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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
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# Contents

# Foreword

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# 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".

[2] Void.

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

[4] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); UE Procedures in Idle Mode".

[5] 3GPP TS 36.306 "Evolved Universal Terrestrial Radio Access (E-UTRA); UE Radio Access Capabilities".

[6] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification".

[7] 3GPP TS 36.322:"Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Link Control (RLC) protocol specification".

[8] 3GPP TS 36.323: "Evolved Universal Terrestrial Radio Access (E-UTRA); Packet Data Convergence Protocol (PDCP) Specification".

[9] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRAN); Overall description; Stage 2".

[10] 3GPP TS 22.011: "Service accessibility".

[11] 3GPP TS 23.122: "Non-Access-Stratum (NAS) functions related to Mobile Station (MS) in idle mode".

[12] 3GPP2 C.S0002-F v1.0: "Physical Layer Standard for cdma2000 Spread Spectrum Systems".

[13] ITU-T Recommendation X.680 (07/2002) "Information Technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation" (Same as the ISO/IEC International Standard 8824-1).

[14] ITU-T Recommendation X.681 (07/2002) "Information Technology - Abstract Syntax Notation One (ASN.1): Information object specification" (Same as the ISO/IEC International Standard 8824-2).

[15] ITU-T Recommendation X.691 (07/2002) "Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)" (Same as the ISO/IEC International Standard 8825-2).

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

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

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

[19] 3GPP TS 25.331:"Universal Terrestrial Radio Access (UTRA); Radio Resource Control (RRC); Protocol specification".

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

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

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

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

[24] 3GPP2 C.S0057-E v1.0: "Band Class Specification for cdma2000 Spread Spectrum Systems".

[25] 3GPP2 C.S0005-F v1.0: "Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems".

[26] 3GPP2 C.S0024-C v2.0: "cdma2000 High Rate Packet Data Air Interface Specification".

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

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

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

[30] 3GPP TS 25.123: "Requirements for Support of Radio Resource Management (TDD)".

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

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

[33] 3GPP2 A.S0008-C v4.0: "Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Radio Access Network Interfaces with Session Control in the Access Network"

[34] 3GPP2 C.S0004-F v1.0: "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems"

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

[36] 3GPP TS 44.060: "General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control/Medium Access Control (RLC/MAC) protocol".

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

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

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

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

[41] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[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".

[48] 3GPP TS 36.214: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer - Measurements".

[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; Subsriber and equipment trace; Trace control and confiuration 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".

[65] 3GPP TS 25.307: "Requirement on User Equipments (UEs) supporting a release-independent frequency band".

[66] 3GPP TS 24.312: "Access Network Discovery and Selection Function (ANDSF) Management Object (MO)".

[67] IEEE 802.11-2012, Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications, IEEE Std.

[68] 3GPP TS 23.303: "Proximity-based services (ProSe); Stage 2".

[69] 3GPP TS 24.334: "Proximity-services (ProSe) User Equipment (UE) to ProSe function protocol aspects; Stage 3".

[70] 3GPP TS 24.333: "Proximity-services (ProSe) Management Objects (MO)".

# 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].

**Cell Group**: A subset of the serving cells of a UE, configured with Dual Connectivity (DC), i.e. the Master Cell Group (MCG) or the Secondary Cell Group (SCG).

**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**: A group of serving cells of a UE 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**: A group of secondary cells of a UE, configured with DC, 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.

**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].

| | |
|---|---|
| 1xRTT | CDMA2000 1x Radio Transmission Technology |
| ACK | Acknowledgement |
| AM | Acknowledged Mode |
| ANDSF | Access Network Discovery and Selection Function |
| ARQ | Automatic Repeat Request |
| AS | Access Stratum |
| ASN.1 | Abstract Syntax Notation One |
| BCCH | Broadcast Control Channel |
| BCD | Binary Coded Decimal |
| BCH | Broadcast Channel |
| BLER | Block Error Rate |
| CA | Carrier Aggregation |
| CCCH | Common Control Channel |
| CCO | Cell Change Order |
| CG | Cell Group |
| CMAS | Commercial Mobile Alert Service |
| CP | Control Plane |
| C-RNTI | Cell RNTI |
| CRS | Cell-specific Reference Signal |
| CSFB | CS fallback |
| CSG | Closed Subscriber Group |
| CSI | Channel State Information |
| DC | Dual Connectivity |
| DCCH | Dedicated Control Channel |
| DCI | Downlink Control Information |
| DL | Downlink |
| DL-SCH | Downlink Shared Channel |
| DRB | (user) Data Radio Bearer |
| DRX | Discontinuous Reception |
| DTCH | Dedicated Traffic Channel |
| EAB | Extended Access Barring |
| EHPLMN | Equivalent Home Public Land Mobile Network |
| eIMTA | Enhanced Interference Management and Traffic Adaptation |
| ENB | Evolved Node B |
| EPC | Evolved Packet Core |
| EPDCCH | Enhanced Physical Downlink Control Channel |
| EPS | Evolved Packet System |
| ETWS | Earthquake and Tsunami Warning System |
| E-UTRA | Evolved Universal Terrestrial Radio Access |

| | |
|---|---|
| E-UTRAN | Evolved Universal Terrestrial Radio Access Network |
| FDD | Frequency Division Duplex |
| FFS | For Further Study |
| GERAN | GSM/EDGE Radio Access Network |
| GNSS | Global Navigation Satellite System |
| GSM | Global System for Mobile Communications |
| HARQ | Hybrid Automatic Repeat Request |
| HPLMN | Home Public Land Mobile Network |
| HRPD | CDMA2000 High Rate Packet Data |
| IDC | In-Device Coexistence |
| IE | Information element |
| IMEI | International Mobile Equipment Identity |
| IMSI | International Mobile Subscriber Identity |
| ISM | Industrial, Scientific and Medical |
| kB | Kilobyte (1000 bytes) |
| L1 | Layer 1 |
| L2 | Layer 2 |
| L3 | Layer 3 |
| MAC | Medium Access Control |
| MBMS | Multimedia Broadcast Multicast Service |
| MBSFN | Multimedia Broadcast multicast service Single Frequency Network |
| MCG | Master Cell Group |
| MDT | Minimization of Drive Tests |
| MIB | Master Information Block |
| MO | Mobile Originating |
| MRB | MBMS Point to Multipoint Radio Bearer |
| MRO | Mobility Robustness Optimisation |
| MSI | MCH Scheduling Information |
| MT | Mobile Terminating |
| N/A | Not Applicable |
| NACC | Network Assisted Cell Change |
| NAICS | Network Assisted Interference Cancellation/Suppression |
| NAS | Non Access Stratum |
| PCCH | Paging Control Channel |
| PCell | Primary Cell |
| PDCCH | Physical Downlink Control Channel |
| PDCP | Packet Data Convergence Protocol |
| PDU | Protocol Data Unit |
| PLMN | Public Land Mobile Network |
| ProSe | Proximity based Services |
| PSCell | Primary Secondary Cell |
| PTAG | Primary Timing Advance Group |
| PUCCH | Physical Uplink Control Channel |
| QoS | Quality of Service |
| RACH | Random Access CHannel |
| RAT | Radio Access Technology |
| RB | Radio Bearer |
| RLC | Radio Link Control |
| RN | Relay Node |
| RNTI | Radio Network Temporary Identifier |
| ROHC | RObust Header Compression |
| RPLMN | Registered Public Land Mobile Network |
| RRC | Radio Resource Control |
| RSCP | Received Signal Code Power |
| RSRP | Reference Signal Received Power |
| RSRQ | Reference Signal Received Quality |
| RSSI | Received Signal Strength Indicator |
| SAE | System Architecture Evolution |
| SAP | Service Access Point |
| SC | Sidelink Control |
| SCell | Secondary Cell |
| SCG | Secondary Cell Group |

| | |
|---|---|
| SFN | System Frame Number |
| SI | System Information |
| SIB | System Information Block |
| SI-RNTI | System Information RNTI |
| SL | Sidelink |
| SLSS | Sidelink Synchronisation Signal |
| SPS | Semi-Persistent Scheduling |
| SR | Scheduling Request |
| SRB | Signalling Radio Bearer |
| SSAC | Service Specific Access Control |
| STAG | Secondary Timing Advance Group |
| S-TMSI | SAE Temporary Mobile Station Identifier |
| TA | Tracking Area |
| TAG | Timing Advance Group |
| TDD | Time Division Duplex |
| TDM | Time Division Multiplexing |
| TM | Transparent Mode |
| TPC-RNTI | Transmit Power Control RNTI |
| UE | User Equipment |
| UICC | Universal Integrated Circuit Card |
| UL | Uplink |
| UL-SCH | Uplink Shared Channel |
| UM | Unacknowledged Mode |
| UP | User Plane |
| UTC | Coordinated Universal Time |
| UTRAN | Universal Terrestrial Radio Access Network |
| VoLTE | Voice over Long Term Evolution |
| WLAN | Wireless Local Area Network |

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.

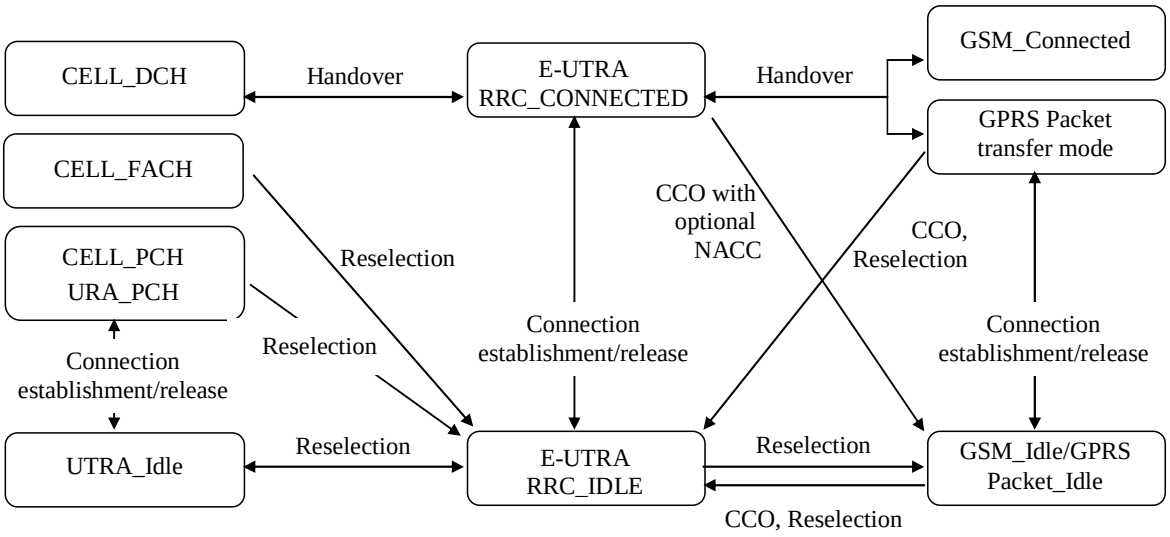


**Figure 4.2.1-1: E-UTRA states and inter RAT mobility procedures, 3GPP**

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.

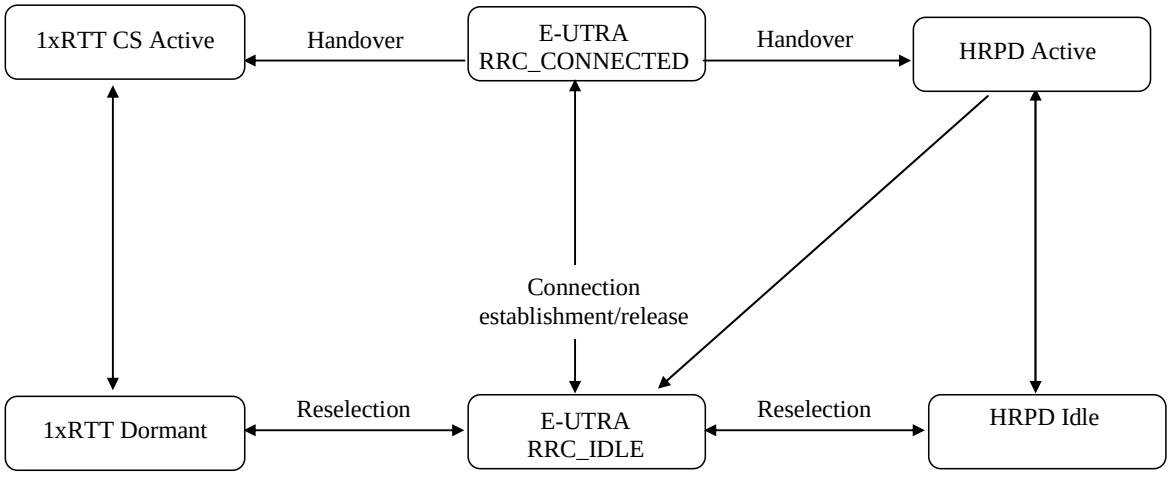


**Figure 4.2.1-2: Mobility procedures between E-UTRA and CDMA2000**

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 *RRCConnectionReconfiguration* message including the *fullConfig*:

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

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

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

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

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

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

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

# 5.2 System information

## 5.2.1 Introduction

### 5.2.1.1 General

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

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 aquire 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.

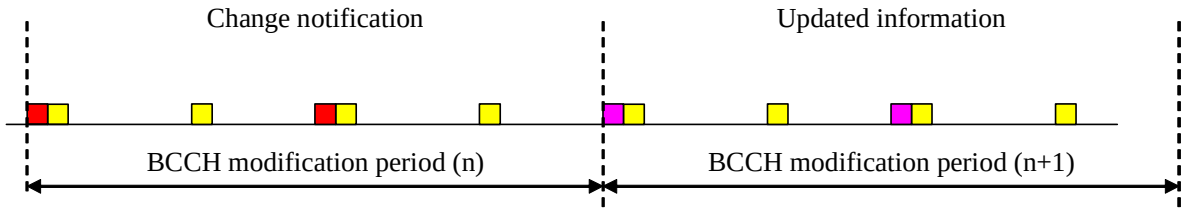


**Figure 5.2.1.3-1: Change of system Information**

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

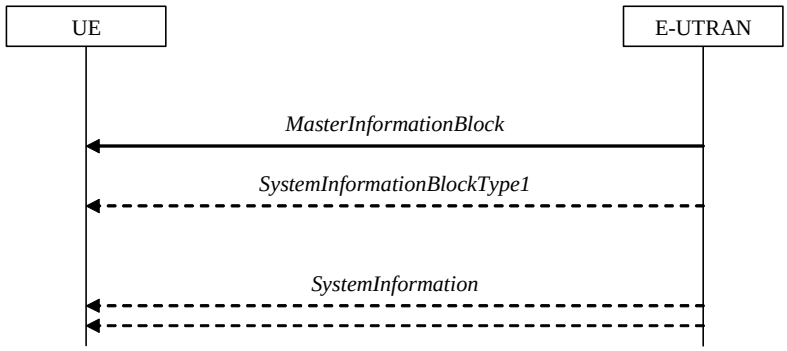


**Figure 5.2.2.1-1: System information acquisition, normal**

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

### 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:

3> discard any previously buffered *warningMessageSegment*;

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

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

3> if *schedulingInfoList* indicates that *SystemInformationBlockType12* is present:

4> acquire *SystemInformationBlockType12*;

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

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

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

3> acquire *SystemInformationBlockType13*;

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

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

4> acquire SystemInformationBlockType15;

1> if the UE is EAB capable:

2> when the UE does not have stored a valid version of *SystemInformationBlockType14* upon entering RRC_IDLE, or when the UE acquires *SystemInformationBlockType1* following EAB parameters change notification or upon entering a cell during RRC_IDLE:

3> if *schedulingInfoList* indicates that *SystemInformationBlockType14* is present:

4> start acquiring *SystemInformationBlockType14* immediately;

3> else:

4> discard *SystemInformationBlockType14*, if previously received;

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

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

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

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

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

3> acquire *SystemInformationBlockType18*;

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

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

3> acquire *SystemInformationBlockType19*;

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

3> if *schedulingInfoList* indicates that *SystemInformationBlockType19* is present and the UE does not have stored a valid version of this system information block:

4> 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;

1> else:

2> if the frequency band indicated in the *freqBandIndicator* is part of the frequency bands supported by the UE; or

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

3> forward the *cellIdentity* to upper layers;

3> forward the *trackingAreaCode* to upper layers;

2> else:

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

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

### 5.2.2.8 Actions upon reception of *SystemInformation* messages

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

### 5.2.2.9 Actions upon reception of *SystemInformationBlockType2*

Upon receiving *SystemInformationBlockType2*, the UE shall:

1> apply the configuration included in the *radioResourceConfigCommon*;

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

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

1> if the *mbsfn-SubframeConfigList* is included:

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

1> apply the specified PCCH configuration defined in 9.1.1.3;

1> not apply the *timeAlignmentTimerCommon*;

1> if in RRC_CONNECTED and UE is configured with RLF timers and constants values received within *rlf-TimersAndConstants*:

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

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

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

### 5.2.2.10 Actions upon reception of *SystemInformationBlockType3*

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

### 5.2.2.11 Actions upon reception of *SystemInformationBlockType4*

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

### 5.2.2.12 Actions upon reception of *SystemInformationBlockType5*

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

### 5.2.2.13 Actions upon reception of *SystemInformationBlockType6*

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

### 5.2.2.14 Actions upon reception of *SystemInformationBlockType7*

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

### 5.2.2.15 Actions upon reception of *SystemInformationBlockType8*

Upon receiving *SystemInformationBlockType8*, the UE shall:

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

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

1> if the *systemTimeInfo* is included:

2> forward the *systemTimeInfo* to CDMA2000 upper layers;

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

2> forward the *searchWindowSize* to CDMA2000 upper layers;

1> if *parametersHRPD* is included:

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

2> if the *cellReselectionParametersHRPD* is included:

3> forward the *neighCellList* to the CDMA2000 upper layers;

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 s*erialNumber* 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*;

1> else:

2> store the received *warningMessageSegment*;

2> continue reception of *SystemInformationBlockType11*;

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

### 5.2.2.19 Actions upon reception of *SystemInformationBlockType12*

Upon receiving *SystemInformationBlockType12*, the UE shall:

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

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

2> continue reception of *SystemInformationBlockType12*;

1> else:

2> if the received values of *messageIdentifier* and *serialNumber* are the same (each value is the same) as a pair for which a warning message is currently being assembled:

3> store the received *warningMessageSegment*;

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

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

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

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

3> continue reception of *SystemInformationBlockType12*;

2> else if the received values of *messageIdentifier* and/or *serialNumber* are not the same as any of the pairs for which a warning message is currently being assembled:

3> start assembling a warning message for this *messageIdentifier* and *serialNumber* pair;

3> store the received *warningMessageSegment*;

3> continue reception of *SystemInformationBlockType12*;

The UE should discard *warningMessageSegment* and the associated values of *messageIdentifier* and *serialNumber* for *SystemInformationBlockType12* if the complete warning message has not been assembled within a period of 3 hours.

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

### 5.2.2.20 Actions upon reception of *SystemInformationBlockType13*

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

### 5.2.2.21 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 direct communication:

3> from the next SC period, as defined by *sc-Period*, use the resource pool indicated by *commRxPool* for sidelink direct communication monitoring, as specified in 5.10.3;

2> if configured to transmit sidelink direct communication:

3> from the next SC period, as defined by *sc-Period*, use the resource pool indicated by *commTxPoolNormalCommon* or by *commTxPoolExceptional* for sidelink direct 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 direct 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 direct 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 direct 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 *schedulingInfoList* in *SystemInformationBlockType1*;

2> determine the integer value $x = (n - 1)*w$, where $w$ is the *si-WindowLength*;

2> the SI-window starts at the subframe #*a*, where $a = x \bmod 10$, in the radio frame for which SFN mod $T$ = FLOOR($x$/10), where $T$ is the *si-Periodicity* of the concerned SI message;

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

1> receive DL-SCH using the SI-RNTI from the start of the SI-window and continue until the end of the SI-window whose absolute length in time is given by *si-WindowLength*, or until the SI message was received, excluding the following subframes:

2> subframe #5 in radio frames for which SFN mod 2 = 0;

2> any MBSFN subframes;

2> any uplink subframes in TDD;

1> if the SI message was not received by the end of the SI-window, repeat reception at the next SI-window occasion for the concerned SI message;

# 5.3 Connection control

## 5.3.1 Introduction

### 5.3.1.1 RRC connection control

RRC connection establishment involves the establishment of SRB1. E-UTRAN completes RRC connection establishment prior to completing the establishment of the S1 connection, i.e. prior to receiving the UE context information from the EPC. Consequently, AS security is not activated during the initial phase of the RRC connection. During this initial phase of the RRC connection, the E-UTRAN may configure the UE to perform measurement reporting. 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.

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

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

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

The integrity and ciphering algorithms can only be changed upon handover. The four AS keys ($K_{eNB,}$ $K_{RRCint}$, $K_{RRCenc}$ and $K_{UPenc}$) change upon every handover and connection re-establishment. The *keyChangeIndicator* is used upon handover and indicates whether the UE should use the keys associated with the $K_{ASME}$ 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 $K_{eNB}$ that is used to generate $K_{RRCint}$, $K_{RRCenc}$ and $K_{UPenc}$ (see TS 33.401 [32]). An intra cell handover procedure may be used to change the keys in RRC_CONNECTED.

For each radio bearer an independent counter (COUNT, as specified in TS 36.323 [8]) is maintained for each direction. For each DRB, the COUNT is used as input for ciphering. For each SRB, the COUNT is used as input for both ciphering and integrity protection. It is not allowed to use the same COUNT value more than once for a given security key. In order to limit the signalling overhead, individual messages/ packets include a short sequence number (PDCP SN, as specified in TS 36.323 [8]). In addition, an overflow counter mechanism is used: the hyper frame number

(TX_HFN and RX_HFN, as specified in TS 36.323 [8]). The HFN needs to be synchronized between the UE and the eNB. The eNB is responsible for avoiding reuse of the COUNT with the same RB identity and with the same $K_{eNB}$, e.g. due to the transfer of large volumes of data, release and establishment of new RBs. In order to avoid such re-use, the eNB may e.g. use different RB identities for successive RB establishments, trigger an intra cell handover or an RRC_CONNECTED to RRC_IDLE to RRC_CONNECTED transition.

