UTRA FDD |
| **28** | - TTI bundling | Yes for FDD |
| **29** | - Semi-Persistent Scheduling | Yes |
| **30** | - Handover between FDD and TDD  
   - can only be set to 1 if the UE has set bit number 13 to 1 | No |
| **31** | - 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. | Yes |
| **32** | Undefined | No |
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</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: - Inter-RAT periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportStrongestCellsForSON</code> - Inter-RAT periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportCGI</code></td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 22 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td>34</td>
<td>Inter-RAT ANR features for GERAN including: - Inter-RAT periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportStrongestCells</code> - Inter-RAT periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportCGI</code></td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 23 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td>35</td>
<td>Inter-RAT ANR features for 1xRTT including: - Inter-RAT periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportStrongestCellsForSON</code> - Inter-RAT periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportCGI</code></td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 24 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td>36</td>
<td>Inter-RAT ANR features for HRPD including: - Inter-RAT periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportStrongestCellsForSON</code> - Inter-RAT periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportCGI</code></td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 26 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td>37</td>
<td>Inter-RAT ANR features for UTRAN TDD including: - Inter-RAT periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportStrongestCellsForSON</code> - Inter-RAT periodical measurement reporting where <code>triggerType</code> is set to <code>periodical</code> and <code>purpose</code> is set to <code>reportCGI</code></td>
<td>- can only be set to 1 if the UE has set bit number 5 and at least one of the bit number 22 (for UEs supporting only UTRA TDD) or the bit number 39 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td>38</td>
<td>- EUTRA RRC_CONNECTED to UTRA TDD CELL_DCH PS handover, if the UE supports both UTRAN FDD and UTRAN TDD</td>
<td>- can only be set to 1 if the UE has set bit number 39 to 1</td>
<td>Yes</td>
</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>
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</tr>
<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>- related to SR-VCC - can only be set to 1 if the UE has set bit number 38 to 1</td>
<td>Yes</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>Yes</td>
</tr>
<tr>
<td>42</td>
<td>Undefined</td>
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<td>43</td>
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<td>44</td>
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<td>45</td>
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<td>57</td>
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<tr>
<td>64</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: The column FDD/ TDD diff indicates if the UE is allowed to signal different values for FDD and TDD. Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a feature for which it indicates support within the FGI signalling.

Clarification for mobility from EUTRAN and inter-frequency handover within EUTRAN

There are several feature groups related to mobility from E-UTRAN and inter-frequency handover within EUTRAN. The description of these features is based on the assumption that we have 5 main "functions" related to mobility from E-UTRAN:

A. Support of measurements and cell reselection procedure in idle mode
B. Support of RRC release with redirection procedure in connected mode
C. Support of Network Assisted Cell Change in connected mode
D. Support of measurements and reporting in connected mode
E. Support of handover procedure in connected mode

All functions can be applied for mobility to Inter-frequency to EUTRAN, GERAN, UTRAN, CDMA2000 HRPD and CDMA2000 1xRTT except for function C) which is only applicable for mobility to GERAN. Table B.1-2 below summarises the mobility functions that are supported based on the UE capability signaling (band support) and the setting of the feature group support indicators.
Table B.1-2: Mobility from E-UTRAN

<table>
<thead>
<tr>
<th>Feature</th>
<th>GERAN</th>
<th>UTRAN</th>
<th>HRPD</th>
<th>1xRTT</th>
<th>EUTRAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Measurements and cell reselection procedure in E-UTRA idle mode</td>
<td>Supported if GERAN band support is indicated</td>
<td>Supported if UTRAN band support is indicated</td>
<td>Supported if CDMA2000 HRPD band support is indicated</td>
<td>Supported if CDMA2000 1xRTT band support is indicated</td>
<td>Supported for supported bands</td>
</tr>
<tr>
<td>B. RRC release with blind redirection procedure in E-UTRA connected mode</td>
<td>Supported if GERAN band support is indicated</td>
<td>Supported if UTRAN band support is indicated</td>
<td>Supported if CDMA2000 HRPD band support is indicated</td>
<td>Supported if CDMA2000 1xRTT band support is indicated</td>
<td>Supported for supported bands</td>
</tr>
<tr>
<td>C. Cell Change Order (with or without) Network Assisted Cell Change) in E-UTRA connected mode</td>
<td>Group 10</td>
<td>N.A.</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A.</td>
</tr>
<tr>
<td>D. Inter-frequency/RAT measurements, reporting and measurement reporting event B2 (for inter-RAT) in E-UTRA connected mode</td>
<td>Group 23</td>
<td>Group 22/39</td>
<td>Group 26</td>
<td>Group 24</td>
<td>Group 25</td>
</tr>
<tr>
<td>E. Inter-frequency/RAT handover procedure in E-UTRA connected mode</td>
<td>Group 9 (GSM_connected handover) Separate UE capability bit defined in TS 36.306 for PS handover</td>
<td>Group 8/38 (PS handover) or Group 27/40 (SRVCC handover)</td>
<td>Group 12</td>
<td>Group 13 (within FDD or TDD) Group 11 Group 30 (between FDD and TDD)</td>
<td></td>
</tr>
</tbody>
</table>