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

In case of DC, a separate $K_{eNB}$ is used for SCG-DRBs ($S\text{-}K_{eNB}$). This key is derived from the key used for the MCG ($K_{eNB}$) and an SCG counter that is used to ensure freshness. To refresh the $S\text{-}K_{eNB}$ 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 $K_{eNB}$ and $S\text{-}K_{eNB}$ 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 $K_{UPint}$ key is derived from the $K_{eNB}$ key as described in TS33.401 [32]. The same integrity protection algorithm used for SRBs also applies to the DRBs. The $K_{UPint}$ changes at every handover and RRC connection re-establishment and is based on an updated $K_{eNB}$ which is derived by taking into account the *nextHopChainingCount.* The COUNT value maintained for DRB ciphering is also used for integrity protection, if the integrity protection is configured for the DRB.

### 5.3.1.3 Connected mode mobility

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

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.

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


**Figure 5.3.2.1-1: Paging**

The purpose of this procedure is:

- to transmit paging information to a UE in RRC_IDLE and/ or;
- to inform UEs in RRC_IDLE and UEs in RRC_CONNECTED about a system information change and/ or;

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

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

#### 5.3.2.2 Initiation

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

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

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

1> if in RRC_IDLE, for each of the *PagingRecord*, if any, included in the *Paging* message:

2> if the *ue-Identity* included in the *PagingRecord* matches one of the UE identities allocated by upper layers:

3> forward the *ue-Identity* and the *cn-Domain* to the upper layers;

1> if the *systemInfoModification* is included:

2> re-acquire the required system information using the system information acquisition procedure as specified in 5.2.2.

1> if the *etws-Indication* is included and the UE is ETWS capable:

2> re-acquire *SystemInformationBlockType1* immediately, i.e., without waiting until the next system information modification period boundary;

2> if the *schedulingInfoList* indicates that *SystemInformationBlockType10* is present:

3> acquire *SystemInformationBlockType10*;

2> if the *schedulingInfoList* indicates that *SystemInformationBlockType11* is present:

3> acquire *SystemInformationBlockType11*;

1> if the *cmas-Indication* is included and the UE is CMAS capable:

2> re-acquire *SystemInformationBlockType1* immediately, i.e., without waiting until the next system information modification period boundary as specified in 5.2.1.5;

2> if the *schedulingInfoList* indicates that *SystemInformationBlockType12* is present:

3> acquire *SystemInformationBlockType12*;

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

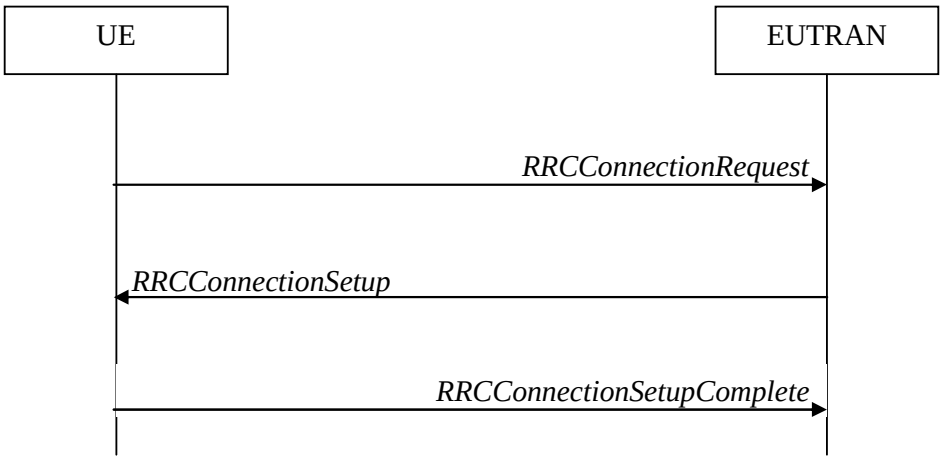


**Figure 5.3.3.1-1: RRC connection establishment, successful**

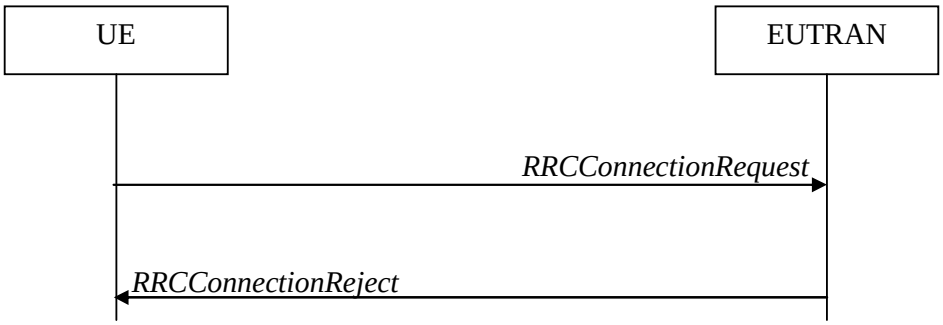


**Figure 5.3.3.1-2: RRC connection establishment, network reject**

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

E-UTRAN applies the procedure as follows:

- to establish SRB1 only.

### 5.3.3.1a Conditions for establishing RRC Connection for sidelink direct communication/ discovery

Upper layers initiate an RRC connection for sidelink direct communication only in the following case:

1> if configured by upper layers to transmit sidelink direct 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*;

Upper layers initiate an RRC connection for sidelink direct discovery only in the following case:

1> if configured by upper layers to transmit sidelink direct 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: 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]:

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:

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

4> inform upper layers about the failure to establish the RRC connection and that access barring for mobile originating CS fallback and mobile originating calls is applicable, due to *ac-BarringForMO-Data*, upon which the procedure ends;

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

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

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

2> if the UE is establishing the RRC connection for mobile originating SMSoIP or SMS and *SystemInformationBlockType2* includes *ac-BarringSkipForSMS*:

3> consider access to the cell as not barred;

2> else:

3> if *establishmentCause* is set to *mo-Signalling:*

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

4> if access to the cell is barred:

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

3> if *establishmentCause* is set to *mo-Data*:

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

4> if access to the cell is barred:

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

6> 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;

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

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

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

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

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

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

1> apply the CCCH configuration as specified in 9.1.1.2;

1> apply the *timeAlignmentTimerCommon* included in *SystemInformationBlockType2*;

1> start timer T300;

1> initiate transmission of the *RRCConnectionRequest* message in accordance with 5.3.3.3;

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

### 5.3.3.3 Actions related to transmission of *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> 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> if the UE supports mobility state reporting:

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

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:

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

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

3> perform the actions as specified in 5.3.3.7;

2> if timer T300 is running:

3> stop timer T300;

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

3> inform upper layers about the failure to establish the RRC connection;

### 5.3.3.6 T300 expiry

The UE shall:

1> if timer T300 expires:

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

2> if the UE supports RRC Connection Establishment failure temporary Qoffset and T300 has expired a consecutive *connEstFailCount* times on the same cell for which *txFailParams* is included in *SystemInformationBlockType2*:

3> for a period as indicated by *connEstFailOffsetValidity*:

4> use *connEstFailOffset* for the parameter $Qoffset_{temp}$ 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 $Qoffset_{temp}$ during *connEstFailOffsetValidity* for the concerned cell.

2> store the following connection establishment failure information in the *VarConnEstFailReport* by setting its fields as follows:

3> clear the information included in *VarConnEstFailReport*, if any;

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

3> set the *failedCellId* to the global cell identity of the cell where connection establishment failure is detected;

3> set the *measResultFailedCell* to include the RSRP and RSRQ, if available, of the cell where connection establishment failure is detected and based on measurements collected up to the moment the UE detected the failure;

3> if available, set the *measResultNeighCells*, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency as well as 3 inter-RAT neighbours, per frequency/ set of frequencies (GERAN) per RAT and according to the following:

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

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

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

4> include the *locationCoordinates*;

4> include the *horizontalVelocity*, if available;

3> set the *numberOfPreamblesSent* to indicate the number of preambles sent by MAC for the failed random access procedure;

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

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:

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

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

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

3> else:

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

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

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

### 5.3.3.11 Access barring check

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

2> consider access to the cell as barred;

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

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

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

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

3> consider access to the cell as not barred;

2> else:

3> draw a random number '*rand*' uniformly distributed in the range: $0 \leq rand < 1$;

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

4> consider access to the cell as not barred;

3> else:

4> consider access to the cell as barred;

1> else:

2> consider access to the cell as not barred;

1> if access to the cell is barred and both timers T302 and "Tbarring" are not running:

2> draw a random number '*rand*' that is uniformly distributed in the range $0 \leq rand < 1$;

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

"Tbarring" = $(0.7 + 0.6 * rand) * ac\text{-}BarringTime$.

### 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

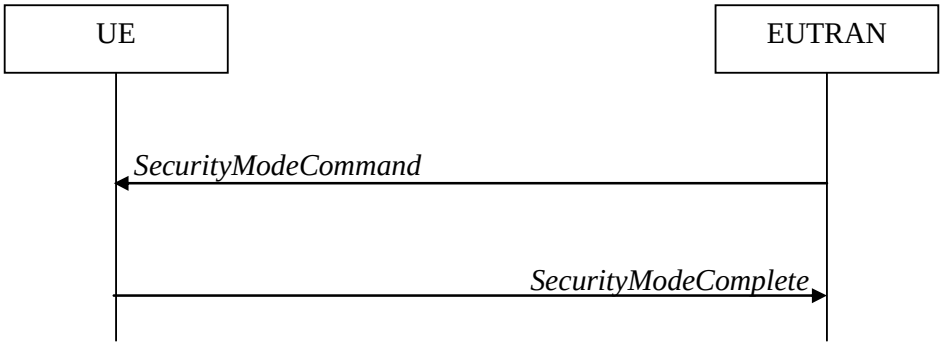


**Figure 5.3.4.1-1: Security mode command, successful**

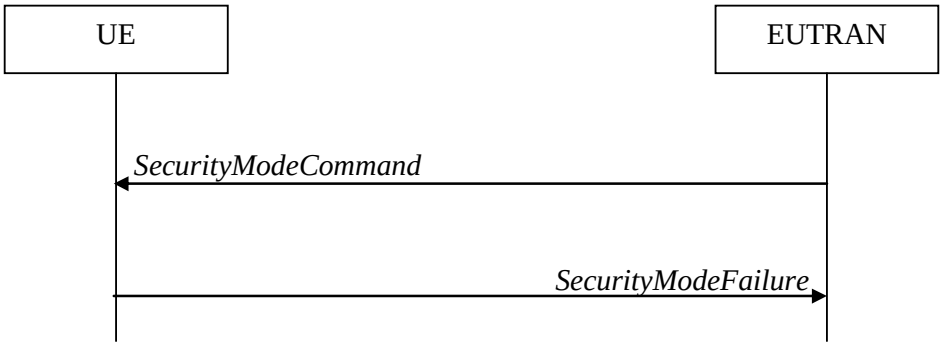


**Figure 5.3.4.1-2: Security mode command, failure**

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

### 5.3.4.2 Initiation

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 $K_{eNB}$ key, as specified in TS 33.401 [32];

1> derive the $K_{RRCint}$ 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 $K_{RRCint}$ key;

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

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

2> if connected as an RN:

3> derive the $K_{UPint}$ 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 $K_{RRCint}$ 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 $K_{RRCenc}$ key and the $K_{UPenc}$ key after completing the procedure, i.e. ciphering shall be applied to all subsequent messages received and sent by the UE, except for the *SecurityModeComplete* message which is sent unciphered;

2> if connected as an RN:

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

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

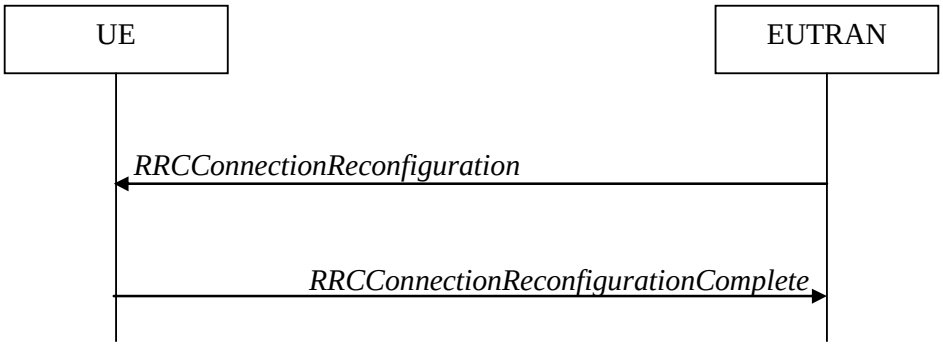


**Figure 5.3.5.1-1: RRC connection reconfiguration, successful**

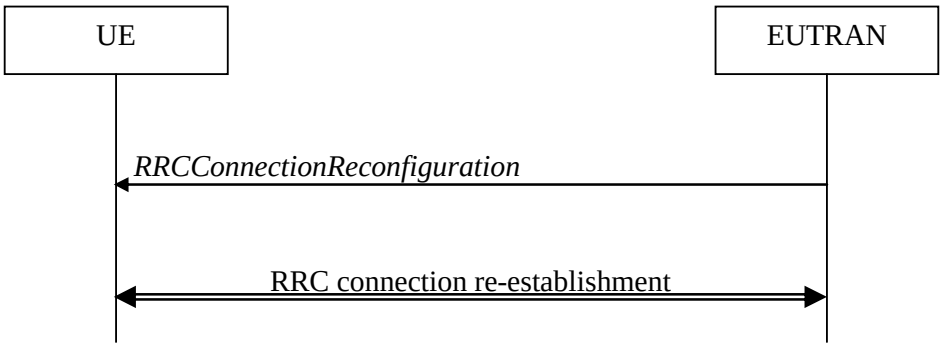


**Figure 5.3.5.1-2: RRC connection reconfiguration, failure**

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

### 5.3.5.2 Initiation

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

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

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

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

1> if this is the first *RRCConnectionReconfiguration* message after successful completion of the RRC Connection Re-establishment procedure:

2> re-establish PDCP for SRB2 and for all DRBs that are established, if any;

2> re-establish RLC for SRB2 and for all DRBs that are established, if any;

2> if the *RRCConnectionReconfiguration* message includes the *fullConfig*:

3> perform the radio configuration procedure as specified in section 5.3.5.8;

2> if the *RRCConnectionReconfiguration* message includes the *radioResourceConfigDedicated*:

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

2> resume SRB2 and all DRBs that are suspended, if any;

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

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

1> else:

2> if the *RRCConnectionReconfiguration* message includes the *radioResourceConfigDedicated*:

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

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

1> if the received *RRCConnectionReconfiguration* includes the *sCellToReleaseList*:

2> perform SCell release as specified in 5.3.10.3a;

1> if the received *RRCConnectionReconfiguration* includes the *sCellToAddModList*:

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

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

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

2> perform SCG reconfiguration as specified in 5.3.10.10;

1> if the received *RRCConnectionReconfiguration* includes the *systemInformationBlockType1Dedicated*:

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

1> if the *RRCConnectionReconfiguration* message includes the *dedicatedInfoNASList*:

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

1> if the *RRCConnectionReconfiguration* message includes the *measConfig*:

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

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

1> if the *RRCConnectionReconfiguration* message includes the *otherConfig*:

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

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

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

1> if the *RRCConnectionReconfiguration* message includes *wlan-OffloadInfo*:

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

1> 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*:

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

1> else:

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

1> store the *nextHopChainingCount* value;

1> if the *securityAlgorithmConfig* is included in the *securityConfigHO*:

2> derive the $K_{RRCint}$ key associated with the *integrityProtAlgorithm*, as specified in TS 33.401 [32];

2> if connected as an RN:

3> derive the $K_{UPint}$ key associated with the *integrityProtAlgorithm*, as specified in TS 33.401 [32];

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

1> else:

2> derive the $K_{RRCint}$ key associated with the current integrity algorithm, as specified in TS 33.401 [32];

2> if connected as an RN:

3> derive the $K_{UPint}$ key associated with the current integrity algorithm, as specified in TS 33.401 [32];

2> derive the $K_{RRCenc}$ key and the $K_{UPenc}$ key associated with the current ciphering algorithm, as specified in TS 33.401 [32];

1> configure lower layers to apply the integrity protection algorithm and the $K_{RRCint}$ key, i.e. the integrity protection configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

1> configure lower layers to apply the ciphering algorithm, the $K_{RRCenc}$ key and the $K_{UPenc}$ key, i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

1> if connected as an RN:

2> configure lower layers to apply the integrity protection algorithm and the $K_{UPint}$ key, for current or subsequently established DRBs that are configured to apply integrity protection, if any;

1> if the received *RRCConnectionReconfiguration* includes the *sCellToReleaseList*:

2> perform SCell release as specified in 5.3.10.3a;

1> if the received *RRCConnectionReconfiguration* includes the s*CellToAddModList*:

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

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

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

2> perform SCG reconfiguration as specified in 5.3.10.10;

1> if the received *RRCConnectionReconfiguration* includes the *systemInformationBlockType1Dedicated*:

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

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

1> if the *RRCConnectionReconfiguration* message includes the *measConfig*:

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

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

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

1> if the *RRCConnectionReconfiguration* message includes the *otherConfig*:

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

1> if the *RRCConnectionReconfiguration* message includes *wlan-OffloadInfo*:

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

1> set the content of *RRCConnectionReconfigurationComplete* message as follows:

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

3> include *rlf-InfoAvailable*;

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

3> include *logMeasAvailableMBSFN*;

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

3> include 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*:

3> include *connEstFailInfoAvailable*;

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

1> if MAC successfully completes the random access procedure:

2> stop timer T304;

2> apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PCell, if any;

2> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PCell (e.g. measurement gaps, periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PCell;

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

2> if the UE is configured to provide IDC indications:

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

4> initiate transmission of the *InDeviceCoexIndication* message in accordance with 5.6.9.3;

2> if the UE is configured to provide power preference indications:

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

4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.6.10.3;

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

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

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

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

4> 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.

### 5.3.5.5 Reconfiguration failure

The UE shall:

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

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

2> if security has not been activated:

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

2> else:

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

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

NOTE 2: If the UE is unable to comply with part of the configuration, it does not apply any part of the configuration, i.e. there is no partial success/ failure.

#### 5.3.5.6 T304 expiry (handover failure)

The UE shall:

1> if T304 expires (handover failure):

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

2> revert back to the configuration used in the source PCell, excluding the configuration configured by the *physicalConfigDedicated*, the *mac-MainConfig* and the *sps-Config*;

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

3> clear the information included in *VarRLF-Report*, if any;

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

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

4> if the UE includes *rsrqResult*, include the *lastServCellRSRQ-Type*;

3> set the *measResultNeighCells* to include the best measured cells, other than the source PCell, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected handover failure, and set its fields as follows;

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

4> if the UE includes *rsrqResult*, include the *rsrq-Type*;

4> if the UE was configured to perform measurement reporting for one or more neighbouring UTRA frequencies, include the *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 2: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Blacklisted cells are not required to be reported.

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

4> include the *locationCoordinates*;

4> include the *horizontalVelocity*, if available;

3> set the *failedPCellId* to the global cell identity, if available, and otherwise to the physical cell identity and carrier frequency of the target PCell of the failed handover;

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

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

3> set the *connectionFailureType* to '*hof*';

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

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

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

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

### 5.3.5.7 Void

### 5.3.5.7a T307 expiry (SCG change failure)

The UE shall:

1> if T307 expires:

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

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

### 5.3.5.8 Radio Configuration involving full configuration option

The UE shall:

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

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

1> if the *RRCConnectionReconfiguration* message includes the *mobilityControlInfo*:

2> release/ clear all current common radio configurations;

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

1> else:

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

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

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

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

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

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

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

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

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

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

2> release the PDCP entity;

2> release the RLC entity or entities;

2> release the DTCH logical channel;

2> release the *drb-identity*;

NOTE 3: This will retain the *eps-bearerIdentity* but remove the DRBs including *drb-identity* of these bearers from the current UE configuration and trigger the setup of the DRBs within the AS in Section 5.3.10.3 using the new configuration. The *eps-bearerIdentity* acts as the anchor for associating the released and re-setup DRB.

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

2> perform DRB release as specified in 5.3.10.2;

## 5.3.6 Counter check

### 5.3.6.1 General

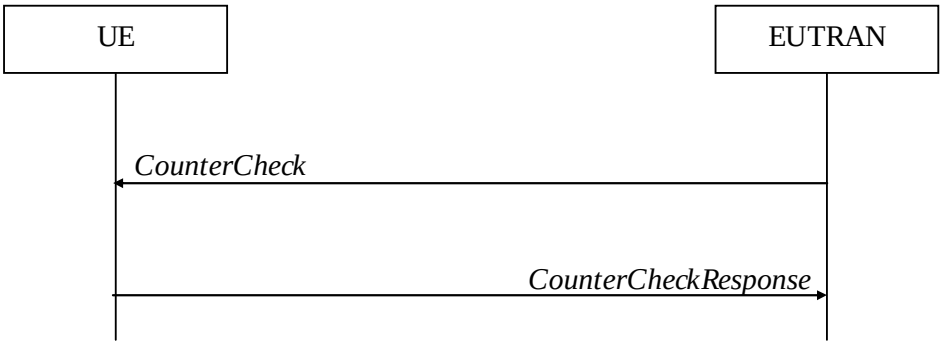


**Figure 5.3.6.1-1: Counter check procedure**

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

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

#### 5.3.6.2 Initiation

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

NOTE: E-UTRAN may initiate the procedure when any of the COUNT values reaches a specific value.

#### 5.3.6.3 Reception of the *CounterCheck* message by the UE

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

1> for each DRB that is established:

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

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

2> if the *drb-Identity* is not included in the *drb-CountMSB-InfoList*:

3> include the DRB in the *drb-CountInfoList* in the *CounterCheckResponse* message by including the *drb-Identity*, the *count-Uplink* and the *count-Downlink* set to the value of the corresponding COUNT;

2> else if, for at least one direction, the most significant bits of the COUNT are different from the value indicated in the *drb-CountMSB-InfoList*:

3> include the DRB in the *drb-CountInfoList* in the *CounterCheckResponse* message by including the *drb-Identity*, the *count-Uplink* and the *count-Downlink* set to the value of the corresponding COUNT;

1> for each DRB that is included in the *drb-CountMSB-InfoList* in the *CounterCheck* message that is not established:

2> include the DRB in the *drb-CountInfoList* in the *CounterCheckResponse* message by including the *drb-Identity*, the *count-Uplink* and the *count-Downlink* with the most significant bits set identical to the corresponding values in the *drb-CountMSB-InfoList* and the least significant bits set to zero;

1> submit the *CounterCheckResponse* message to lower layers for transmission upon which the procedure ends;

### 5.3.7 RRC connection re-establishment

#### 5.3.7.1 General

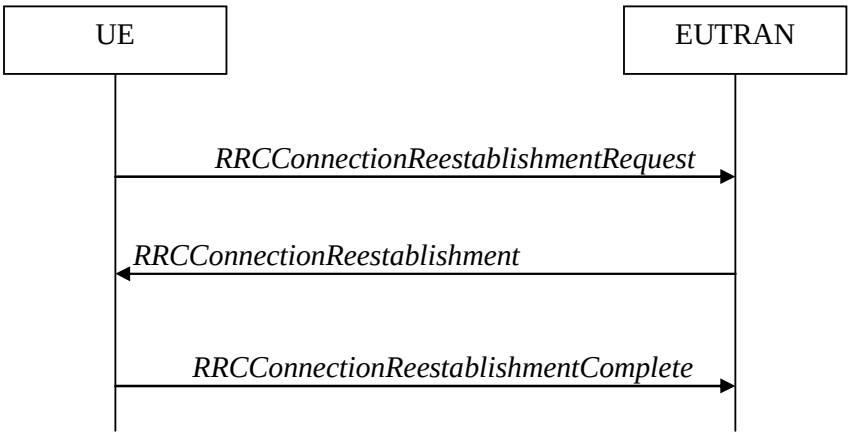


**Figure 5.3.7.1-1: RRC connection re-establishment, successful**

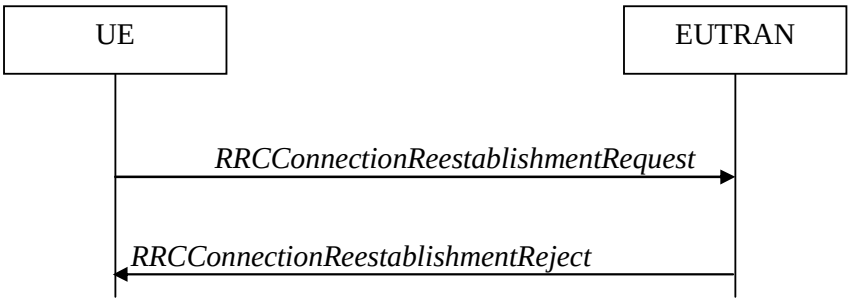


**Figure 5.3.7.1-2: RRC connection re-establishment, failure**

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

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

E-UTRAN applies the procedure as follows:

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

### 5.3.7.2 Initiation

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

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

1> upon handover failure, in accordance with 5.3.5.6; or

1> upon mobility from E-UTRA failure, in accordance with 5.4.3.5; or

1> upon integrity check failure indication from lower layers; or

1> upon an RRC connection reconfiguration failure, in accordance with 5.3.5.5;

Upon initiation of the procedure, the UE shall:

1> stop timer T310, if running;

1> stop timer T312, if running;

1> stop timer T313, if running;

1> stop timer T307, if running;

1> start timer T311;

1> suspend all RBs except SRB0;

1> reset MAC;

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

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

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

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

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

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

1> release *obtainLocationConfig*, if configured;

1> release *idc-Config*, if configured;

1> release *measSubframePatternPCell*, if configured;

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

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

1> if connected as an RN and configured with an RN subframe configuration:

2> release the RN subframe configuration;

1> perform cell selection in accordance with the cell selection process as specified in TS 36.304 [4];

### 5.3.7.3 Actions following cell selection while T311 is running

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

1> stop timer T311;

1> start timer T301;

1> apply the *timeAlignmentTimerCommon* included in *SystemInformationBlockType2*;

1> initiate transmission of the *RRCConnectionReestablishmentRequest* message in accordance with 5.3.7.4;

NOTE: This procedure applies also if the UE returns to the source PCell.

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

1> 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 $K_{eNB}$ key based on the $K_{ASME}$ key to which the current $K_{eNB}$ is associated, using the *nextHopChainingCount* value indicated in the *RRCConnectionReestablishment* message, as specified in TS 33.401 [32];

1> store the *nextHopChainingCount* value;

1> derive the $K_{RRCint}$ 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*:

3> include the *connEstFailInfoAvailable*;

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

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

1> submit the *RRCConnectionReestablishmentComplete* message to lower layers for transmission;

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

2> if the UE has transmitted an *MBMSInterestIndication* message during the last 1 second preceding detection of radio link failure:

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

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

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

1> if *SystemInformationBlockType18* is broadcast by the PCell; and the UE transmitted a *SidelinkUEInformation* message including *commRxInterestedFreq* or *commTxResourceReq* during the last 1 second preceding detection of radio link failure; or

1> if *SystemInformationBlockType19* is broadcast by the PCell; and the UE transmitted a *SidelinkUEInformation* message including *discRxInterest* or *discTxResourceReq* during the last 1 second preceding detection of radio link failure:

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

1> the procedure ends;

### 5.3.7.6 T311 expiry

Upon T311 expiry, the UE shall:

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

#### 5.3.7.7 T301 expiry or selected cell no longer suitable

The UE shall:

1> if timer T301 expires; or

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

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

#### 5.3.7.8 Reception of RRCConnectionReestablishmentReject by the UE

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

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

### 5.3.8 RRC connection release

#### 5.3.8.1 General

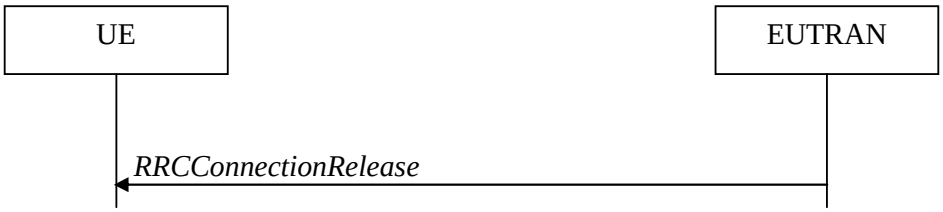


**Figure 5.3.8.1-1: RRC connection release, successful**

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 PSCell as specified in 5.3.10.13;

1> if the received *RadioResourceConfigDedicatedSCell-r10* includes the *naics-Info*:

2> perform NAICS neighbour cell information reconfiguration for the SCell as specified in 5.3.10.13;

### 5.3.10.1 SRB addition/ modification

The UE shall:

1> 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 single *radioResourceConfiguration* is not supported.

### 5.3.10.3a1 DC specific DRB addition or reconfiguration

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

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

2> if *drb-ToAddModList* is received and includes the *drb-Identity* value (i.e. add split DRB):

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

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

3> establish an SCG RLC entity and an SCG DTCH logical channel in accordance with the *rlc-ConfigSCG*, *logicalChannelIdentitySCG* and *logicalChannelConfigSCG* included in *drb-ToAddModListSCG*;

2> else (i.e. add SCG DRB):

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

3> establish an SCG RLC entity and an SCG DTCH logical channel in accordance with the *rlc-ConfigSCG*, *logicalChannelIdentitySCG* and *logicalChannelConfigSCG* included in *drb-ToAddModListSCG*;

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

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

2> if the DRB indicated by *drb-Identity* is a split DRB:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4> reconfigure the PDCP entity in accordance with the *pdcp-Config*, if included in *drb-ToAddModListSCG*;

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

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

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

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

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

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

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

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

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

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

### 5.3.10.3a SCell release

The UE shall:

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

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

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

4> release the SCell;

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

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

### 5.3.10.3b SCell addition/ modification

The UE shall:

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

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

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

2> for each *measId* included in the *measIdList* within *VarMeasConfig*:

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

3> if the concerned SCell is included in *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*:

4> remove the concerned SCell from *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*;

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

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

### 5.3.10.3c PSCell addition or modification

The UE shall:

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

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

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

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

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

### 5.3.10.4 MAC main reconfiguration

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 *cqi-ReportConfig-r10* is included in the received *physicalConfigDedicated* and the previous version of this field that was received by the UE was *cqi-ReportConfig* (without suffix i.e. the version defined in REL-8):

2> apply the default CQI reporting configuration as specified in 9.2.4;

NOTE: Application of the default configuration involves release of all extensions introduced in REL-9 and later.

1> reconfigure the physical channel configuration in accordance with the received *physicalConfigDedicated*;

1> if the *antennaInfo* is included and set to *explicitValue*:

2> if the configured *transmissionMode* is *tm1*, *tm2*, *tm5*, *tm6* or *tm7*; or

2> if the configured *transmissionMode* is *tm8* and *pmi-RI-Report* is not present; or

2> if the configured *transmissionMode* is *tm9* and *pmi-RI-Report* is not present; or

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

3> release *ri-ConfigIndex* in *cqi-ReportPeriodic*, if previously configured;

1> else if the *antennaInfo* is included and set to *defaultValue*:

2> release *ri-ConfigIndex* in *cqi-ReportPeriodic*, if previously configured;

### 5.3.10.7 Radio Link Failure Timers and Constants reconfiguration

The UE shall:

1> if the received *rlf-TimersAndConstants* is set to release:

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

1> else:

2> reconfigure the value of timers and constants in accordance with received *rlf-TimersAndConstants*;

1> if the received *rlf-TimersAndConstantsSCG* is set to release:

2> stop timer T313, if running, and

2> release the value of timer *t313* as well as constants *n313* and *n314*;

1> else:

2> reconfigure the value of timers and constants in accordance with received *rlf-TimersAndConstantsSCG*;

### 5.3.10.8 Time domain measurement resource restriction for serving cell

The UE shall:

1> if the received *measSubframePatternPCell* is set to *release*:

2> release the time domain measurement resource restriction for the PCell, if previously configured

1> else:

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

### 5.3.10.9 Other configuration

The UE shall:

1> if the received *otherConfig* includes the *reportProximityConfig*:

2> if *proximityIndicationEUTRA* is set to *enabled*:

3> 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;

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*, preceeding 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 PDCP and the SCG RLC entity;

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 PDCP and the MCG RLC entity;

3> configure lower layers to consider the 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> 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-$K_{eNB}$ key based on the $K_{eNB}$ 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 *pSCellToAddMod*:

3> perform PSCell addition or modification as specified in 5.3.10.3c;

2> if the received *scg-ConfigPartSCG* includes the *sCellToReleaseListSCG*:

3> perform SCell release for the SCG as specified in 5.3.10.3a;

2> if the received *scg-ConfigPartSCG* includes the *sCellToAddModListSCG*:

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

2> configure lower layers in accordance with *mobilityControlInfoSCG*, if received;

2> if the received *scg-ConfigPartSCG* includes the *mobilityControlInfoSCG* (i.e. SCG change):

3> resume all SCG DRBs and resume SCG transmission for split DRBs, if suspended;

3> stop timer T313, if running;

3> start timer T307 with the timer value set to *t307*, as included in the *mobilityControlInfoSCG*;

3> start synchronising to the DL of the target PSCell;

3> initiate the random access procedure on the PSCell, as specified in TS 36.321 [6]:

NOTE 1: The UE is not required to determine the SFN of the target PSCell by acquiring system information from that cell before performing RACH access in the target PSCell.

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

4> stop timer T307;

4> apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PSCell, if any;

4> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PSCell (e.g. periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PSCell;

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

### 5.3.10.11 SCG dedicated resource configuration

The UE shall:

1> if the received *radioResourceConfigDedicatedSCG* includes the *drb-ToAddModListSCG*:

2> for each *drb-Identity* value included in the *drb-ToAddModListSCG* perform the DC specific DRB addition or reconfiguration as specified in 5.3.10.3a1

1> if the received *radioResourceConfigDedicatedSCG* includes the *mac-MainConfigSCG*:

2> perform the SCG MAC main reconfiguration as specified in 5.3.10.4;

### 5.3.10.12 Reconfiguration SCG or split DRB by *drb-ToAddModList*

The UE shall:

1> for each split or SCG DRBs that is part of the current configuration:

2> if the corresponding *drb-Identity* value is included in the received *drb-ToAddModList; and*:

2> if the corresponding *drb-Identity* value is not included in the received *drb-ToAddModListSCG* (i.e. reconfigure split, split to MCG or SCG to MCG):

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

### 5.3.10.13 Neighbour cell information reconfiguration

The UE shall:

1> if the received *naics-Info* is set to *release*:

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

1> if the received *naics-Info* includes the *neighCellsToReleaseList-r12*:

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

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

1> if the received *naics-Info* includes the *NeighCellsToAddModList-r12*:

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

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

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

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

#### 5.3.10.14 Void

#### 5.3.10.15 Sidelink dedicated configuration

The UE shall:

1> if the *RRCConnectionReconfiguration* message includes the *sl-CommConfig*:

2> if *commTxResources* is included and set to *setup*:

3> from the next SC period use the resources indicated by *commTxResources* for sidelink direct communication transmission, as specified in 5.10.4;

2> else if *commTxResources* is included and set to *release*:

3> from the next SC period, release the resources allocated for sidelink direct communication transmission previously configured by *commTxResources*;

1> if the *RRCConnectionReconfiguration* message includes the *sl-DiscConfig*:

2> if *discTxResources* is included and set to *setup*:

3> from the next discovery period, as defined by *discPeriod*, use the resources indicated by *discTxResources* for sidelink direct discovery announcement, as specified in 5.10.6;

2> else if *discTxResources* is included and set to *release*:

3> from the next discovery period, as defined by *discPeriod*, release the resources allocated for sidelink direct discovery announcement previously configured by *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> enter RRC_IDLE and perform procedures as specified in TS 36.304 [4, 5.2.7];

2> if timer T350 is configured:

3> start timer T350;

2> else:

3> release the *wlan-OffloadConfigDedicated*;

## 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 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;

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

Upon receiving an SRS release request from lower layers, the UE shall:

1> apply the default physical channel configuration for *soundingRS-UL-ConfigDedicated*, as specified in 9.2.4, for the cells of the concerned TAG;

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

## 5.3.14 Proximity indication

### 5.3.14.1 General

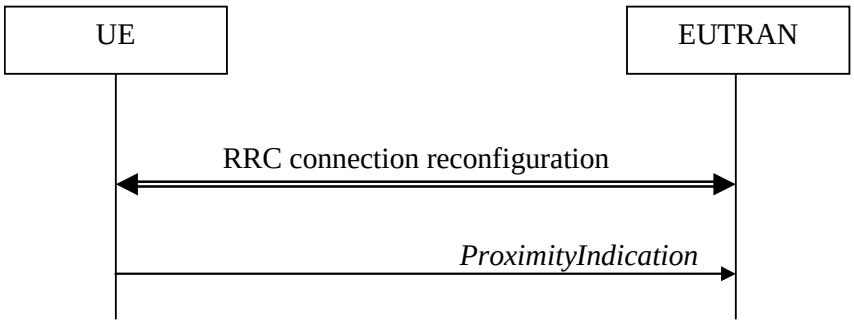


**Figure 5.3.14.1-1: Proximity indication**

The purpose of this procedure is to indicate that the UE is entering or leaving the proximity of one or more CSG member cells. The detection of proximity is based on an autonomous search function as defined in TS 36.304 [4].

### 5.3.14.2 Initiation

A UE in RRC_CONNECTED shall:

1> if the UE enters the proximity of one or more CSG member cell(s) on an E-UTRA frequency while proximity indication is enabled for such E-UTRA cells; or

1> if the UE enters the proximity of one or more CSG member cell(s) on an UTRA frequency while proximity indication is enabled for such UTRA cells; or

1> if the UE leaves the proximity of all CSG member cell(s) on an E-UTRA frequency while proximity indication is enabled for such E-UTRA cells; or

1> if the UE leaves the proximity of all CSG member cell(s) on an UTRA frequency while proximity indication is enabled for such UTRA cells:

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

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

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

### 5.3.14.3 Actions related to transmission of *ProximityIndication* message

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

1> if the UE applies the procedure to report entering the proximity of CSG member cell(s):

2> set *type* to *entering*;

1> else if the UE applies the procedure to report leaving the proximity of CSG member cell(s):

2> set *type* to *leaving*;

1> if the proximity indication was triggered for one or more CSG member cell(s) on an E-UTRA frequency:

2> set the *carrierFreq* to *eutra* with the value set to the E-ARFCN value of the E-UTRA cell(s) for which proximity indication was triggered;

1> else if the proximity indication was triggered for one or more CSG member cell(s) on a UTRA frequency:

2> set the *carrierFreq* to *utra* with the value set to the ARFCN value of the UTRA cell(s) for which proximity indication was triggered;

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

### 5.3.15 Void

## 5.4 Inter-RAT mobility

### 5.4.1 Introduction

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

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

### 5.4.2 Handover to E-UTRA

#### 5.4.2.1 General

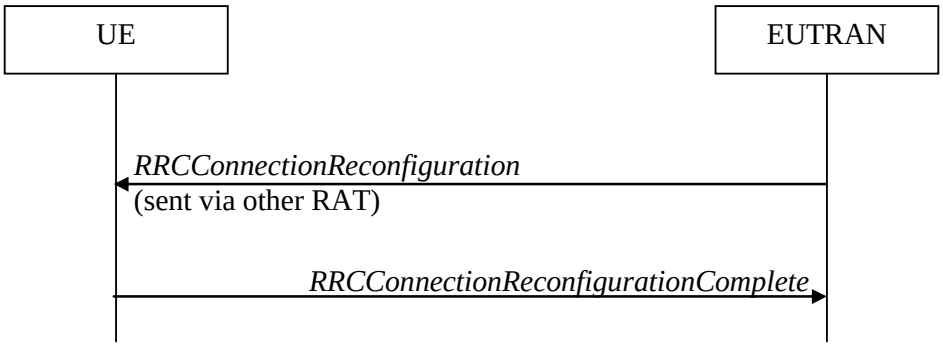


**Figure 5.4.2.1-1: Handover to E-UTRA, successful**

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

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

#### 5.4.2.2 Initiation

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

E-UTRAN applies the procedure as follows:

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

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

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

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

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

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

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

1> consider the target PCell to be one on the frequency indicated by the *carrierFreq* with a physical cell identity indicated by the *targetPhysCellId*;

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

1> set the C-RNTI to the value of the *newUE-Identity*;

1> for the target PCell, apply the downlink bandwidth indicated by the *dl-Bandwidth;*

1> for the target PCell, apply the uplink bandwidth indicated by (the absence or presence of) the *ul-Bandwidth;*

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

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

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

1> forward the *nas-SecurityParamToEUTRA* to the upper layers;

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

1> derive the $K_{RRCint}$ key associated with the *integrityProtAlgorithm*, as specified in TS 33.401 [32];

1> derive the $K_{RRCenc}$ key and the $K_{UPenc}$ 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 $K_{RRCint}$ 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 $K_{RRCenc}$ key and the $K_{UPenc}$ key immediately, i.e. the indicated ciphering configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

1> if the received *RRCConnectionReconfiguration* includes the s*CellToAddModList*:

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 *RRCConnectionReconfiguration* message includes the *otherConfig*:

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

1> if the *RRCConnectionReconfiguration* message includes *wlan-OffloadInfo*:

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

1> set the content of *RRCConnectionReconfigurationComplete* message as follows:

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

3> include *rlf-InfoAvailable*;

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

3> include *logMeasAvailableMBSFN*;

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

3> include 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*:

3> include *connEstFailInfoAvailable*;

1> submit the *RRCConnectionReconfigurationComplete* message to lower layers for transmission using the new configuration;

1> if the *RRCConnectionReconfiguration* message does not include *rlf-TimersAndConstants* set to *setup*:

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

1> if MAC successfully completes the random access procedure:

2> stop timer T304;

2> apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PCell, if any;

2> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PCell (e.g. measurement gaps, periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PCell;

NOTE 1: Whenever the UE shall setup or reconfigure a configuration in accordance with a field that is received it applies the new configuration, except for the cases addressed by the above statements.

2> enter E-UTRA RRC_CONNECTED, upon which the procedure ends;

NOTE 2: The UE is not required to determine the SFN of the target PCell by acquiring system information from that cell before performing RACH access in the target PCell.

#### 5.4.2.4 Reconfiguration failure

The UE shall:

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

2> perform the actions defined for this failure case as defined in the specifications applicable for the other RAT;

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

NOTE 2: If the UE is unable to comply with part of the configuration, it does not apply any part of the configuration, i.e. there is no partial success/ failure.