In case measurements and reporting function is not supported by UE, the network may still issue the mobility procedures redirection (B) and CCO (C) in a blind fashion.

B.2 CSG support

In this release of the protocol, it is mandatory for the UE to support a minimum set of CSG functionality consisting of:

- Identifying whether a cell is CSG or not;
- Ignoring CSG cells in cell selection/reselection.

Additional CSG functionality in AS, i.e. the requirement to detect and camp on CSG cells when the “CSG whitelist” is available or when manual CSG selection is triggered by the user, are related to the corresponding NAS features. This additional AS functionality consists of:

- Manual CSG selection;
- Autonomous CSG search;
- Implicit priority handling for cell reselection with CSG cells.

It is possible that this additional CSG functionality in AS is not supported or tested in early UE implementations.

Note that since the above AS features relate to idle mode operations, the capability support is not signalled to the network. For these reasons, no “feature group indicator” is assigned to this feature to indicate early support in Rel-8.
Annex C (normative):
Release 10 AS feature handling

C.1 Feature group indicators

This annex contains the definitions of the bits in field featureGroupIndRel10.

In this release of the protocol, the UE shall include the field featureGroupIndRel10 in the IE UE-EUTRA-Capability-v1020-IEs. All the functionalities defined within the field featureGroupIndRel10 defined in Table C.1-1 are mandatory for the UE, if the related capability (spatial multiplexing in UL, PDSCH transmission mode 9, carrier aggregation, handover to EUTRA, or RAT) is also supported. For a specific indicator, if all functionalities for a feature group listed in Table C.1-1 have been implemented and tested, the UE shall set the indicator as one (1), else (i.e. if any one of the functionalities in a feature group listed in Table C.1-1 have not been implemented or tested), the UE shall set the indicator as zero (0).

The UE shall set all indicators that correspond to RATs not supported by the UE as zero (0).

The UE shall set all indicators, which do not have a definition in Table C.1-1, as zero (0).

If the optional field featureGroupIndRel10 is not included by a UE of a future release, the network may assume that all features, listed in Table C.1-1 and deployed in the network, have been implemented and tested by the UE.

The indexing in Table C.1-1 starts from index 101, which is the leftmost bit in the field featureGroupIndRel10.