#### 5.4.2.5 T304 expiry (handover to E-UTRA failure)

The UE shall:

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

2> reset MAC;

2> perform the actions defined for this failure case as defined in the specifications applicable for the other RAT;

## 5.4.3 Mobility from E-UTRA

### 5.4.3.1 General


**Figure 5.4.3.1-1: Mobility from E-UTRA, successful**

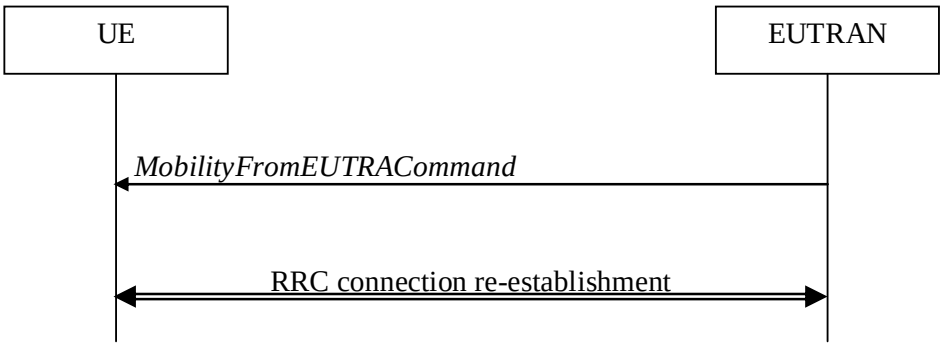


**Figure 5.4.3.1-2: Mobility from E-UTRA, failure**

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*;

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

NOTE: For enhanced CS fallback to CDMA2000 1xRTT, the above UE behavior applies only when the UE is attempting the enhanced 1xRTT CS fallback and connection to the target radio access technology fails or if the UE is attempting enhanced 1xRTT CS fallback along with concurrent mobility to CDMA2000 HRPD and connection to both the target radio access technologies fails.

## 5.4.4 Handover from E-UTRA preparation request (CDMA2000)

### 5.4.4.1 General

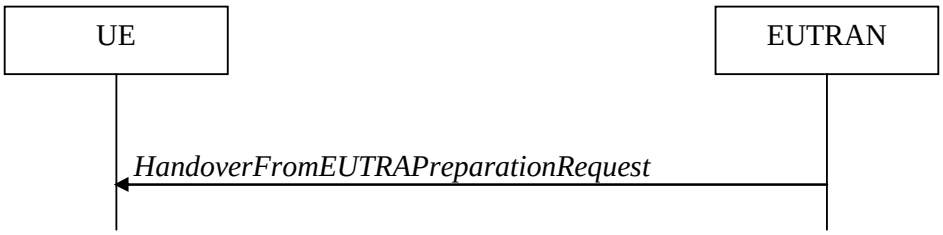


**Figure 5.4.4.1-1: Handover from E-UTRA preparation request**

The purpose of this procedure is to trigger the UE to prepare for handover or enhanced 1xRTT CS fallback to CDMA2000 by requesting a connection with this network. The UE may use this procedure to concurrently prepare for handover to CDMA2000 HRPD along with preparation for enhanced CS fallback to CDMA2000 1xRTT. This procedure applies to CDMA2000 capable UEs only.

This procedure is also used to trigger the UE which supports dual Rx/Tx enhanced 1xCSFB to redirect its second radio to CDMA2000 1xRTT.

The handover from E-UTRA preparation request procedure applies when signalling radio bearers are established.

### 5.4.4.2 Initiation

E-UTRAN initiates the handover from E-UTRA preparation request procedure to a UE in RRC_CONNECTED, possibly in response to a *MeasurementReport* message or CS fallback indication for the UE, by sending a *HandoverFromEUTRAPreparationRequest* message. E-UTRA initiates the procedure only when AS security has been activated.

### 5.4.4.3 Reception of the *HandoverFromEUTRAPreparationRequest* by the UE

Upon reception of the *HandoverFromEUTRAPreparationRequest* message, the UE shall:

1> if *dualRxTxRedirectIndicator* is present in the received message:

2> forward *dualRxTxRedirectIndicator* to the CDMA2000 upper layers;

2> forward *redirectCarrierCDMA2000-1XRTT* to the CDMA2000 upper layers, if included;

1> else:

2> indicate the request to prepare handover or enhanced 1xRTT CS fallback and forward the *cdma2000-Type* to the CDMA2000 upper layers;

2> if *cdma2000-Type* is set to *type1XRTT*:

3> forward the *rand* and the *mobilityParameters* to the CDMA2000 upper layers;

2> if *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


**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 and A6.

NOTE 2: When performed during re-establishment, the UE is only configured with a primary frequency (i.e. the SCell(s) are released, if configured).

#### 5.5.2.3 Measurement identity addition/ modification

E-UTRAN applies the procedure as follows:

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

The UE shall:

1> for each *measId* included in the received *measIdToAddModList*:

2> if an entry with the matching *measId* exists in the *measIdList* within the *VarMeasConfig*:

3> replace the entry with the value received for this *measId*;

2> else:

3> add a new entry for this *measId* within the *VarMeasConfig*;

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

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

2> if the *triggerType* is set to *periodical* and the *purpose* is set to *reportCGI* in the *reportConfig* associated with this *measId*:

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

4> if the *si-RequestForHO* is included in the *reportConfig* associated with this *measId*:

5> start timer T321 with the timer value set to 150 ms for this *measId*;

4> else:

5> start timer T321 with the timer value set to 1 second for this *measId*;

3> else if the *measObject* associated with this *measId* concerns UTRA:

4> if the *si-RequestForHO* is included in the *reportConfig* associated with this *measId*:

5> for UTRA FDD, start timer T321 with the timer value set to 2 seconds for this *measId*;

5> for UTRA TDD, start timer T321 with the timer value set to [1 second] for this *measId*;

4> else:

5> start timer T321 with the timer value set to 8 seconds for this *measId*;

3> else:

4> start timer T321 with the timer value set to 8 seconds for this *measId*;

#### 5.5.2.4 Measurement object removal

The UE shall:

1> for each *measObjectId* included in the received *measObjectToRemoveList* that is part of the current UE configuration in *VarMeasConfig*:

2> remove the entry with the matching *measObjectId* from the *measObjectList* within the *VarMeasConfig*;

2> remove all *measId* associated with this *measObjectId* from the *measIdList* within the *VarMeasConfig*, if any;

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

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

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

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

#### 5.5.2.5 Measurement object addition/ modification

The UE shall:

1> for each *measObjectId* included in the received *measObjectToAddModList*:

2> if an entry with the matching *measObjectId* exists in the *measObjectList* within the *VarMeasConfig*, for this entry:

3> 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*:

6> for each *measCSI-RS-Id* included in the *measCSI-RS-ToRemoveList*:

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

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

6> if an entry with the matching *measCSI-RS-Id* exists in the *measCSI-RS-ToAddModList*:

7> replace the entry with the value received for this *measCSI-RS-Id*;

6> else:

7> add a new entry for the received *measCSI-RS-Id* to the *measCSI-RS-ToAddModList*;

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

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

4> else:

5> release the discovery signals measurement configuration;

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

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

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

2> else:

3> 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:

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

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

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

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

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

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

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

### 5.5.2.7 Reporting configuration addition/ modification

The UE shall:

1> for each *reportConfigId* included in the received *reportConfigToAddModList*:

2> if an entry with the matching *reportConfigId* exists in the *reportConfigList* within the *VarMeasConfig*, for this entry:

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

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

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

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

2> else:

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

#### 5.5.2.8 Quantity configuration

The UE shall:

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

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

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

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

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

#### 5.5.2.9 Measurement gap configuration

The UE shall:

1> if *measGapConfig* is set to *setup*:

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

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

SFN mod $T$ = FLOOR(*gapOffset*/10);

subframe = *gapOffset* mod 10;

with $T$ = 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:

SFN mod $T$ = FLOOR(*dmtc-Offset*/10);

subframe = *dmtc-Offset* mod 10;

with $T$ = *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

The UE shall:

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

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

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

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

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

2> else:

3> if the corresponding *measObject* concerns E-UTRA:

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

5> consider only the PCell to be applicable;

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

5> consider only the serving cell to be applicable;

4> else if *eventC1* or *eventC2* is configured in the corresponding *reportConfig*; or if *reportStrongestCSI-RSs* is included in the corresponding *reportConfig*:

5> consider a CSI-RS resource on the associated frequency to be applicable when the concerned CSI-RS resource is included in the *measCSI-RS-ToAddModList* defined within the *VarMeasConfig* for this *measId*;

4> else:

5> consider any neighbouring cell detected on the associated frequency to be applicable when the concerned cell is not included in the *blackCellsToAddModList* defined within the *VarMeasConfig* for this *measId*;

5> 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;

4> if the corresponding *reportConfig* includes *alternativeTimeToTrigger* and if the UE supports *alternativeTimeToTrigger*:

5> use the value of *alternativeTimeToTrigger* as the time to trigger instead of the value of *timeToTrigger* in the corresponding *reportConfig* for cells included in the *altTTT-CellsToAddModList* of the corresponding *measObject*;

3> else if the corresponding *measObject* concerns UTRA or CDMA2000:

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

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

3> else if the corresponding *measObject* concerns GERAN:

4> consider a neighbouring cell on the associated set of frequencies to be applicable when the concerned cell matches the *ncc-Permitted* defined within the *VarMeasConfig* for this *measId*;

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

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

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

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

3> if the UE supports T312 and if *useT312* is included for this event and if T310 is running:

4> if T312 is not running:

5> start timer T312 with the value configured in the corresponding *measObject*;

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

2> if the *triggerType* is set to *event* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable cells not included in the *cellsTriggeredList* for all measurements after layer 3 filtering taken during *timeToTrigger* defined for this event within the *VarMeasConfig* (a subsequent cell triggers the event):

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

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

3> if the UE supports T312 and if *useT312* is included for this event and if T310 is running:

4> if T312 is not running:

5> start timer T312 with the value configured in the corresponding *measObject*;

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

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

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

3> if the UE supports T312 and if *useT312* is included for this event and if T310 is running:

4> if T312 is not running:

5> start timer T312 with the value configured in the corresponding *measObject*;

3> if *reportOnLeave* is set to *TRUE* for the corresponding reporting configuration or if *a6-ReportOnLeave* is set to *TRUE* for the corresponding reporting configuration:

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

3> if the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId* is empty:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2> if 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)

$$Ms - Hys > Thresh$$

Inequality A1-2 (Leaving condition)

$$Ms + Hys < Thresh$$

The variables in the formula are defined as follows:

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

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

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

***Ms*** is expressed in dBm in case of RSRP, or in dB in case of RSRQ.

***Hys is*** expressed in dB.

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

### 5.5.4.3 Event A2 (Serving becomes worse than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A2-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A2-2, as specified below, is fulfilled;

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

Inequality A2-1 (Entering condition)

$$Ms + Hys < Thresh$$

Inequality A2-2 (Leaving condition)

$$Ms - Hys > Thresh$$

The variables in the formula are defined as follows:

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

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

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

***Ms*** is expressed in dBm in case of RSRP, or in dB in case of RSRQ.

***Hys*** is expressed in dB.

***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;

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

1> if *usePSCell* of the corresponding *reportConfig* is set to *true*:

2> use the PSCell for *Mp, Ofp and Ocp*;

1> else:

2> 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;

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

Inequality A4-1 (Entering condition)

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

Inequality A4-2 (Leaving condition)

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

The variables in the formula are defined as follows:

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

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

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

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

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

***Mn*** is expressed in dBm in case of RSRP, or in dB in case of RSRQ.

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

***Thresh*** is expressed in the same unit as ***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;

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

1> if *usePSCell* of the corresponding *reportConfig* is set to *true*:

2> use the PSCell for *Mp*;

1> else:

2> 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)

$$Mp + Hys < Thresh1$$

Inequality A5-2 (Entering condition 2)

$$Mn + Ofn + Ocn - Hys > Thresh2$$

Inequality A5-3 (Leaving condition 1)

$$Mp - Hys > Thresh1$$

Inequality A5-4 (Leaving condition 2)

$$Mn + Ofn + Ocn + Hys < Thresh2$$

The variables in the formula are defined as follows:

***Mp*** is the measurement result of the 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)

$$Mn + Ocn - Hys > Ms + Ocs + Off$$

Inequality A6-2 (Leaving condition)

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

The variables in the formula are defined as follows:

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

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

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

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

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

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

***Mn, Ms*** are expressed in dBm in case of RSRP, or in dB in case of RSRQ.

***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)

$Mcr + Ocr - Hys > Thresh$

Inequality C1-2 (Leaving condition)

$Mcr + Ocr + Hys < Thresh$

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)

$Mcr + Ocr - Hys > Mref + Oref + Off$

Inequality C2-2 (Leaving condition)

$Mcr + Ocr + Hys < Mref + Oref + Off$

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 of the CSI-RS resource (i.e. *csi-RS-IndividualOffset* as defined within *measObjectEUTRA* corresponding to the frequency of the CSI-RS resource), and set to zero if not configured for the CSI-RS resource.

***Mref*** is the measurement result of the reference CSI-RS resource (i.e. *c2-RefCSI-RS* as defined within *reportConfigEUTRA* for this event), not taking into account any offsets.

***Oref*** is the CSI-RS specific offset of the reference CSI-RS resource (i.e. *csi-RS-IndividualOffset* as defined within *measObjectEUTRA* corresponding to the frequency of the reference CSI-RS resource), and is set to zero if not configured for the reference CSI-RS resource.

***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. *c2-Offset* as defined within *reportConfigEUTRA* for this event).

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

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

### 5.5.5 Measurement reporting

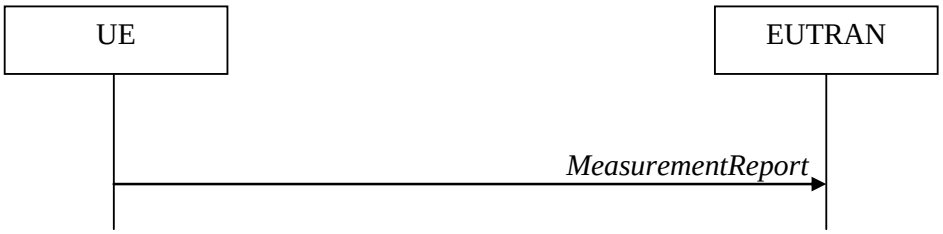


**Figure 5.5.5-1: Measurement reporting**

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

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

1> set the *measId* to the measurement identity that triggered the measurement reporting;

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

1> set the *measResultServFreqList* to include for each SCell that is configured, if any, within *measResultSCell* the quantities of the concerned SCell, if available according to performance requirements in [16];

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

2> for each serving frequency for which *measObjectId* is referenced in the *measIdList*, other than the frequency corresponding with the *measId* that triggered the measurement reporting:

3> set the *measResultServFreqList* to include within *measResultBestNeighCell* the *physCellId* and the quantities of the best non-serving cell, based on RSRP, on the concerned serving frequency;

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

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

3> if the *triggerType* is set to *event*:

4> include the cells included in the *cellsTriggeredList* as defined within the *VarMeasReportList* for this *measId*;

3> else:

4> include the applicable cells for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;

NOTE 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 that have been successfully acquired and in accordance with the following:

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

a) equal to the RPLMN or an EPLMN; and

b) the CSG whitelist of the UE includes an entry comprising of the concerned PLMN identity and the CSG identity broadcast by the cell;

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

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

5> else:

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

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

1> 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];

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

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

3> if the *triggerType* is set to *event*:

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

3> else:

4> 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].

3> for each CSI-RS resource that is included in the *measResultCSI-RS-List*:

4> include the *measCSI-RS-Id*;

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

5> 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;

4> 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:

5> 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 *timeToTrigger* value multiplied by *sf-Medium* within *VarMeasConfig*;

1> else:

2> no scaling is applied;

### 5.5.7 Inter-frequency RSTD measurement indication

#### 5.5.7.1 General

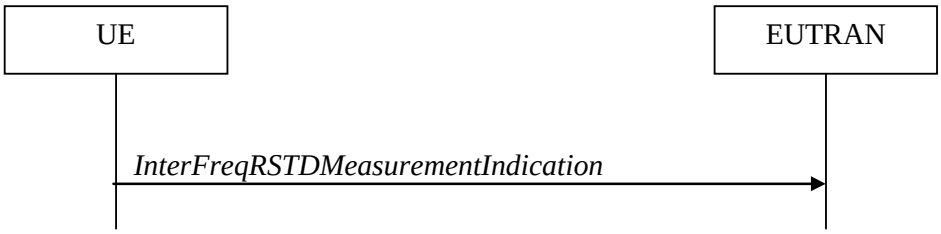


**Figure 5.5.7.1-1: Inter-frequency RSTD measurement indication**

The purpose of this procedure is to indicate to the network that the UE is going to start/stop OTDOA inter-frequency RSTD measurements which require measurement gaps as specified in [16, 8.1.2.6].

NOTE: It is a network decision to configure the measurement gap.

#### 5.5.7.2 Initiation

The UE shall:

1> if and only if upper layers indicate to start performing inter-frequency RSTD measurements and the UE requires measurement gaps for these measurements while measurement gaps are either not configured or not sufficient:

2> initiate the procedure to indicate start;

NOTE 1: The UE verifies the measurement gap situation only upon receiving the indication from upper layers. If at this point in time sufficient gaps are available, the UE does not initiate the procedure. Unless it receives a new indication from upper layers, the UE is only allowed to further repeat the procedure in the same PCell once per frequency if the provided measurement gaps are insufficient.

1> if and only if upper layers indicate to stop performing inter-frequency RSTD measurements:

2> initiate the procedure to indicate stop;

NOTE 2: The UE may initiate the procedure to indicate stop even if it did not previously initiate the procedure to indicate start.

#### 5.5.7.3 Actions related to transmission of *InterFreqRSTDMeasurementIndication* message

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

1> set the *rstd-InterFreqIndication* as follows:

2> if the procedure is initiated to indicate start of inter-frequency RSTD measurements:

3> set the *rstd-InterFreqInfoList* according to the information received from upper layers;

2> else if the procedure is initiated to indicate stop of inter-frequency RSTD measurements:

3> set the *rstd-InterFreqIndication* to the value *stop*;

1> submit the *InterFreqRSTDMeasurementIndication* message to lower layers for transmission, upon which the procedure ends;

## 5.6 Other

### 5.6.1 DL information transfer

#### 5.6.1.1 General

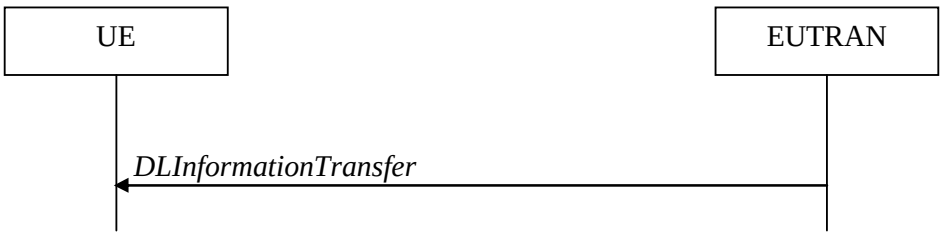


**Figure 5.6.1.1-1: DL information transfer**

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

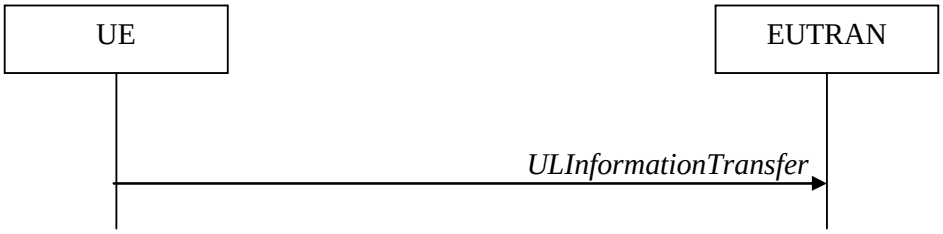


**Figure 5.6.2.1-1: UL information transfer**

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 Initiation

A UE in RRC_CONNECTED initiates the UL information transfer procedure whenever there is a need to transfer NAS or non-3GPP dedicated information, except at RRC connection establishment in which case the NAS information is piggybacked to the *RRCConnectionSetupComplete* message. The UE initiates the UL information transfer procedure by sending the *ULInformationTransfer* message. When CDMA2000 information has to be transferred, the UE shall initiate the procedure only if SRB2 is established.

#### 5.6.2.3 Actions related to transmission of *ULInformationTransfer* message

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

1> if there is a need to transfer NAS information:

2> set the *dedicatedInfoType* to include the *dedicatedInfoNAS*;

1> if there is a need to transfer CDMA2000 1XRTT information:

2> set the *dedicatedInfoType* to include the *dedicatedInfoCDMA2000-1XRTT*;

1> if there is a need to transfer CDMA2000 HRPD information:

2> set the *dedicatedInfoType* to include the *dedicatedInfoCDMA2000-HRPD*;

1> submit the *ULInformationTransfer* message to lower layers for transmission, upon which the procedure ends;

#### 5.6.2.4 Failure to deliver *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

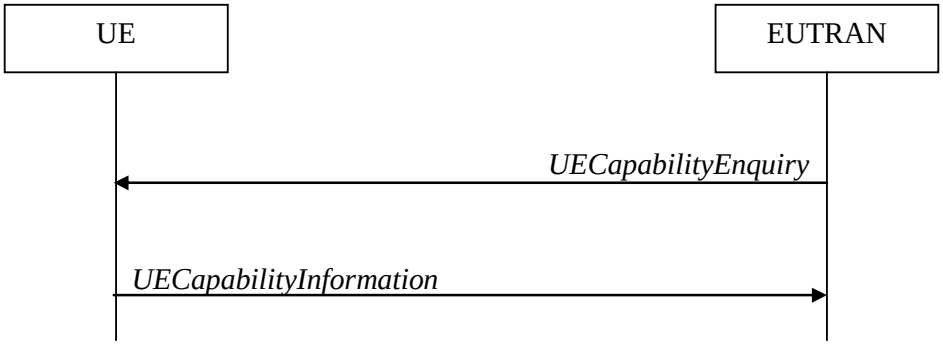


**Figure 5.6.3.1-1: UE capability transfer**

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 *eutra*:

3> include the *UE-EUTRA-Capability* within a *ue-CapabilityRAT-Container* and with the *rat-Type* set to *eutra*;

3> if the UE supports FDD and TDD:

4> set all fields of *UECapabilityInformation*, except field *fdd-Add-UE-EUTRA-Capabilities* and *tdd-Add-UE-EUTRA-Capabilities* (including their sub-fields), to include the values applicable for both FDD and TDD (i.e. functionality supported by both modes);

4> if (some of) the UE capability fields have a different value for FDD and TDD:

5> if for FDD, the UE supports additional functionality compared to what is indicated by the previous fields of *UECapabilityInformation*:

6> include field *fdd-Add-UE-EUTRA-Capabilities* and set it to include fields reflecting the additional functionality applicable for FDD;

5> if for TDD, the UE supports additional functionality compared to what is indicated by the previous fields of *UECapabilityInformation*:

6> include field *tdd-Add-UE-EUTRA-Capabilities* and set it to include fields reflecting the additional functionality applicable for TDD;

NOTE: 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 *UECapabilityInformation* message to lower layers for transmission, upon which the procedure ends;

## 5.6.4 CSFB to 1x Parameter transfer

### 5.6.4.1 General

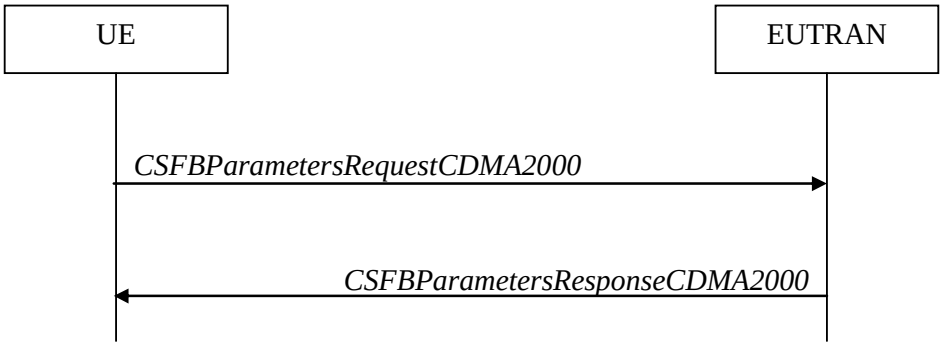


**Figure 5.6.4.1-1: CSFB to 1x Parameter transfer**

The purpose of this procedure is to transfer the CDMA2000 1xRTT parameters required to register the UE in the CDMA2000 1xRTT network for CSFB support.

#### 5.6.4.2 Initiation

A UE in RRC_CONNECTED initiates the CSFB to 1x Parameter transfer procedure upon request from the CDMA2000 upper layers. The UE initiates the CSFB to 1x Parameter transfer procedure by sending the *CSFBParametersRequestCDMA2000* message.

#### 5.6.4.3 Actions related to transmission of *CSFBParametersRequestCDMA2000* message

The UE shall:

1> submit the *CSFBParametersRequestCDMA2000* message to lower layers for transmission using the current configuration;

#### 5.6.4.4 Reception of the *CSFBParametersResponseCDMA2000* message

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

1> forward the *rand* and the *mobilityParameters* to the CDMA2000 1xRTT upper layers;

### 5.6.5 UE Information

#### 5.6.5.1 General

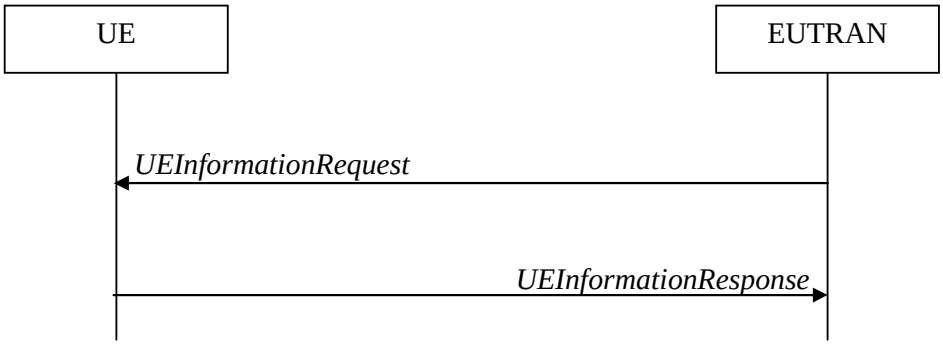


**Figure 5.6.5.1-1: UE information procedure**

The UE information procedure is used by E-UTRAN to request the UE to report information.

#### 5.6.5.2 Initiation

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

#### 5.6.5.3 Reception of the *UEInformationRequest* message

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

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*;

2> discard the *connEstFailReport* from *VarConnEstFailReport* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;

1> if the *logMeasReportReq* is present and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:

2> if *VarLogMeasReport* includes one or more logged measurement entries, set the contents of the *logMeasReport* in the *UEInformationResponse* message as follows:

3> include the *absoluteTimeStamp* and set it to the value of *absoluteTimeInfo* in the *VarLogMeasReport*;

3> include the *traceReference* and set it to the value of *traceReference* in the *VarLogMeasReport*;

3> include the *traceRecordingSessionRef* and set it to the value of *traceRecordingSessionRef* in the *VarLogMeasReport;*

3> include the *tce-Id* and set it to the value of *tce-Id* in the *VarLogMeasReport*;

3> include the *logMeasInfoList* and set it to include one or more entries from *VarLogMeasReport* starting from the entries logged first;

3> if the *VarLogMeasReport* includes one or more additional logged measurement entries that are not included in the *logMeasInfoList* within the *UEInformationResponse* message:

4> include the *logMeasAvailable*;

1> if *mobilityHistoryReportReq* is set to *true*:

2> include the *mobilityHistoryReport* and set it to include entries from *VarMobilityHistoryReport*;

2> include in the *mobilityHistoryReport* an entry for the current cell, possibly after removing the oldest entry if required, and set its fields as follows:

3> set *visitedCellId* to the global cell identity of the current cell:

3> set field *timeSpent* to the time spent in the current cell;

1> if the *logMeasReport* is included in the *UEInformationResponse*:

2> submit the *UEInformationResponse* message to lower layers for transmission via SRB2;

2> discard the logged measurement entries included in the *logMeasInfoList* from *VarLogMeasReport* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;

1> else:

2> submit the *UEInformationResponse* message to lower layers for transmission via SRB1;

## 5.6.6 Logged Measurement Configuration

### 5.6.6.1 General

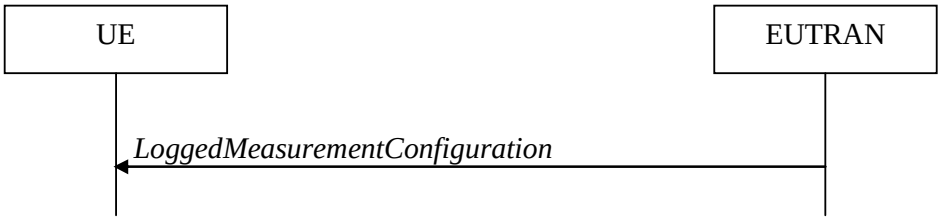


**Figure 5.6.6.1-1: Logged measurement configuration**

The purpose of this procedure is to configure the UE to perform logging of measurement results while in RRC_IDLE and to perform logging of measurement results for MBSFN in both RRC_IDLE and RRC_CONNECTED. The procedure applies to logged measurements capable UEs that are in RRC_CONNECTED.

NOTE E-UTRAN may retrieve stored logged measurement information by means of the UE Information procedure.

### 5.6.6.2 Initiation

E-UTRAN initiates the logged measurement configuration procedure to UE in RRC_CONNECTED by sending the *LoggedMeasurementConfiguration* message.

### 5.6.6.3 Reception of the *LoggedMeasurementConfiguration* by the UE

Upon receiving the *LoggedMeasurementConfiguration* message the UE shall:

1> discard the logged measurement configuration as well as the logged measurement information as specified in 5.6.7;

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

1> if the *LoggedMeasurementConfiguration* message includes *plmn-IdentityList*:

2> set *plmn-IdentityList* in *VarLogMeasReport* to include the RPLMN as well as the PLMNs included in *plmn-IdentityList*;

1> else:

2> set *plmn-IdentityList* in *VarLogMeasReport* to include the RPLMN;

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

1> store the received *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*;

2> 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 availble,

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 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 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 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 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

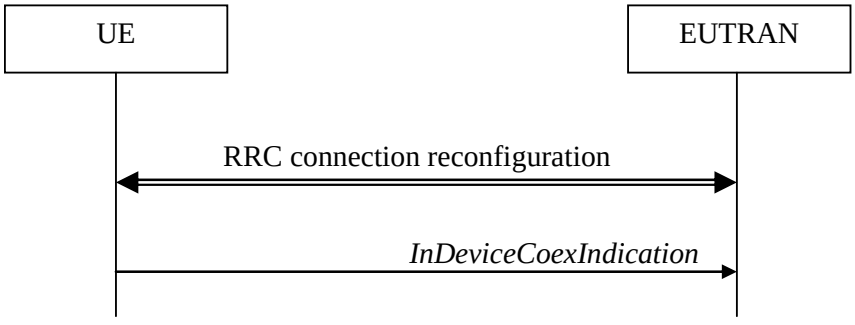


**Figure 5.6.9.1-1: In-device coexistence indication**

The purpose of this procedure is to inform E-UTRAN about (a change of) the In-Device Coexistence (IDC) problems experienced by the UE in RRC_CONNECTED, as described in TS 36.300 [9], and to provide the E-UTRAN with information in order to resolve them.

### 5.6.9.2 Initiation

A UE capable of providing IDC indications may initiate the procedure when it is configured to provide IDC indications and upon change of IDC problem information.

Upon initiating the procedure, the UE shall:

1> if configured to provide IDC indications:

2> if the UE did not transmit an *InDeviceCoexIndication* message since it was configured to provide IDC indications:

3> if on one or more frequencies for which a *measObjectEUTRA* is configured, the UE is experiencing IDC problems that it cannot solve by itself:

4> initiate transmission of the *InDeviceCoexIndication* message in accordance with 5.6.9.3;

2> else:

3> if the set of frequencies, for which a *measObjectEUTRA* is configured and on which the UE is experiencing IDC problems that it cannot solve by itself, is different from the set indicated in the last transmitted *InDeviceCoexIndication* message; or

3> if for one or more of the frequencies in the previously reported set of frequencies, the *interferenceDirection* is different from the value indicated in the last transmitted *InDeviceCoexIndication* message; or

3> if the TDM assistance information is different from the assistance information included in the last transmitted *InDeviceCoexIndication* message:

4> initiate transmission of the *InDeviceCoexIndication* message in accordance with 5.6.9.3;

### 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;

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).

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

## 5.6.10 UE Assistance Information

### 5.6.10.1 General

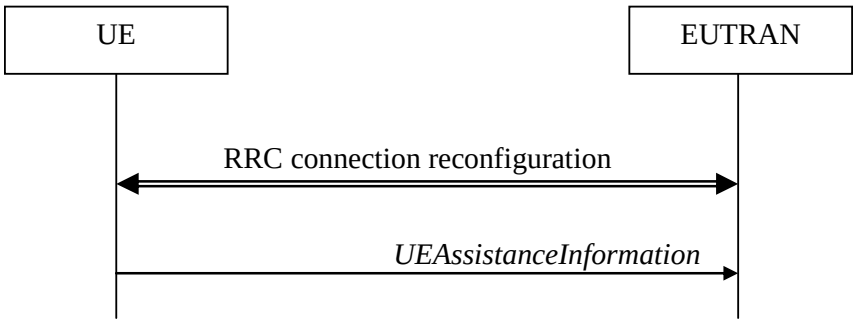


**Figure 5.6.10.1-1: UE Assistance Information**

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 explictly indicates otherwise.

### 5.6.10.2 Initiation

A UE capable of providing power preference indications in RRC_CONNECTED may initiate the procedure in several cases including upon being configured to provide power preference indications and upon change of power preference.

Upon initiating the procedure, the UE shall:

1> if configured to provide power preference indications:

2> if the UE did not transmit a *UEAssistanceInformation* message since it was configured to provide power preference indications; or

2> if the current power preference is different from the one indicated in the last transmission of the *UEAssistanceInformation* message and timer T340 is not running:

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.6.10.3;

### 5.6.10.3 Actions related to transmission of *UEAssistanceInformation* message

The UE shall set the contents of the *UEAssistanceInformation* message:

1> if the UE prefers a configuration primarily optimised for power saving:

2> set *powerPrefIndication* to *lowPowerConsumption*;

1> else:

2> start or restart timer T340 with the timer value set to the *powerPrefIndicationTimer*;

2> set *powerPrefIndication* to *normal*;

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

## 5.6.11 Mobility history information

### 5.6.11.1 General

This procedure specifies how the mobility history information is stored by the UE, covering RRC_CONNECTED and RRC_IDLE.

### 5.6.11.2 Initiation

If the UE supports storage of mobility history information, the UE shall:

1> Upon change of cell, consisting of PCell in RRC_CONNECTED or serving cell in RRC_IDLE, to another E-UTRA or inter-RAT cell or when entering out of service:

2> include an entry in variable *VarMobilityHistoryReport* possibly after removing the oldest entry, if necessary, according to following*:*

3> if the global cell identity of the previous PCell/ serving cell is available:

4> include the global cell identity of that cell in the field *visitedCellId* of the entry;

3> else:

4> include the physical cell identity and carrier frequency of that cell in the field *visitedCellId* of the entry;

3> set the field *timeSpent* of the entry as the time spent in the previous PCell/ serving cell;

1> upon entering E-UTRA (in RRC_CONNECTED or RRC_IDLE) while previously out of service and/ or using another RAT:

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*;

2> if the *wlan-OffloadConfigCommon* corresponding to the RPLMN is broadcast by the cell:

3> apply the *wlan-OffloadConfigCommon* corresponding to the RPLMN included in *SystemInformationBlockType17*;

1> else:

2> apply the received *wlan-OffloadConfigDedicated*:

### 5.6.12.3 WLAN offload RAN evaluation

The UE shall:

1> if the UE is configured with either *wlan-OffloadConfigCommon* or *wlan-OffloadConfigDedicated*:

2> provide measurement results required for the evaluation of the network selection and traffic steering rules as defined in TS 24.312 [66] to upper layers;

2> evaluate the network selection and traffic steering rules as defined in TS 36.304 [4];

#### 5.6.12.4 T350 expiry or stop

The UE shall:

1> if T350 expires or is stopped:

2> release the *wlan-OffloadConfigDedicated* and *t350*;

2> if the *wlan-OffloadConfigCommon* corresponding to the RPLMN is broadcast by the cell:

3> apply the *wlan-OffloadConfigCommon* corresponding to the RPLMN included in *SystemInformationBlockType17*;

#### 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

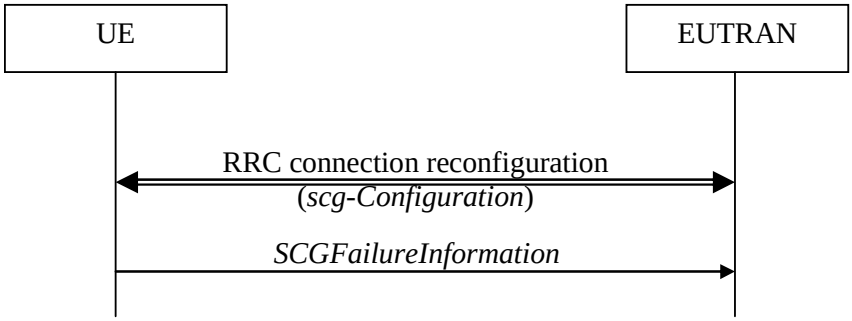


**Figure 5.6.13.1-1: SCG failure information**

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;

Upon initiating the procedure, the UE shall:

1> suspend all SCG DRBs and suspend SCG transmission for split DRBs;

1> reset SCG-MAC;

1> stop T307;

1> initiate transmission of the *SCGFailureInformation* message in accordance with 5.6.13.3;

### 5.6.13.3 Actions related to transmission of *SCGFailureInformation* message

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

1> if the UE initiates transmission of the *SCGFailureInformation* message to provide SCG radio link failure information:

2> include *failureType* and set it to the trigger for detecting SCG radio link failure;

1> else if the UE initiates transmission of the *SCGFailureInformation* message to provide SCG change failure information:

2> include *failureType* and set it to *scg-ChangeFailure*;

1> set the *measResultServFreqList* to include for each SCG cell that is configured, if any, within *measResultSCell* the quantities of the concerned SCell, if available according to performance requirements in [16];

1> for each SCG serving frequency included in *measResultServFreqList*, include within *measResultBestNeighCell* the *physCellId* and the quantities of the best non-serving cell, based on RSRP, on the concerned serving frequency;

1> set the *measResultNeighCells* to include the best measured cells on non-serving E-UTRA frequencies, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected the failure, and set its fields as follows;

2> if the UE was configured to perform measurements for one or more non-serving EUTRA frequencies and measurement results are available, include the *measResultListEUTRA*;

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

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

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

## 5.7 Generic error handling

### 5.7.1 General

The generic error handling defined in the subsequent sub-clauses applies unless explicitly specified otherwise e.g. within the procedure specific error handling.

The UE shall consider a value as not comprehended when it is set:

- to an extended value that is not defined in the version of the transfer syntax supported by the UE.
- to a spare or reserved value unless the specification defines specific behaviour that the UE shall apply upon receiving the concerned spare/ reserved value.

The UE shall consider a field as not comprehended when it is defined:

- as spare or reserved unless the specification defines specific behaviour that the UE shall apply upon receiving the concerned spare/ reserved field.

### 5.7.2 ASN.1 violation or encoding error

The UE shall:

1> when receiving an RRC message on the BCCH, PCCH, CCCH, MCCH or SBCCH for which the abstract syntax is invalid [13]:

2> ignore the message;

NOTE This section applies in case one or more fields is set to a value, other than a spare, reserved or extended value, not defined in this version of the transfer syntax. E.g. in the case the UE receives value 12 for a field defined as INTEGER (1..11). In cases like this, it may not be possible to reliably detect which field is in the error hence the error handling is at the message level.

### 5.7.3 Field set to a not comprehended value

The UE shall, when receiving an RRC message on any logical channel:

1> if the message includes a field that has a value that the UE does not comprehend:

2> if a default value is defined for this field:

3> treat the message while using the default value defined for this field;

2> else if the concerned field is optional:

3> treat the message as if the field were absent and in accordance with the need code for absence of the concerned field;

2> else:

3> treat the message as if the field were absent and in accordance with sub-clause 5.7.4;

### 5.7.4 Mandatory field missing

The UE shall:

1> if the message includes a field that is mandatory to include in the message (e.g. because conditions for mandatory presence are fulfilled) and that field is absent or treated as absent:

2> if the RRC message was received on DCCH or CCCH:

3> ignore the message;

2> else:

3> if the field concerns a (sub-field of) an entry of a list (i.e. a SEQUENCE OF):

4> treat the list as if the entry including the missing or not comprehended field was not present;

3> else if the field concerns a sub-field of another field, referred to as the 'parent' field i.e. the field that is one nesting level up compared to the erroneous field:

4> consider the 'parent' field to be set to a not comprehended value;

4> apply the generic error handling to the subsequent 'parent' field(s), until reaching the top nesting level i.e. the message level;

3> else (field at message level):

4> ignore the message;

NOTE 1: The error handling defined in these sub-clauses implies that the UE ignores a message with the message type or version set to a not comprehended value.

NOTE 2: The nested error handling for messages received on logical channels other than DCCH and CCCH applies for errors in extensions also, even for errors that can be regarded as invalid E-UTRAN operation e.g. E-UTRAN not observing conditional presence.

The following ASN.1 further clarifies the levels applicable in case of nested error handling for errors in extension fields.

```
-- /example/ ASN1START

-- Example with extension addition group

ItemInfoList ::=                SEQUENCE (SIZE (1..max)) OF ItemInfo

ItemInfo ::=                    SEQUENCE {
    itemIdentity                    INTEGER (1..max),
    field1                          Field1,
    field2                          Field2              OPTIONAL,       -- Need ON
    ...
    [[  field3-r9                   Field3-r9           OPTIONAL,       -- Cond Cond1
        field4-r9                   Field4-r9           OPTIONAL        -- Need ON
    ]]
}

-- Example with traditional non-critical extension (empty sequence)

BroadcastInfoBlock1 ::=         SEQUENCE {
    itemIdentity                    INTEGER (1..max),
    field1                          Field1,
    field2                          Field2              OPTIONAL,       -- Need ON
    nonCriticalExtension            BroadcastInfoBlock1-v940-IEs OPTIONAL
}

BroadcastInfoBlock1-v940-IEs::= SEQUENCE {
    field3-r9                       Field3-r9           OPTIONAL,       -- Cond Cond1
    field4-r9                       Field4-r9           OPTIONAL,       -- Need ON
    nonCriticalExtension            SEQUENCE {}             OPTIONAL        -- Need OP
}

-- ASN1STOP
```

The UE shall, apply the following principles regarding the levels applicable in case of nested error handling:

- an extension additon group is not regarded as a level on its own. E.g. in the ASN.1 extract in the previous, a error regarding the conditionality of *field3* would result in the entire itemInfo entry to be ignored (rather than just the extension addition group containing *field3* and *field4*)

- a traditional *nonCriticalExtension* is not regarded as a level on its own. E.g. in the ASN.1 extract in the previous, a error regarding the conditionality of *field3* would result in the entire *BroadcastInfoBlock1* to be ignored (rather than just the non critical extension containing *field3* and *field4*).

### 5.7.5 Not comprehended field

The UE shall, when receiving an RRC message on any logical channel:

1> if the message includes a field that the UE does not comprehend:

2> treat the rest of the message as if the field was absent;

NOTE: This section does not apply to the case of an extension to the value range of a field. Such cases are addressed instead by the requirements in section 5.7.3.