### Table C.1-1: Definitions of feature group indicators

<table>
<thead>
<tr>
<th>Index of indicator</th>
<th>Definition (description of the supported functionality, if indicator set to one)</th>
<th>Notes</th>
<th>If indicated &quot;Yes&quot; the feature shall be implemented and successfully tested for this version of the specification</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>101 (leftmost bit)</td>
<td>- DMRS with OCC (orthogonal cover code) and SGH (sequence group hopping) disabling</td>
<td>- if the UE supports two or more layers for spatial multiplexing in UL, this bit shall be set to 1. &lt;br&gt;- If a category 0 UE does not support this feature, this bit shall be set to 0.</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></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. &lt;br&gt;- for Category 8 UEs, this bit shall be set to 1.</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
| 105 | - Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-0 – UE selected subband CQI without PMI, when PDSCH transmission mode 9 is configured  
- Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-1 – UE selected subband CQI with single PMI, when PDSCH transmission mode 9 and up to 4 CSI reference signal ports are configured | - this bit can be set to 1 only if indices 2 (Table B.1-1) and 103 are set to 1.  
- For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if index 2 is set to 1 for both FDD and TDD, and index 103 is set to 1 for at least one of FDD and TDD duplex modes. | Yes |
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<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 'supported') and if index 2 (Table B.1-1) is set to 1. - For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if at least one of index 104 and $tm9\text{-With-8Tx-FDD-r10}$ is set to 1/'supported', and if index 2 is set to 1 for both FDD and TDD.</td>
</tr>
<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</td>
<td>- this bit can be set to 1 only if indices 1 (Table B.1-1) and 103 are set to 1. - For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if index 1 is set to 1 for both FDD and TDD, and index 103 is set to 1 for at least one of FDD and TDD duplex modes.</td>
</tr>
<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 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 'supported') and if index 1 (Table B.1-1) is set to 1. - For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if at least one of index 104 and $tm9\text{-With-8Tx-FDD-r10}$ is set to 1/'supported', and if index 1 is set to 1 for both FDD and TDD.</td>
</tr>
<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 'supported'). - For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if at least one of index 104 and $tm9\text{-With-8Tx-FDD-r10}$ is set to 1/'supported'.</td>
</tr>
<tr>
<td>Bit</td>
<td>Function</td>
<td>Value</td>
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<td>-----</td>
<td>---------------------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>110</td>
<td>Periodic CQI/PMI/RI reporting on PUCCH Mode 1-1, submode 2</td>
<td>Yes</td>
</tr>
<tr>
<td>111</td>
<td>Measurement reporting trigger Event A6</td>
<td>Yes</td>
</tr>
<tr>
<td>112</td>
<td>SCell addition within the Handover to EUTRA procedure</td>
<td>Yes</td>
</tr>
<tr>
<td>113</td>
<td>Trigger type 0 SRS (periodic SRS) transmission on X Serving Cells</td>
<td>Yes</td>
</tr>
<tr>
<td>114</td>
<td>Reporting of both UTRA CPICH RSCP and Ec/N0 in a Measurement Report</td>
<td>No</td>
</tr>
<tr>
<td>115</td>
<td>Time domain ICIC RLM/RRM measurement subframe restriction for the serving cell</td>
<td>Yes</td>
</tr>
<tr>
<td>116</td>
<td>Relative transmit phase continuity for spatial multiplexing in UL</td>
<td>Yes</td>
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<tr>
<td>117</td>
<td>Undefined</td>
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<td></td>
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<tr>
<td>132</td>
<td>Undefined</td>
<td></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 E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a feature for which it indicates support within the FGI signalling.
Annex D (informative):
Descriptive background information

D.1 Signalling of Multiple Frequency Band Indicators (Multiple FBI)

D.1.1 Mapping between frequency band indicator and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the E-UTRA frequency bands in SystemInformationBlockType1 by means of an example as shown in Figure D.1.1-1. In this example:

- E-UTRAN cell belongs to band B90 and also bands B6, B7, B91, and B92.
- The freqBandIndicatorPriority field is not present in SystemInformationBlockType1.
- E-UTRAN uses B64 to indicate the presence of B90 in freqBandIndicator-v9e0.
- For the MFBI list of this cell, E-UTRAN uses B64 in MultiBandInfoList to indicate the position and priority of the bands in MultiBandInfoList-v9e0.
- The UE, after reading SystemInformationBlockType1, generates an MFBI list with priority of B91, B6, B92, and B7. If the UE supports the frequency band in the freqBandIndicator-v9e0 IE it applies that frequency band. Otherwise, the UE applies the first listed band in the MFBI list which it supports.

![Figure D.1.1-1: Mapping of frequency bands to MultiBandInfoList/MultiBandInfoList-v9e0](image)

D.1.2 Mapping between inter-frequency neighbour list and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the E-UTRA frequencies signalled in SystemInformationBlockType5 by means of an example as shown in Figure D.1.2-1. In this example:
- E-UTRAN includes 4 frequencies (EARFCNs): the bands associated with f1 and f4 belong to bands lower than 64; the bands associated with f2 and f3 belong to bands larger than 64. The reserved EARFCN value of 65535 is used to indicate the presence of ARFCN-ValueEUTRA-v9e0.

- The band associated with f1 has two overlapping bands, B1 and B2 (lower than 64); the band associated with f2 has one overlapping band, B91; the band associated with f3 has four overlapping bands B3, B4, B92, and B93; the band associated with f4 does not have overlapping bands.

- E-UTRAN includes 4 lists in both interFreqCarrierFreqList-v8h0 and interFreqCarrierFreqList-v9e0 and ensure the order of the lists is matching. Each list corresponds to one EARFCN and contains up to 8 bands. The first list corresponds to f1, the second list corresponds to f2, and so on. The grey lists mean not including MultiBandInfoList or MultiBandInfoList-v9e0, i.e. the corresponding EARFCN does not have any overlapping frequency bands in MultiBandInfoList or MultiBandInfoList-v9e0.

Figure D.1.2-1: Mapping of EARFCNs to MultiBandInfoList/MultiBandInfoList-v9e0

D.1.3 Mapping between UTRA FDD frequency list and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the UTRA FDD frequencies signalled in SystemInformationBlockType6 by means of an example as shown in Figure D.1.3-1. In this example:

- E-UTRAN includes 4 UTRA FDD frequencies (UARFCNs).
- The bands associated with f1 and f4 have no overlapping bands. The band associated with f2 has two overlapping bands, B1 and B2. The band associated with f3 has one overlapping band, B3.