## 5.8 MBMS

### 5.8.1 Introduction

#### 5.8.1.1 General

In general the control information relevant only for UEs supporting MBMS is separated as much as possible from unicast control information. Most of the MBMS control information is provided on a logical channel specific for MBMS common control information: the MCCH. E-UTRA employs one MCCH logical channel per MBSFN area. In case the network configures multiple MBSFN areas, the UE acquires the MBMS control information from the MCCHs that are configured to identify if services it is interested to receive are ongoing. The action applicable when the UE is unable to simultaneously receive MBMS and unicast services is up to UE implementation. In this release of the specification, an MBMS capable UE is only required to support reception of a single MBMS service at a time, and reception of more than one MBMS service (also possibly on more than one MBSFN area) in parallel is left for UE implementation. The MCCH carries the *MBSFNAreaConfiguration* message, which indicates the MBMS sessions that are ongoing as well as the (corresponding) radio resource configuration. The MCCH may also carry the *MBMSCountingRequest* message, when E-UTRAN wishes to count the number of UEs in RRC_CONNECTED that are receiving or interested to receive one or more specific MBMS services.

A limited amount of MBMS control information is provided on the BCCH. This primarily concerns the information needed to acquire the MCCH(s). This information is carried by means of a single MBMS specific *SystemInformationBlock*: *SystemInformationBlockType13*. An MBSFN area is identified solely by the *mbsfn-AreaId* in *SystemInformationBlockType13*. At mobility, the UE considers that the MBSFN area is continuous when the source cell and the target cell broadcast the same value in the *mbsfn-AreaId*.

#### 5.8.1.2 Scheduling

The MCCH information is transmitted periodically, using a configurable repetition period. Scheduling information is not provided for MCCH i.e. both the time domain scheduling as well as the lower layer configuration are semi-statically configured, as defined within *SystemInformationBlockType13*.

For MBMS user data, which is carried by the MTCH logical channel, E-UTRAN periodically provides MCH scheduling information (MSI) at lower layers (MAC). This MCH information only concerns the time domain scheduling i.e. the frequency domain scheduling and the lower layer configuration are semi-statically configured. The periodicity of the MSI is configurable and defined by the MCH scheduling period.

#### 5.8.1.3 MCCH information validity and notification of changes

Change of MCCH information only occurs at specific radio frames, i.e. the concept of a modification period is used. Within a modification period, the same MCCH information may be transmitted a number of times, as defined by its scheduling (which is based on a repetition period). The modification period boundaries are defined by SFN values for

which SFN mod *m*= 0, where *m* is the number of radio frames comprising the modification period. The modification period is configured by means of *SystemInformationBlockType13*.

When the network changes (some of) the MCCH information, it notifies the UEs about the change during a first modification period. In the next modification period, the network transmits the updated MCCH information. These general principles are illustrated in figure 5.8.1.3-1, in which different colours indicate different MCCH information. Upon receiving a change notification, a UE interested to receive MBMS services acquires the new MCCH information immediately from the start of the next modification period. The UE applies the previously acquired MCCH information until the UE acquires the new MCCH information.

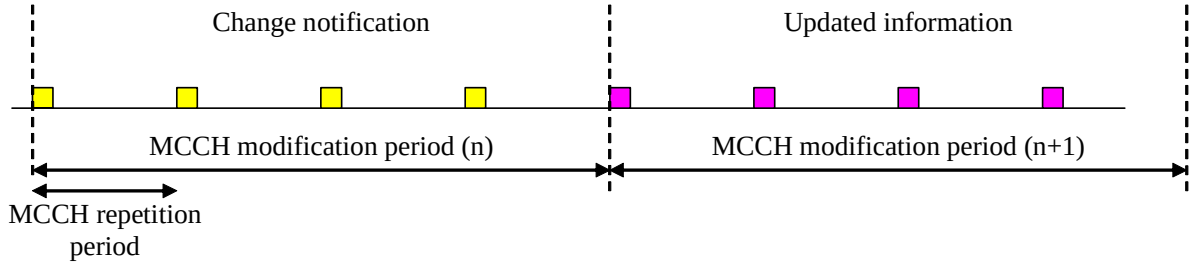


**Figure 5.8.1.3-1: Change of MCCH Information**

Indication of an MBMS specific RNTI, the M-RNTI (see TS 36.321 [6]), on PDCCH is used to inform UEs in RRC_IDLE and UEs in RRC_CONNECTED about an MCCH information change. When receiving an MCCH information change notification, the UE knows that the MCCH information will change at the next modification period boundary. The notification on PDCCH indicates which of the MCCHs will change, which is done by means of an 8-bit bitmap. Within this bitmap, the bit at the position indicated by the field *notificationIndicator* is used to indicate changes for that MBSFN area: if the bit is set to "1", the corresponding MCCH will change. No further details are provided e.g. regarding which MCCH information will change. The MCCH information change notification is used to inform the UE about a change of MCCH information upon session start or about the start of MBMS counting.

The MCCH information change notifications on PDCCH are transmitted periodically and are carried on MBSFN subframes only. These MCCH information change notification occasions are common for all MCCHs that are configured, and configurable by parameters included in *SystemInformationBlockType13:* a repetition coefficient, a radio frame offset and a subframe index. These common notification occasions are based on the MCCH with the shortest modification period.

NOTE 1: E-UTRAN may modify the MBMS configuration information provided on MCCH at the same time as updating the MBMS configuration information carried on BCCH i.e. at a coinciding BCCH and MCCH modification period. Upon detecting that a new MCCH is configured on BCCH, a UE interested to receive one or more MBMS services should acquire the MCCH, unless it knows that the services it is interested in are not provided by the corresponding MBSFN area.

A UE that is receiving an MBMS service shall acquire the MCCH information from the start of each modification period. A UE that is not receiving an MBMS service, as well as UEs that are receiving an MBMS service but potentially interested to receive other services not started yet in another MBSFN area, shall verify that the stored MCCH information remains valid by attempting to find the MCCH information change notification at least *notificationRepetitionCoeff* times during the modification period of the applicable MCCH(s), if no MCCH information change notification is received.

NOTE 2: In case the UE is aware which MCCH(s) E-UTRAN uses for the service(s) it is interested to receive, the UE may only need to monitor change notifications for a subset of the MCCHs that are configured, referred to as the 'applicable MCCH(s)' in the above.

## 5.8.2 MCCH information acquisition

### 5.8.2.1 General

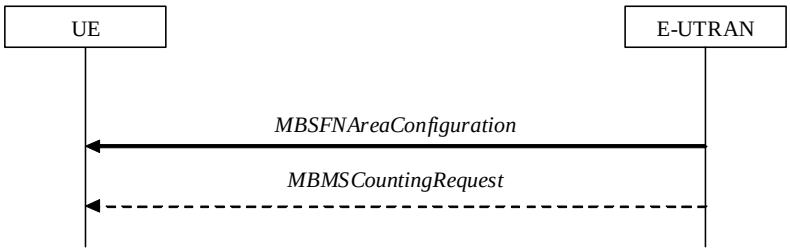


**Figure 5.8.2.1-1: MCCH information acquisition**

The UE applies the MCCH information acquisition procedure to acquire the MBMS control information that is broadcasted by the E-UTRAN. The procedure applies to MBMS capable UEs that are in RRC_IDLE or in RRC_CONNECTED.

### 5.8.2.2 Initiation

A UE interested to receive MBMS services shall apply the MCCH information acquisition procedure upon entering the corresponding MBSFN area (e.g. upon power on, following UE mobility) and upon receiving a notification that the MCCH information has changed. A UE that is receiving an MBMS service shall apply the MCCH information acquisition procedure to acquire the MCCH, that corresponds with the service that is being received, at the start of each modification period.

Unless explicitly stated otherwise in the procedural specification, the MCCH information acquisition procedure overwrites any stored MCCH information, i.e. delta configuration is not applicable for MCCH information and the UE discontinues using a field if it is absent in MCCH information unless explicitly specified otherwise.

### 5.8.2.3 MCCH information acquisition by the UE

An MBMS capable UE shall:

1> if the procedure is triggered by an MCCH information change notification:

2> start acquiring the *MBSFNAreaConfiguration* message and the *MBMSCountingRequest* message if present, from the beginning of the modification period following the one in which the change notification was received;

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

1> if the UE enters an MBSFN area:

2> acquire the *MBSFNAreaConfiguration* message and the *MBMSCountingRequest* message if present, at the next repetition period;

1> if the UE is receiving an MBMS service:

2> start acquiring the *MBSFNAreaConfiguration* message and the *MBMSCountingRequest* message if present, that both concern the MBSFN area of the service that is being received, from the beginning of each modification period;

### 5.8.2.4 Actions upon reception of the *MBSFNAreaConfiguration* message

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

#### 5.8.2.5 Actions upon reception of the *MBMSCountingRequest* message

Upon receiving *MBMSCountingRequest* message, the UE shall perform the MBMS Counting procedure as specified in 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 *locgicalChannelIdentity*, 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

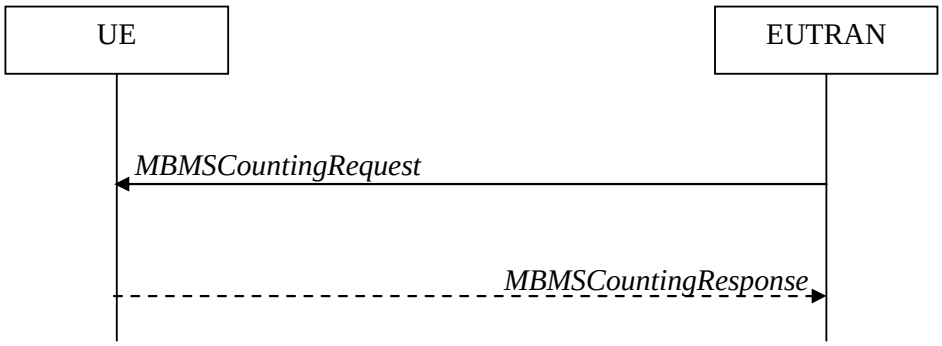


**Figure 5.8.4.1-1: MBMS Counting procedure**

The MBMS Counting procedure is used by the E-UTRAN to count the number of RRC_CONNECTED mode UEs which are receiving via an MRB or interested to receive via an MRB the specified MBMS services.

The UE determines interest in an MBMS service, that is identified by the TMGI, by interaction with upper layers.

### 5.8.4.2 Initiation

E-UTRAN initiates the procedure by sending an *MBMSCountingRequest* message.

### 5.8.4.3 Reception of the *MBMSCountingRequest* message by the UE

Upon receiving the *MBMSCountingRequest* message, the UE in RRC_CONNECTED mode shall:

1> if the *SystemInformationBlockType1*, that provided the scheduling information for the *systemInformationBlockType13* that included the configuration of the MCCH via which the *MBMSCountingRequest* message was received, contained the identity of the Registered PLMN; and

1> if the UE is receiving via an MRB or interested to receive via an MRB at least one of the services in the received *countingRequestList:*

2> if more than one entry is included in the *mbsfn-AreaInfoList* received in the *SystemInformationBlockType13* that included the configuration of the MCCH via which the *MBMSCountingRequest* message was received*:*

3> include the *mbsfn-AreaIndex* in the *MBMSCountingResponse* message and set it to the index of the entry in the *mbsfn-AreaInfoList* within the received *SystemInformationBlockType13* that corresponds with the MBSFN area used to transfer the received *MBMSCountingRequest* message;

2> for each MBMS service included in the received *countingRequestList*:

3> if the UE is receiving via an MRB or interested to receive via an MRB this MBMS service:

4> include an entry in the *countingResponseList* within the *MBMSCountingResponse* message with *countingResponseService* set it to the index of the entry in the *countingRequestList* within the received *MBMSCountingRequest* that corresponds with the MBMS service the UE is receiving or interested to receive;

2> submit the *MBMSCountingResponse* message to lower layers for transmission upon which the procedure ends;

NOTE 1: UEs that are receiving an MBMS User Service [56] by means of a Unicast Bearer Service [57] (i.e. via a DRB), but are interested to receive the concerned MBMS User Service [56] via an MBMS Bearer Service (i.e. via an MRB), respond to the counting request.

NOTE 2: If ciphering is used at upper layers, the UE does not respond to the counting request if it can not decipher the MBMS service for which counting is performed (see TS 22.146 [62, 5.3]).

NOTE 3: The UE treats the *MBMSCountingRequest* messages received in each modification period independently. In the unlikely case E-UTRAN would repeat an *MBMSCountingRequest* (i.e. including the same services) in a subsequent modification period, the UE responds again. The UE provides at most one *MBMSCountingResponse* message to multiple transmission attempts of an *MBMSCountingRequest* messages in a given modification period.

## 5.8.5 MBMS interest indication

### 5.8.5.1 General

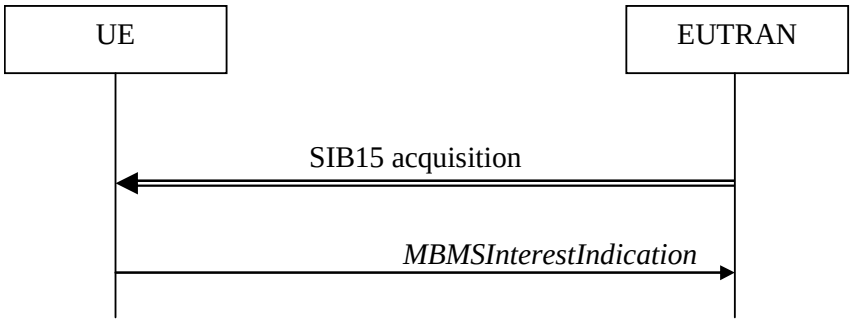


**Figure 5.8.5.1-1: MBMS interest indication**

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

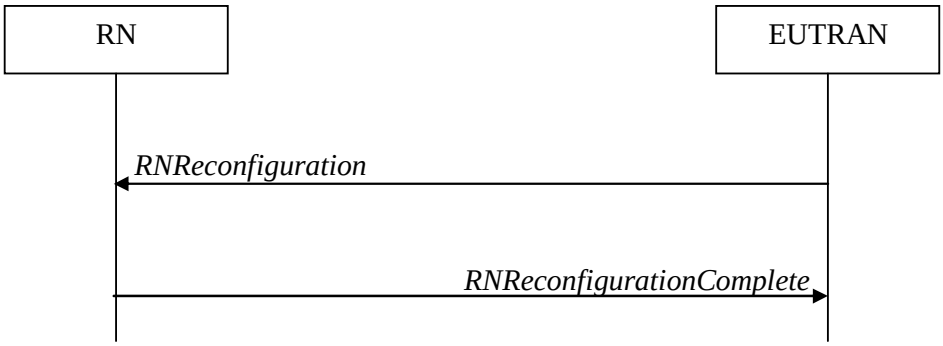


**Figure 5.9.1.1-1: RN reconfiguration**

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 direct 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 direct communication/ discovery/ synchronisation resource configuration provided by dedicated signalling applies for the PCell/ the primary frequency. Furthermore, the UE shall not use the sidelink direct communication/ discovery/ synchronisation transmission resources received in one cell with the timing of another cell.

NOTE 1: Upper layers configure the UE to receive or transmit sidelink direct communication on a specific frequency, to monitor sidelink direct discovery announcements on one or more frequencies or to transmit sidelink direct 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

The UE shall perform sidelink operation only if the following conditions are met:

1> if the UE"s serving cell is suitable (RRC_IDLE or RRC_CONNECTED); or

1> if the UE"s serving cell fulfils the conditions to support sidelink direct communication in limited service state as specified in TS 23.303 [68, 4.5.6] and the UE is in RRC_IDLE:

1> if the UE has no serving cell (RRC_IDLE);

## 5.10.2 Sidelink UE information

### 5.10.2.1 General

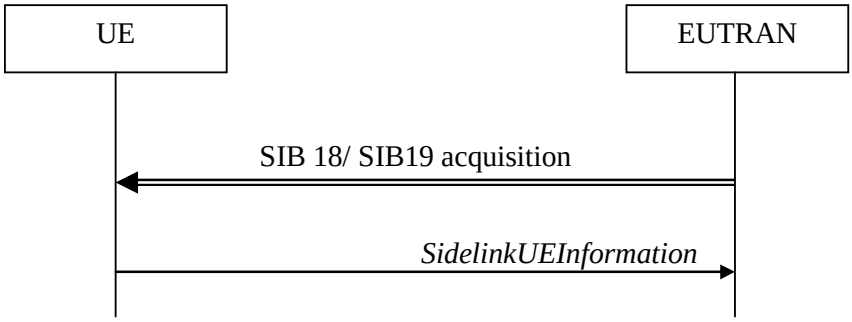


**Figure 5.10.2-1: Sidelink UE information**

The purpose of this procedure is to inform E-UTRAN that the UE is interested or no longer interested to receive sidelink direct communication or discovery, as well as to request assignment or release of transmission resources for sidelink direct communication or discovery announcements.

### 5.10.2.2 Initiation

A UE capable of sidelink direct communication or discovery that is in RRC_CONNECTED may initiate the procedure to indicate it is (interested in) receiving sidelink direct 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 direct communication or discovery may initiate the procedure to request assignment of dedicated resources for the concerned sidelink direct communication transmission or discovery announcements.

NOTE 1: A UE in RRC_IDLE that is configured to transmit sidelink direct 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 direct 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 direct communication on has changed since the last transmission of the *SidelinkUEInformation* message:

4> initiate transmission of the *SidelinkUEInformation* message to indicate the sidelink direct 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 direct communication reception in accordance with 5.10.2.3;

2> if configured by upper layers to transmit sidelink direct 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 direct 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 direct 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 direct 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 direct 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 direct discovery reception in accordance with 5.10.2.3;

2> if the UE is configured by upper layers to transmit sidelink direct 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 direct 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 direct 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 direct 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 direct communication:

3> include *commRxInterestedFreq* and set it to the sidelink direct communication frequency;

2> if configured by upper layers to transmit sidelink direct communication:

3> include *commTxResourceReq* and set its fields as follows:

4> set *carrierFreq* to indicate the sidelink direct communication frequency i.e. the same value as indicated in *commRxInterestedFreq* if included;

4> set *destinationInfoList* to include the sidelink direct 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 direct 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 direct discovery announcements:

3> include *discTxResourceReq* and set it to indicate the number of resources for sidelink direct discovery announcement 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 Direct communication monitoring

A UE capable of sidelink direct communication that is configured by upper layers to receive sidelink direct 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 direct communication, as defined in TS 36.304 [4, 11.4]:

3> if the cell chosen for sidelink direct 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: Each entry included in *preconfigComm* may be used for a range of SLSSIDs. Furthermore, such pool entries may be used by UEs transmitting according to a different timing reference. 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 Direct communication transmission

A UE capable of sidelink direct communication that is configured by upper layers to transmit sidelink direct 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 direct communication, as defined in TS 36.304 [4, 11.4]:

3> if the UE is in RRC_CONNECTED and uses the PCell for sidelink direct 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 direct 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 direct communication in RRC_IDLE or on cell other than PCell in RRC_CONNECTED):

4> if the cell chosen for sidelink direct 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 direct 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 Direct discovery monitoring

A UE capable of sidelink direct discovery that is configured by upper layers to monitor sidelink direct discovery announcements shall:

1> for each frequency the UE is configured to monitor sidelink direct discovery announcements on, prioritising the frequencies included in *discInterFreqList*, if included in *SystemInformationBlockType19*:

2> configure lower layers to monitor sidelink direct 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 direct 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 Direct discovery announcement

A UE capable of sidelink direct discovery that is configured by upper layers to transmit sidelink direct discovery announcements shall:

NOTE 1: In case the configured resources are insufficient it is up to UE implementation to decide which sidelink direct 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 direct discovery announcement):

3> if the UE is configured with *discTxResources* set to *scheduled*:

4> configure lower layers to transmit the sidelink direct 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 direct 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:

5> randomly select, using a uniform distribution, an entry of *discTxPoolCommon*:

4> configure lower layers to transmit the sidelink direct 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 Direct synchronisation information transmission

### 5.10.7.1 General

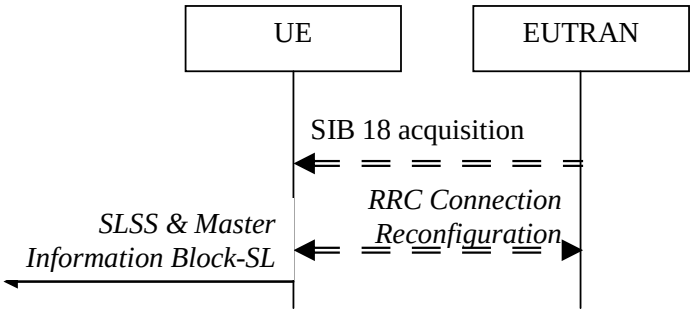


**Figure 5.10.7.1-1: Synchronisation information transmission for sidelink direct communication, in (partial) coverage**

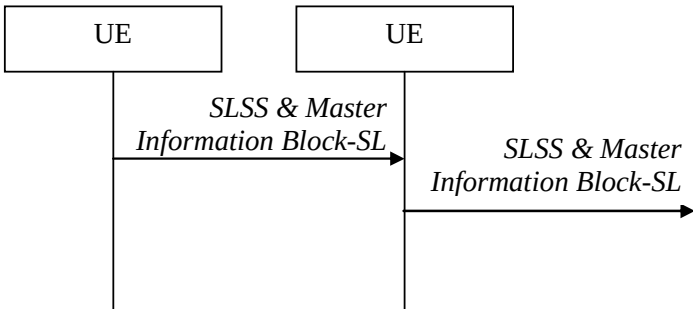


**Figure 5.10.7.1-2: Synchronisation information transmission for sidelink direct communication, out of coverage**

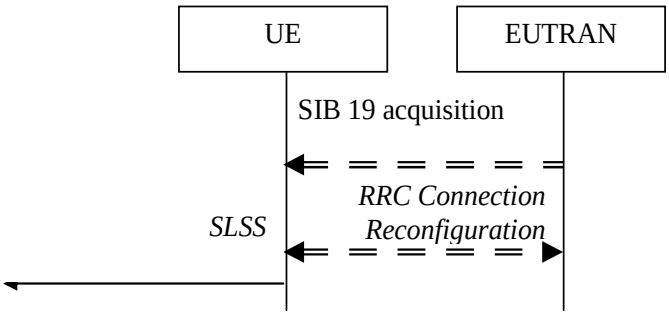


**Figure 5.10.7.1-3: Synchronisation information transmission for sidelink direct discovery**

The purpose of this procedure is to provide synchronisation information to a UE. The synchronisation information concerns a Sidelink Synchronisation Signal (SLSS) for sidelink direct discovery, while it concerns a SLSS, timing information and some additional configuration parameters (i.e. the *MasterInformationBlock-SL* message) for sidelink direct 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/ 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 direct 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 direct communication that is configured by upper layers to transmit sidelink direct 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 direct communication in accordance with 5.10.4 and when the following conditions are met:

1> if in coverage on the frequency used for sidelink direct 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 transmission direct communication 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 direct 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 direct discovery announcement:

2> select the SLSSID included in the entry of *discSyncConfig* included in the received *SystemInformationBlockType19*, that includes *tx-Parameters*;

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 direct communication:

2> if in coverage on the frequency used for sidelink direct 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* (arbitrary selection between these) 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* (arbitrary selection between these) 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 direct 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 direct communication;

2> if *tdd-Config* is included in the received *SystemInformationBlockType1*:

3> set *subframeAssignmentSL* to the value representing the same meaning as of s*ubframeAssignment* 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 Actions related to reception of *MasterInformationBlock-SL* message

A UE receiving or transmitting sidelink direct communication that has a selected SyncRef UE shall:

1> apply the values of *sl-Bandwidth*, *subframeAssignmentSL*, *directFrameNumber* and *directSubframeNumber* included in the received *MasterInformationBlock-SL* message;

### 5.10.8 Direct 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 direct 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 direct 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 direct 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 information elements specified in the message syntax. The syntax of the information elements that are defined as stand-alone abstract types is further specified in a similar manner in sub-clause 6.3.

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

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

| Abbreviation | Meaning |
|---|---|
| Cond *conditionTag*<br>(Used in downlink only) | *Conditionally present*<br>An information element for which the need is specified by means of conditions. For each *conditionTag*, the need is specified in a tabular form following the ASN.1 segment. In case, according to the conditions, a field is not present, the UE takes no action and where applicable shall continue to use the existing value (and/ or the associated functionality) unless explicitly stated otherwise (e.g. in the conditional presence table or in the description of the field itself). |
| Need OP<br>(Used in downlink only) | *Optionally present*<br>An information element that is optional to signal. For downlink messages, the UE is not required to take any special action on absence of the IE beyond what is specified in the procedural text or the field description table following the ASN.1 segment. The UE behaviour on absence should be captured either in the procedural text or in the field description. |
| Need ON<br>(Used in downlink only) | *Optionally present, No action*<br>An information element that is optional to signal. If the message is received by the UE, and in case the information element is absent, the UE takes no action and where applicable shall continue to use the existing value (and/ or the associated functionality). |
| Need OR<br>(Used in downlink only) | *Optionally present, Release*<br>An information element that is optional to signal. If the message is received by the UE, and in case the information element is absent, the UE shall discontinue/ stop using/ delete any existing value (and/ or the associated functionality). |

Any IE 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.

```
-- /example/ ASN1START

RRCMessage-r8-IEs ::=               SEQUENCE {
    field1                          InformationElement1,
    field2                          InformationElement2         OPTIONAL,  -- Need ON
    nonCriticalExtension            RRCMessage-v8a0-IEs         OPTIONAL
}

RRCMessage-v8a0-IEs ::=             SEQUENCE {
    field3                          InformationElement3         OPTIONAL,  -- Need ON
    nonCriticalExtension            RRCMessage-v940-IEs         OPTIONAL
}

RRCMessage-v940-IEs ::=             SEQUENCE {
    field4                          InformationElement4         OPTIONAL,  -- Need OR
    nonCriticalExtension            SEQUENCE {}                 OPTIONAL
}

InformationElement1 ::=         SEQUENCE {
    field11                     InformationElement11        OPTIONAL,  -- Need ON
    field12                     InformationElement12        OPTIONAL,  -- Need OR
    ...,
    [[  field13                     InformationElement13        OPTIONAL,  -- Need OR
        field14                     InformationElement14        OPTIONAL   -- Need ON
    ]]
}

InformationElement2 ::=         SEQUENCE {
```

```
    field21                 InformationElement11        OPTIONAL,  -- Need OR

    ...
}


-- ASN1STOP
```

The handling of need codes as specified in the previous implies that:

- if *field2* in *RRCMessage-r8-IEs* is absent, the UE does not modify *field21*;
- if *field2* in *RRCMessage-r8-IEs* is present but does not include *field21*, the UE releases *field21*;
- if the extension group containing *field13* is absent, the UE releases *field13* and does not modify *field14*;
- if *nonCriticalExtension* defined by IE *RRCMessage-v8a0-IEs* is absent, the UE does not modify *field3* and releases *field4*;

# 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{
            mbmsCountingRequest-r10          MBMSCountingRequest-r10
        },
        messageClassExtension  SEQUENCE {}
    }
}


-- ASN1STOP
```

## – PCCH-Message

The *PCCH-Message* class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the PCCH logical channel.

```
-- ASN1START


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


PCCH-MessageType ::= CHOICE {
    c1                      CHOICE {
        paging                                  Paging
    },
    messageClassExtension  SEQUENCE {}
}


-- ASN1STOP
```

## – DL-CCCH-Message

The *DL-CCCH-Message* class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the downlink CCCH logical channel.

```
-- ASN1START
```

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

DL-CCCH-MessageType ::= CHOICE {
    c1                          CHOICE {
        rrcConnectionReestablishment            RRCConnectionReestablishment,
        rrcConnectionReestablishmentReject      RRCConnectionReestablishmentReject,
        rrcConnectionReject                     RRCConnectionReject,
        rrcConnectionSetup                      RRCConnectionSetup
    },
    messageClassExtension  SEQUENCE {}
}

-- ASN1STOP
```

## – 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.

```
-- ASN1START

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

DL-DCCH-MessageType ::= CHOICE {
    c1                          CHOICE {
        csfbParametersResponseCDMA2000          CSFBParametersResponseCDMA2000,
        dlInformationTransfer                   DLInformationTransfer,
        handoverFromEUTRAPreparationRequest     HandoverFromEUTRAPreparationRequest,
        mobilityFromEUTRACommand                MobilityFromEUTRACommand,
        rrcConnectionReconfiguration            RRCConnectionReconfiguration,
        rrcConnectionRelease                    RRCConnectionRelease,
        securityModeCommand                     SecurityModeCommand,
```

```
        ueCapabilityEnquiry                 UECapabilityEnquiry,
        counterCheck                        CounterCheck,
        ueInformationRequest-r9             UEInformationRequest-r9,
        loggedMeasurementConfiguration-r10  LoggedMeasurementConfiguration-r10,
        rnReconfiguration-r10               RNReconfiguration-r10,
        spare4 NULL,
        spare3 NULL, spare2 NULL, spare1 NULL
    },
    messageClassExtension  SEQUENCE {}
}

-- ASN1STOP
```

### – UL-CCCH-Message

The *UL-CCCH-Message* class is the set of RRC messages that may be sent from the UE to the E-UTRAN on the uplink CCCH logical channel.

```
-- ASN1START

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

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

-- ASN1STOP
```

### – UL-DCCH-Message

The *UL-DCCH-Message* class is the set of RRC messages that may be sent from the UE to the E-UTRAN or from the RN to the E-UTRAN on the uplink DCCH logical channel.

```
-- ASN1START

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

UL-DCCH-MessageType ::= CHOICE {
    c1                      CHOICE {
        csfbParametersRequestCDMA2000           CSFBParametersRequestCDMA2000,
        measurementReport                       MeasurementReport,
        rrcConnectionReconfigurationComplete    RRCConnectionReconfigurationComplete,
        rrcConnectionReestablishmentComplete    RRCConnectionReestablishmentComplete,
        rrcConnectionSetupComplete              RRCConnectionSetupComplete,
        securityModeComplete                    SecurityModeComplete,
        securityModeFailure                     SecurityModeFailure,
        ueCapabilityInformation                 UECapabilityInformation,
        ulHandoverPreparationTransfer           ULHandoverPreparationTransfer,
        ulInformationTransfer                   ULInformationTransfer,
        counterCheckResponse                    CounterCheckResponse,
        ueInformationResponse-r9                UEInformationResponse-r9,
        proximityIndication-r9                  ProximityIndication-r9,
        rnReconfigurationComplete-r10           RNReconfigurationComplete-r10,
        mbmsCountingResponse-r10                MBMSCountingResponse-r10,
        interFreqRSTDMeasurementIndication-r10  InterFreqRSTDMeasurementIndication-r10
    },
    messageClassExtension  CHOICE {
        c2                          CHOICE {
            ueAssistanceInformation-r11         UEAssistanceInformation-r11,
            inDeviceCoexIndication-r11          InDeviceCoexIndication-r11,
            mbmsInterestIndication-r11          MBMSInterestIndication-r11,
            scgFailureInformation-r12           SCGFailureInformation-r12,
            sidelinkUEInformation-r12           SidelinkUEInformation-r12,
            spare11 NULL, spare10 NULL,
            spare9 NULL, spare8 NULL, spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
```

```
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        messageClassExtensionFuture-r11 SEQUENCE {}
    }
}


-- ASN1STOP
```

## 6.2.2 Message definitions

### – CounterCheck

The *CounterCheck* message is used by the E-UTRAN to indicate the current COUNT MSB values associated to each DRB and to request the UE to compare these to its COUNT MSB values and to report the comparison results to E-UTRAN.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

***CounterCheck message***

```
-- ASN1START


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


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

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

DRB-CountMSB-InfoList ::=       SEQUENCE (SIZE (1..maxDRB)) OF DRB-CountMSB-Info

DRB-CountMSB-Info ::=   SEQUENCE {
                                                                drb-Identity
                                                                    DRB-
Identity,
    countMSB-Uplink             INTEGER(0..33554431),
    countMSB-Downlink           INTEGER(0..33554431)
}

-- ASN1STOP
```

| ***CounterCheck* field descriptions** |
|---|
| ***count-MSB-Downlink***<br>Indicates the value of 25 MSBs from downlink COUNT associated to this DRB. |
| ***count-MSB-Uplink***<br>Indicates the value of 25 MSBs from uplink COUNT associated to this DRB. |
| ***drb-CountMSB-InfoList***<br>Indicates the MSBs of the COUNT values of the DRBs. |

## – CounterCheckResponse

The *CounterCheckResponse* message is used by the UE to respond to a *CounterCheck* message.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

***CounterCheckResponse message***

```
-- 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** |
|---|
| ***count-Downlink***<br>Indicates the value of downlink COUNT associated to this DRB. |
| ***count-Uplink***<br>Indicates the value of uplink COUNT associated to this DRB. |
| ***drb-CountInfoList***<br>Indicates the COUNT values of the DRBs. |

## – CSFBParametersRequestCDMA2000

The *CSFBParametersRequestCDMA2000* message is used by the UE to obtain the CDMA2000 1xRTT Parameters from the network. The UE needs these parameters to generate the CDMA2000 1xRTT Registration message used to register with the CDMA2000 1xRTT Network which is required to support CSFB to CDMA2000 1xRTT.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

***CSFBParametersRequestCDMA2000 message***

```
-- ASN1START

CSFBParametersRequestCDMA2000 ::= SEQUENCE {
    criticalExtensions                  CHOICE {
        csfbParametersRequestCDMA2000-r8 CSFBParametersRequestCDMA2000-r8-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

CSFBParametersRequestCDMA2000-r8-IEs ::= SEQUENCE {
    nonCriticalExtension            CSFBParametersRequestCDMA2000-v8a0-IEs   OPTIONAL
}

CSFBParametersRequestCDMA2000-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension        OCTET STRING                    OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

## – CSFBParametersResponseCDMA2000

The *CSFBParametersResponseCDMA2000* message is used to provide the CDMA2000 1xRTT Parameters to the UE so the UE can register with the CDMA2000 1xRTT Network to support CSFB to CDMA2000 1xRTT.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

***CSFBParametersResponseCDMA2000 message***

```
-- ASN1START
```

```
CSFBParametersResponseCDMA2000 ::= SEQUENCE {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        csfbParametersResponseCDMA2000-r8       CSFBParametersResponseCDMA2000-r8-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

CSFBParametersResponseCDMA2000-r8-IEs ::= SEQUENCE {
    rand                            RAND-CDMA2000,
    mobilityParameters                  MobilityParametersCDMA2000,
    nonCriticalExtension            CSFBParametersResponseCDMA2000-v8a0-IEs OPTIONAL
}

CSFBParametersResponseCDMA2000-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension        OCTET STRING                OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                 OPTIONAL
}

-- ASN1STOP
```

## – DLInformationTransfer

The *DLInformationTransfer* message is used for the downlink transfer of NAS or non-3GPP dedicated information.

Signalling radio bearer: SRB2 or SRB1 (only if SRB2 not established yet. If SRB2 is suspended, E-UTRAN does not send this message until SRB2 is resumed.)

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

***DLInformationTransfer message***

```
-- ASN1START

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,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
    }
}

HandoverFromEUTRAPreparationRequest-r8-IEs ::= SEQUENCE {
    cdma2000-Type               CDMA2000-Type,
    rand                        RAND-CDMA2000           OPTIONAL,  -- Cond cdma2000-Type
    mobilityParameters          MobilityParametersCDMA2000  OPTIONAL,  -- Cond cdma2000-Type
    nonCriticalExtension        HandoverFromEUTRAPreparationRequest-v890-IEsOPTIONAL
}

HandoverFromEUTRAPreparationRequest-v890-IEs ::= SEQUENCE {
    lateNonCriticalExtension    OCTET STRING            OPTIONAL,
    nonCriticalExtension        HandoverFromEUTRAPreparationRequest-v920-IEsOPTIONAL
}

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

HandoverFromEUTRAPreparationRequest-v1020-IEs ::= SEQUENCE {
    dualRxTxRedirectIndicator-r10     ENUMERATED {true}     OPTIONAL,  -- Cond cdma2000-1XRTT
    redirectCarrierCDMA2000-1XRTT-r10    CarrierFreqCDMA2000     OPTIONAL,  -- Cond dualRxTxRedirect
    nonCriticalExtension            SEQUENCE {}             OPTIONAL
}
```

```
-- ASN1STOP
```

| ***HandoverFromEUTRAPreparationRequest* field descriptions** |
|---|
| ***concurrPrepCDMA2000-HRPD***<br>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***<br>Value TRUE indicates that the second radio of the dual Rx/Tx UE is being redirected to CDMA2000 1xRTT [51]. |
| ***redirectCarrierCDMA2000-1XRTT***<br>Used to indicate the CDMA2000 1xRTT carrier frequency where the UE is being redirected to. |

| Conditional presence | Explanation |
|---|---|
| *cdma2000-1XRTT* | The field is optionally present, need ON, if the *cdma2000-Type* = *type1XRTT*; otherwise it is not present. |
| *cdma2000-Type* | The field is mandatory present if the *cdma2000-Type* = *type1XRTT*; otherwise it is not present. |
| *dualRxTxRedirect* | The field is optionally present, need ON, if *dualRxTxRedirectIndicator* is present; otherwise it is not present. |

## – InDeviceCoexIndication

The *InDeviceCoexIndication* message is used to inform E-UTRAN about IDC problems which 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***

```
-- ASN1START


InDeviceCoexIndication-r11 ::=          SEQUENCE {
    criticalExtensions                  CHOICE {
        c1                              CHOICE {
            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            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}
}

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))
    },
    ...
}
```

```
-- ASN1STOP
```

| *InDeviceCoexIndication* field descriptions |
|---|
| ***affectedCarrierFreqList***<br>List of E-UTRA carrier frequencies affected by IDC problems. |
| ***drx-ActiveTime***<br>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***<br>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***<br>Indicates the desired DRX starting offset that the E-UTRAN is recommended to configure. The UE shall set the value of drx-Offset smaller than the value of *drx-CycleLength*. The starting frame and subframe satisfy the relation: [(SFN * 10) + subframe number] modulo (*drx-CycleLength*) = *drx-Offset*. |
| ***idc-SubframePatternList***<br>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***<br>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]). |

## – InterFreqRSTDMeasurementIndication

The *InterFreqRSTDMeasurementIndication* message is used to indicate that the UE is going to either start or stop OTDOA inter-frequency RSTD measurement which requires measurement gaps as specified in TS 36.133 [16, 8.1.2.6].

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

***InterFreqRSTDMeasurementIndication message***

```
-- ASN1START

InterFreqRSTDMeasurementIndication-r10 ::=          SEQUENCE {
    criticalExtensions                  CHOICE {
        c1                              CHOICE {
            interFreqRSTDMeasurementIndication-r10  InterFreqRSTDMeasurementIndication-r10-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
```

```
    }
}

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

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

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

-- ASN1STOP
```

| ***InterFreqRSTDMeasurementIndication* field descriptions** |
|---|
| ***carrierFreq***<br>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***<br>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.<br>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*.<br>NOTE: Figure 6.2.2-1 illustrates the *measPRS-Offset* field. |
| ***rstd-InterFreqIndication***<br>Indicates the inter-frequency RSTD measurement action, i.e. the UE is going to start or stop inter-frequency RSTD measurement. |

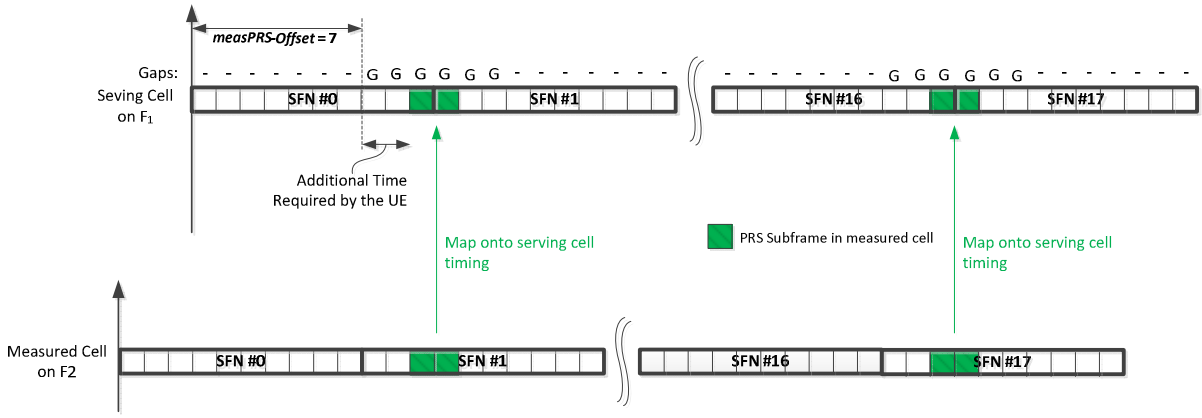


**Figure 6.2.2-1 (informative): Exemplary calculation of *measPRS-Offset* field.**

## – LoggedMeasurementConfiguration

The *LoggedMeasurementConfiguration* message is used by E-UTRAN to configure the UE to perform logging of measurement results while in RRC_IDLE or to perform logging of measurement results for MBSFN while in both RRC_IDLE and RRC_CONNECTED. It is used to transfer the logged measurement configuration for network performance optimisation, see TS 37.320 [60].