- E-UTRAN includes 4 lists in `carrierFreqListUTRA-FDD-v8h0` with the first and fourth entry not including `MultiBandInfoList`.

![Diagram](image)

Figure D.1.3-1: Mapping of UARFCNs to `MultiBandInfoList`
Annex E (normative):
TDD/FDD differentiation of FGIs/capabilities in TDD-FDD CA

Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a feature/capability for which it indicates support within the FGI/capability signalling.

A UE that indicates support for TDD/ FDD CA:

- For the fields for which the UE is allowed to indicate different support for FDD and TDD, the UE shall support the feature on the PCell and/or SCell(s), as specified in tables E-1, E-2 and E-3 in accordance to the following rules:
  - PCell: the UE shall support the feature for the PCell, if the UE indicates support of the feature for the PCell duplex mode;
  - SCell: the UE shall support the feature for SCell(s), if the UE indicates support of the feature for the SCell duplex mode;
  - Per serving cell: the UE shall support the feature for a serving cell if the UE indicates support of the feature for the serving cell’s duplex mode;
  - All serving cells: UE shall support the feature if the UE indicates support of the feature for both TDD and FDD duplex modes;
- For the fields where the UE is not allowed to indicate different support for FDD and TDD, the UE shall support the feature for PCell and SCell(s) if the UE indicates support of the feature via the common FGI/capability bit.

Table E-1: Rel-8/9 FGIs for which FDD/TDD differentiation is allowed (from Annex B)

<table>
<thead>
<tr>
<th>Index of indicator</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>2</td>
<td>All serving cells</td>
</tr>
<tr>
<td>4</td>
<td>All serving cells</td>
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<tr>
<td>8</td>
<td>PCell</td>
</tr>
<tr>
<td>9</td>
<td>PCell</td>
</tr>
<tr>
<td>10</td>
<td>PCell</td>
</tr>
<tr>
<td>11</td>
<td>PCell</td>
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<tr>
<td>12</td>
<td>PCell</td>
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<tr>
<td>15</td>
<td>PCell</td>
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<td>19</td>
<td>PCell</td>
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<td>22</td>
<td>PCell</td>
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<td>23</td>
<td>PCell</td>
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<td>24</td>
<td>PCell</td>
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<td>26</td>
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<td>27</td>
<td>PCell</td>
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<td>28</td>
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<td>29</td>
<td>PCell</td>
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<td>33</td>
<td>PCell</td>
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<td>34</td>
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<td>35</td>
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<td>36</td>
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<td>37</td>
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<tr>
<td>39</td>
<td>PCell</td>
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<tr>
<td>40</td>
<td>PCell</td>
</tr>
<tr>
<td>41</td>
<td>PCell</td>
</tr>
</tbody>
</table>
### Table E-2: Rel-10 FGIs for which FDD/TDD differentiation is allowed (from Annex C)

<table>
<thead>
<tr>
<th>Index of indicator</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>102</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>103</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>105</td>
<td>All serving cells</td>
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<tr>
<td>106</td>
<td>All serving cells</td>
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<tr>
<td>107</td>
<td>All serving cells</td>
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<td>108</td>
<td>All serving cells</td>
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<tr>
<td>109</td>
<td>All serving cells</td>
</tr>
<tr>
<td>110</td>
<td>All serving cells</td>
</tr>
<tr>
<td>111</td>
<td>SCell</td>
</tr>
<tr>
<td>112</td>
<td>PCell</td>
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<tr>
<td>113</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>115</td>
<td>PCell</td>
</tr>
<tr>
<td>116</td>
<td>Per serving cell</td>
</tr>
</tbody>
</table>

### Table E-3: Rel-12 UE-EUTRA capabilities for which FDD/TDD differentiation is allowed

<table>
<thead>
<tr>
<th>UE-EUTRA-Capability</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>crossCarrierScheduling</td>
<td>All serving cells</td>
</tr>
<tr>
<td>e-CSFB-1XRTT</td>
<td>PCell</td>
</tr>
<tr>
<td>e-CSFB-ConcPS-Mob1XRTT</td>
<td>PCell</td>
</tr>
<tr>
<td>e-CSFB-dual-1XRTT</td>
<td>PCell</td>
</tr>
<tr>
<td>ePDCCH</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>e-RedirectionUTRA</td>
<td>PCell</td>
</tr>
<tr>
<td>e-RedirectionUTRA-TDD</td>
<td>PCell</td>
</tr>
<tr>
<td>inDeviceCoexInd</td>
<td>All serving cells</td>
</tr>
<tr>
<td>interFreqRSTD-Measurement</td>
<td>PCell</td>
</tr>
<tr>
<td>interFreqSI-AcquisitionForHO</td>
<td>PCell</td>
</tr>
<tr>
<td>interRAT-PS-HO-ToGERAN</td>
<td>PCell</td>
</tr>
<tr>
<td>intraFreqSI-AcquisitionForHO</td>
<td>PCell</td>
</tr>
<tr>
<td>mbms-Scell</td>
<td>SCell</td>
</tr>
<tr>
<td>mbms-NonServingCell</td>
<td>SCell</td>
</tr>
<tr>
<td>multiACK-CSIreporting</td>
<td>PCell</td>
</tr>
<tr>
<td>multiClusterPUSCH-WithinCC</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>otdoa-UE-Assisted</td>
<td>PCell</td>
</tr>
<tr>
<td>pmi-Disabling</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>rsrqMeasWideband</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>simultaneousPUCCH-PUSCH</td>
<td>All serving cells</td>
</tr>
<tr>
<td>ss-CCH-InterHandl</td>
<td>PCell</td>
</tr>
<tr>
<td>txDiv-PUCCH1b-ChSelect</td>
<td>PCell</td>
</tr>
<tr>
<td>ue-TxAntennaSelectionSupported</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>utran-SI-AcquisitionForHO</td>
<td>PCell</td>
</tr>
</tbody>
</table>
Annex F (informative):
Change history
3GPP TS 36.331 version 12.14.0 Release 12

455

ETSI TS 136 331 V12.14.0 (2017-07)

Change history
Date

TSG # TSG Doc.

CR

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03/2008
03/2008
05/2008
09/2008
12/2008
03/2009

RP-38
RP-39
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Subject/Comment
Approved at TSG-RAN #38 and placed under Change Control
CR to 36.331 with Miscellaneous corrections
CR to 36.331 to convert RRC to agreed ASN.1 format
CR to 36.331 on Miscellaneous clarifications/ corrections
CR on Miscellaneous corrections and clarifications
Miscellaneous corrections and clarifications
Correction to the Counter Check procedure
CR to 36.331-UE Actions on Receiving SIB11
Spare usage on BCCH
Issues in handling optional IE upon absence in GERAN NCL
CR to 36.331 on Removal of useless RLC re-establishment at RB release
Clarification to RRC level padding at PCCH and BCCH
Removal of Inter-RAT message
Padding of the SRB-ID for security input
Validity of ETWS SIB
Configuration of the Two-Intervals-SPS
Corrections on Scaling Factor Values of Qhyst
Optionality of srsMaxUppts
CR for discussion on field name for common and dedicated IE
Corrections to Connected mode mobility
Clarification regarding the measurement reporting procedure
Corrections on s-Measure
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Unification of T300 and T301 and removal of miscallaneous FFSs

ETSI

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Proposed update of the feature grouping

- Removing use of CR on Alignment of CCCH and DCCH handling of missing mandatory field

- Miscellaneous small corrections

- Proposed CR to 36.331 Clarification on mandatory information in AS-

- Correction of UE measurement model

- Minor corrections to the feature grouping

- Octet alignment of VarShortMAC-Input

- Minor corrections to the feature grouping

- Security clarification

- Sending of GERAN SI/PSI information at Inter-RAT Handover

- Correction of UE measurement model

- Restricting the reconfiguration of UM RLC SN field size

- 36.331 CR on Clarification on cell change order from GERAN to E-UTRAN

- 36.331 CR - Handling of expired TAT and failed D-SR

- Proposed CR to 36.331 Clarification on mandatory information in AS-

- Miscellaneous small corrections

- Clarification on the basis of delta signalling

- CR on Alignment of CCCH and DCCH handling of missing mandatory field

- Handling of Measurement Context During HO Preparation

- Clarification of key-eNodeB-Star in AdditionalReestabInfo

- UE Capability Transfer

- Clarification regarding mobility from E-UTRA in-between SMC and SRB2/DRB setup

- Correction and completion of specification conventions

- RB combination in feature group indicator

- CR for need code for fields in mobilityControlInfo

- Alignment of pusch-HoppingOffset with 36.211

- Explicit srb-Identity values for SRB1 and SRB2

- Removing use of defaultValue for mac-MainConfig

- Proposed update of the feature grouping
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