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

***LoggedMeasurementConfiguration message***

```
-- ASN1START


LoggedMeasurementConfiguration-r10 ::=     SEQUENCE {
    criticalExtensions                     CHOICE {
```

```
        c1                              CHOICE {
            loggedMeasurementConfiguration-r10      LoggedMeasurementConfiguration-r10-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}


LoggedMeasurementConfiguration-r10-IEs ::= SEQUENCE {
    traceReference-r10              TraceReference-r10,
    traceRecordingSessionRef-r10  OCTET STRING (SIZE (2)),
    tce-Id-r10                      OCTET STRING (SIZE (1)),
    absoluteTimeInfo-r10            AbsoluteTimeInfo-r10,
    areaConfiguration-r10           AreaConfiguration-r10       OPTIONAL,  -- Need OR
    loggingDuration-r10             LoggingDuration-r10,
    loggingInterval-r10             LoggingInterval-r10,
    nonCriticalExtension        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** |
|---|
| ***absoluteTimeInfo***<br>Indicates the absolute time in the current cell. |
| ***areaConfiguration***<br>Used to restrict the area in which the UE performs measurement logging to cells broadcasting either one of the included cell identities or one of the included tracking area codes/ identities. |
| ***plmn-IdentityList***<br>Indicates a set of PLMNs defining when the UE performs measurement logging as well as the associated status indication and information retrieval i.e. the UE performs these actions when the RPLMN is part of this set of PLMNs. |
| ***targetMBSFN-AreaList***<br>Used to indicate logging of MBSFN measurements and further restrict the area and frequencies for which the UE performs measurement logging for MBSFN. If both MBSFN area id and carrier frequency are present, a specific MBSFN area is indicated. If only carrier frequency is present, all MBSFN areas on that carrier frequency are indicated. If there is no entry in the list, any MBSFN area is indicated. |
| ***tce-Id***<br>Parameter Trace Collection Entity Id: See TS 32.422 [58]. |
| ***traceRecordingSessionRef***<br>Parameter Trace Recording Session Reference: See TS 32.422 [58] |

## – MasterInformationBlock

The *MasterInformationBlock* includes the system information transmitted on BCH.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: BCCH

Direction: E-UTRAN to UE

***MasterInformationBlock***

```
-- ASN1START

MasterInformationBlock ::=          SEQUENCE {
    dl-Bandwidth                    ENUMERATED {
                                        n6, n15, n25, n50, n75, n100},
    phich-Config                    PHICH-Config,
```

```
    systemFrameNumber                BIT STRING (SIZE (8)),
    spare                            BIT STRING (SIZE (10))
}



-- ASN1STOP
```

| ***MasterInformationBlock* field descriptions** |
|---|
| ***dl-Bandwidth***<br>Parameter: transmission bandwidth configuration, $N_{RB}$ in downlink, see TS 36.101 [42, table 5.6-1]. n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on. |
| ***systemFrameNumber***<br>Defines the 8 most significant bits of the SFN. As indicated in TS 36.211 [21, 6.6.1], the 2 least significant bits of the SFN are acquired implicitly in the P-BCH decoding, i.e. timing of 40ms P-BCH TTI indicates 2 least significant bits (within 40ms P-BCH TTI, the first radio frame: 00, the second radio frame: 01, the third radio frame: 10, the last radio frame: 11). One value applies for all serving cells of a Cell Group (i.e. MCG or SCG). The associated functionality is common (i.e. not performed independently for each cell). |

## – MBMSCountingRequest

The *MBMSCountingRequest* message is used by E-UTRAN to count the UEs that are receiving or interested to receive specific MBMS services.

Signalling radio bearer: N/A

RLC-SAP: UM

Logical channel: MCCH

Direction: E-UTRAN to UE

***MBMSCountingRequest message***

```
-- 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***

```
-- ASN1START

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

MBMSCountingResponse-r10-IEs ::= SEQUENCE {
    mbsfn-AreaIndex-r10             INTEGER (0..maxMBSFN-Area-1)                OPTIONAL,
    countingResponseList-r10        CountingResponseList-r10        OPTIONAL,
    lateNonCriticalExtension        OCTET STRING                    OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                     OPTIONAL
}

CountingResponseList-r10 ::=        SEQUENCE (SIZE (1..maxServiceCount)) OF CountingResponseInfo-r10

CountingResponseInfo-r10 ::=        SEQUENCE {
    countingResponseService-r10     INTEGER (0..maxServiceCount-1),
    ...
```

```
}


-- 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***<br>List of MBMS frequencies on which the UE is receiving or interested to receive MBMS via an MRB. |
| ***mbms-Priority***<br>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. E-UTRAN configures an MCCH for each MBSFN area i.e. the MCCH identifies the MBSFN area.

Signalling radio bearer: N/A

RLC-SAP: UM

Logical channel: MCCH

Direction: E-UTRAN to UE

***MBSFNAreaConfiguration message***

```
-- 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***<br>Indicates the subframes allocated to the MBSFN area |
| ***commonSF-AllocPeriod***<br>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 continously 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***<br>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 {}
    }
}

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 {}
    }
}

MobilityFromEUTRACommand-r8-IEs ::=    SEQUENCE {
    cs-FallbackIndicator            BOOLEAN,
```

```
    purpose                         CHOICE{
        handover                    Handover,
        cellChangeOrder                 CellChangeOrder
    },
    nonCriticalExtension        MobilityFromEUTRACommand-v8a0-IEs     OPTIONAL
}

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

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

| ***MobilityFromEUTRACommand* field descriptions** |
|---|
| ***bandIndicator*** <br> Indicates how to interpret the ARFCN of the BCCH carrier. |
| ***carrierFreq*** <br> contains the carrier frequency of the target GERAN cell. |
| ***cs-FallbackIndicator*** <br> Value *true* indicates that the CS Fallback procedure to UTRAN or GERAN is triggered. |
| ***messageContCDMA2000-1XRTT*** <br> 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*** <br> 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*** <br> 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*** <br> 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*** <br> Parameter NETWORK_CONTROL_ORDER in TS 44.060 [36]. |
| ***purpose*** <br> 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*** <br> The *redirectCarrierCDMA2000-HRPD* indicates a CDMA2000 carrier frequency and is used to redirect the UE to a HRPD carrier frequency. |
| ***SystemInfoListGERAN*** <br> If *purpose* = *CellChangeOrder* and if the field is not present, the UE has to acquire SI/PSI from the GERAN cell. |
| ***t304*** <br> Timer T304 as described in section 7.3. Value ms100 corresponds with 100 ms, ms200 corresponds with 200 ms and so on. |
| ***targetRAT-Type*** <br> Indicates the target RAT type. |
| ***targetRAT-MessageContainer*** <br> 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. <br><br> A complete message is included, as specified in the other standard. |

| Conditional presence | Explanation |
|---|---|
| *concHO* | The field is mandatory present if the *mobilityCDMA2000-HRPD* is set to '*handover*'; otherwise the field is optional present, need ON. |
| *concRedir* | The field is mandatory present if the m*obilityCDMA2000-HRPD* is set to '*redirection*'; otherwise the field is not present. |
| *GERAN* | 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 |
| *PSHO* | The field is mandatory present in case of PS handover toward GERAN; otherwise the field is optionally present, but not used by the UE |
| *UTRAGERAN* | The field is mandatory present if the *targetRAT-Type* is set to '*utra*' or '*geran*'; otherwise the field is not present |

NOTE 1: The correspondence between the value of the *targetRAT-Type*, the standard to apply and the message contained within the *targetRAT-MessageContainer* is shown in the table below:

| targetRAT-Type | Standard to apply | targetRAT-MessageContainer |
|---|---|---|
| *cdma2000-1XRTT* | C.S0001 or later, C.S0007 or later, C.S0008 or later | |
| *cdma2000-HRPD* | C.S0024 or later | |
| *geran* | GSM TS 04.18, version 8.5.0 or later, or 3GPP TS 44.018 (clause 9.1.15)<br><br>3GPP TS 44.060, version 6.13.0 or later (clause 11.2.43)<br><br>3GPP TS 44.060, version 7.6.0 or later (clause 11.2.46) | HANDOVER COMMAND<br><br>PS HANDOVER COMMAND<br><br>DTM HANDOVER COMMAND |
| *utra* | 3GPP TS 25.331 (clause 10.2.16a) | HANDOVER TO UTRAN COMMAND |

## – Paging

The *Paging* message is used for the notification of one or more UEs.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: PCCH

Direction: E-UTRAN to UE

***Paging* message**

```
-- ASN1START

Paging ::=                SEQUENCE {
    pagingRecordList            PagingRecordList                OPTIONAL,  -- Need ON
    systemInfoModification      ENUMERATED {true}               OPTIONAL,  -- Need ON
    etws-Indication             ENUMERATED {true}               OPTIONAL,  -- Need ON
    nonCriticalExtension        Paging-v890-IEs                 OPTIONAL
}

Paging-v890-IEs ::=       SEQUENCE {
    lateNonCriticalExtension    OCTET STRING                    OPTIONAL,
    nonCriticalExtension        Paging-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 (SIZE (1..maxPageRec)) OF PagingRecord

PagingRecord ::=                 SEQUENCE {
    ue-Identity                      PagingUE-Identity,
    cn-Domain                        ENUMERATED {ps, cs},
    ...
}

PagingUE-Identity ::=            CHOICE {
    s-TMSI                           S-TMSI,
    imsi                             IMSI,
    ...
}

IMSI ::=                         SEQUENCE (SIZE (6..21)) OF IMSI-Digit

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

-- ASN1STOP
```

| ***Paging* field descriptions** |
|---|
| ***cmas-Indication***<br>If present: indication of a CMAS notification. |
| ***cn-Domain***<br>Indicates the origin of paging. |
| ***eab-ParamModification***<br>If present: indication of an EAB parameters (SIB14) modification. |
| ***etws-Indication***<br>If present: indication of an ETWS primary notification and/ or ETWS secondary notification. |
| ***imsi***<br>The International Mobile Subscriber Identity, a globally unique permanent subscriber identity, see TS 23.003 [27]. The first element contains the first IMSI digit, the second element contains the second IMSI digit and so on. |
| ***systemInfoModification***<br>If present: indication of a BCCH modification other than SIB10, SIB11, SIB12 and SIB14. |
| ***ue-Identity***<br>Provides the NAS identity of the UE that is being paged. |

## – ProximityIndication

The *ProximityIndication* message is used to indicate that the UE is entering or leaving the proximity of one or more CSG member cell(s).

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

***ProximityIndication* message**

```
-- ASN1START


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


ProximityIndication-r9-IEs ::= SEQUENCE {
    type-r9                             ENUMERATED {entering, leaving},
    carrierFreq-r9                  CHOICE {
        eutra-r9                        ARFCN-ValueEUTRA,
        utra-r9                         ARFCN-ValueUTRA,
```

```
        ...,
        eutra2-v9e0                 ARFCN-ValueEUTRA-v9e0
    },
    nonCriticalExtension        ProximityIndication-v930-IEs        OPTIONAL
}

ProximityIndication-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension        OCTET STRING            OPTIONAL,
    nonCriticalExtension        SEQUENCE {}                 OPTIONAL
}

-- ASN1STOP
```

| ***ProximityIndication* field descriptions** |
|---|
| ***carrierFreq***<br>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. |
| ***type***<br>Used to indicate whether the UE is entering or leaving the proximity of CSG member cell(s). |

## – RNReconfiguration

The *RNReconfiguration* is a command to modify the RN subframe configuration and/or to convey changed system information.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to RN

***RNReconfiguration message***

```
-- ASN1START

RNReconfiguration-r10 ::=       SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier,
    criticalExtensions              CHOICE {
        c1                          CHOICE {
            rnReconfiguration-r10       RNReconfiguration-r10-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
```

```
        criticalExtensionsFuture      SEQUENCE {}
    }
}

RNReconfiguration-r10-IEs ::=      SEQUENCE {
    rn-SystemInfo-r10                 RN-SystemInfo-r10          OPTIONAL,  -- Need ON
    rn-SubframeConfig-r10             RN-SubframeConfig-r10           OPTIONAL,  -- Need ON
    lateNonCriticalExtension          OCTET STRING                OPTIONAL,
    nonCriticalExtension              SEQUENCE {}                 OPTIONAL
}

RN-SystemInfo-r10 ::=           SEQUENCE {
    systemInformationBlockType1-r10     OCTET STRING (CONTAINING SystemInformationBlockType1)
    OPTIONAL,  -- Need ON
    systemInformationBlockType2-r10     SystemInformationBlockType2     OPTIONAL,  -- Need ON
    ...
}

-- ASN1STOP
```

## – 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***

```
-- ASN1START

RNReconfigurationComplete-r10 ::=      SEQUENCE {
    rrc-TransactionIdentifier          RRC-TransactionIdentifier,
    criticalExtensions                    CHOICE {
        c1                                CHOICE{
            rnReconfigurationComplete-r10          RNReconfigurationComplete-r10-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
```

```
        },
        criticalExtensionsFuture              SEQUENCE {}
    }
}

RNReconfigurationComplete-r10-IEs ::=  SEQUENCE {
    lateNonCriticalExtension                  OCTET STRING            OPTIONAL,
    nonCriticalExtension                  SEQUENCE {}                 OPTIONAL
}

-- ASN1STOP
```

## – RRCConnectionReconfiguration

The *RRCConnectionReconfiguration* message is the command to modify an RRC connection. It may convey information for measurement configuration, mobility control, radio resource configuration (including RBs, MAC main configuration and physical channel configuration) including any associated dedicated NAS information and security configuration.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

***RRCConnectionReconfiguration message***

```
-- ASN1START

RRCConnectionReconfiguration ::=    SEQUENCE {
    rrc-TransactionIdentifier          RRC-TransactionIdentifier,
    criticalExtensions                     CHOICE {
        c1                                 CHOICE{
            rrcConnectionReconfiguration-r8        RRCConnectionReconfiguration-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture          SEQUENCE {}
    }
}
```

```
RRCConnectionReconfiguration-r8-IEs ::= SEQUENCE {
    measConfig                      MeasConfig                      OPTIONAL,  -- Need ON
    mobilityControlInfo             MobilityControlInfo             OPTIONAL,  -- Cond HO
    dedicatedInfoNASList            SEQUENCE (SIZE(1..maxDRB)) OF
                                    DedicatedInfoNAS            OPTIONAL,  -- Cond nonHO
    radioResourceConfigDedicated    RadioResourceConfigDedicated    OPTIONAL, -- Cond HO-toEUTRA
    securityConfigHO                SecurityConfigHO                OPTIONAL,  -- Cond HO
    nonCriticalExtension            RRCConnectionReconfiguration-v890-IEs     OPTIONAL
}

RRCConnectionReconfiguration-v890-IEs ::= SEQUENCE {
    lateNonCriticalExtension        OCTET STRING                    OPTIONAL,
    nonCriticalExtension            RRCConnectionReconfiguration-v920-IEs     OPTIONAL
}

RRCConnectionReconfiguration-v920-IEs ::= SEQUENCE {
    otherConfig-r9                  OtherConfig-r9                  OPTIONAL,  -- Need ON
    fullConfig-r9                   ENUMERATED {true}               OPTIONAL,  -- Cond HO-Reestab
    nonCriticalExtension            RRCConnectionReconfiguration-v1020-IEs   OPTIONAL
}

RRCConnectionReconfiguration-v1020-IEs ::= SEQUENCE {
    sCellToReleaseList-r10          SCellToReleaseList-r10          OPTIONAL,  -- Need ON
    sCellToAddModList-r10               SCellToAddModList-r10           OPTIONAL,  -- Need ON
    nonCriticalExtension            RRCConnectionReconfiguration-v1130-IEs   OPTIONAL
}

RRCConnectionReconfiguration-v1130-IEs ::= SEQUENCE {
    systemInfomationBlockType1Dedicated-r11  OCTET STRING (CONTAINING SystemInformationBlockType1)
                                                                    OPTIONAL,  -- Need ON
    nonCriticalExtension            RRCConnectionReconfiguration-v1250-IEs   OPTIONAL
}

RRCConnectionReconfiguration-v1250-IEs ::= SEQUENCE {
```

```
    wlan-OffloadInfo-r12                CHOICE {
        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,  -- Cond nonFullConfig
    sl-SyncTxControl-r12                SL-SyncTxControl-r12            OPTIONAL,  -- Need ON
    sl-DiscConfig-r12                   SL-DiscConfig-r12               OPTIONAL,  -- Need ON
    sl-CommConfig-r12                   SL-CommConfig-r12                   OPTIONAL,  -- Need ON
    nonCriticalExtension            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
    ...
}

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
    radioResourceConfigCommonSCell-r10       RadioResourceConfigCommonSCell-r10  OPTIONAL,  -- Cond
SCellAdd
    radioResourceConfigDedicatedSCell-r10  RadioResourceConfigDedicatedSCell-r10 OPTIONAL,  -- Cond
SCellAdd2
    ...,
    [[  dl-CarrierFreq-v1090           ARFCN-ValueEUTRA-v9e0    OPTIONAL   -- Cond EARFCN-max
    ]]
}


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
    }
}


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 fullConfig
            keyChangeIndicator          BOOLEAN,
            nextHopChainingCount        NextHopChainingCount
        },
        interRAT                    SEQUENCE {
            securityAlgorithmConfig         SecurityAlgorithmConfig,
            nas-SecurityParamToEUTRA    OCTET STRING (SIZE(6))
        }
    },
    ...
}



-- ASN1STOP
```

| ***RRCConnectionReconfiguration* field descriptions** |
|---|
| ***dedicatedInfoNASList***<br>This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for each PDU in the list. |
| ***fullConfig***<br>Indicates the full configuration option is applicable for the RRC Connection Reconfiguration message. |
| ***keyChangeIndicator***<br>true is used only in an intra-cell handover when a $K_{eNB}$ 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 $K_{eNB}$ re-keying. false is used in an intra-LTE handover when the new $K_{eNB}$ key is obtained from the current $K_{eNB}$ key or from the NH as described in TS 33.401 [32]. |
| ***nas-securityParamToEUTRA***<br>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. |
| ***networkControlledSyncTx***<br>If configured, the 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. If the field is not configured, the UE acts in accordance with *syncTxThreshIC*. |
| ***nextHopChainingCount***<br>Parameter NCC: See TS 33.401 [32] |
| ***p-MeNB***<br>Indicates the guaranteed power for the MeNB, as specified in 36.213 [23]. |
| ***powerControlMode***<br>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]. |
| ***p-SeNB***<br>Indicates the guaranteed power for the SeNB as specified in 36.213 [23, Table 5.1.4.2-1]. |
| ***sCellIndex***<br>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. |
| ***sCellToAddModListSCG***<br>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*). |
| ***sCellToReleaseListSCG***<br>Indicates the SCG cell to be released. The field is also used to release the PSCell e.g. upon change of PSCell, upon system information change for the PSCell. |
| ***scg-Counter***<br>A counter used upon initial configuration of SCG security as well as upon refresh of S-$K_{eNB}$. E-UTRAN includes the field upon SCG change when one or more SCG DRBs are configured. Otherwise E-UTRAN does not include the field. |
| ***t350***<br>Timer T350 as described in section 7.3. Value *minN* corresponds to N minutes. |

| Conditional presence | Explanation |
|---|---|
| *EARFCN-max* | The field is mandatory present if *dl-CarrierFreq-r10* is included and set to *maxEARFCN*. Otherwise the field is not present. |
| *fullConfig* | This field is mandatory present for handover within E-UTRA when the *fullConfig* is included; otherwise it is optionally present, Need OP. |
| *HO* | The field is mandatory present in case of handover within E-UTRA or to E-UTRA; otherwise the field is not present. |
| *HO-Reestab* | 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. |
| *HO-toEUTRA* | The field is mandatory present in case of handover to E-UTRA or for reconfigurations when *fullConfig* is included; otherwise the field is optionally present, need ON. |
| *nonFullConfig* | The field is not present in case of handover within E-UTRA when the *fullConfig* is included or in case of handover to E-UTRA; otherwise it is optional present, need ON. |
| *nonHO* | The field is not present in case of handover within E-UTRA or to E-UTRA; otherwise it is optional present, need ON. |
| *SCellAdd* | The field is mandatory present upon SCell addition; otherwise it is not present. |
| *SCellAdd2* | The field is mandatory present upon SCell addition; otherwise it is optionally present, need ON. |

## – RRCConnectionReconfigurationComplete

The *RRCConnectionReconfigurationComplete* message is used to confirm the successful completion of an RRC connection reconfiguration.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

***RRCConnectionReconfigurationComplete message***

```
-- ASN1START

RRCConnectionReconfigurationComplete ::= SEQUENCE {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions              CHOICE {
        rrcConnectionReconfigurationComplete-r8
                                        RRCConnectionReconfigurationComplete-r8-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

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

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

RRCConnectionReconfigurationComplete-v1020-IEs ::= SEQUENCE {
    rlf-InfoAvailable-r10           ENUMERATED {true}           OPTIONAL,
    logMeasAvailable-r10            ENUMERATED {true}           OPTIONAL,
    nonCriticalExtension            RRCConnectionReconfigurationComplete-v1130-IEs    OPTIONAL
}

RRCConnectionReconfigurationComplete-v1130-IEs ::= SEQUENCE {
```

```
    connEstFailInfoAvailable-r11        ENUMERATED {true}               OPTIONAL,
    nonCriticalExtension                RRCConnectionReconfigurationComplete-v1250-IEs     OPTIONAL
}

RRCConnectionReconfigurationComplete-v1250-IEs ::= SEQUENCE {
    logMeasAvailableMBSFN-r12           ENUMERATED {true}               OPTIONAL,
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

## – RRCConnectionReestablishment

The *RRCConnectionReestablishment* message is used to re-establish SRB1.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: E-UTRAN to UE

***RRCConnectionReestablishment message***

```
-- ASN1START

RRCConnectionReestablishment ::=    SEQUENCE {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        c1                              CHOICE{
            rrcConnectionReestablishment-r8     RRCConnectionReestablishment-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4    NULL,
            spare3 NULL, spare2 NULL, spare1    NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
    }
}

RRCConnectionReestablishment-r8-IEs ::= SEQUENCE {
```

```
    radioResourceConfigDedicated    RadioResourceConfigDedicated,
    nextHopChainingCount            NextHopChainingCount,
    nonCriticalExtension            RRCConnectionReestablishment-v8a0-IEs    OPTIONAL
}

RRCConnectionReestablishment-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension        OCTET STRING                    OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                     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-v1250-IEs ::= SEQUENCE {
    logMeasAvailableMBSFN-r12       ENUMERATED {true}           OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                 OPTIONAL
}

-- ASN1STOP
```

| ***RRCConnectionReestablishmentComplete* field descriptions** |
|---|
| ***rlf-InfoAvailable*** |
| This 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***

```
-- ASN1START

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

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

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

-- ASN1STOP
```

## – 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***

```
-- ASN1START
```

```
RRCConnectionReestablishmentRequest ::= SEQUENCE {
    criticalExtensions                  CHOICE {
        rrcConnectionReestablishmentRequest-r8
                                        RRCConnectionReestablishmentRequest-r8-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

RRCConnectionReestablishmentRequest-r8-IEs ::= SEQUENCE {
    ue-Identity                         ReestabUE-Identity,
    reestablishmentCause                ReestablishmentCause,
    spare                           BIT STRING (SIZE (2))
}

ReestabUE-Identity ::=              SEQUENCE {
    c-RNTI                              C-RNTI,
    physCellId                          PhysCellId,
    shortMAC-I                          ShortMAC-I
}

ReestablishmentCause ::=            ENUMERATED {
                                    reconfigurationFailure, handoverFailure,
                                    otherFailure, spare1}

-- ASN1STOP
```

| ***RRCConnectionReestablishmentRequest* field descriptions** |
|---|
| ***physCellId***<br>The Physical Cell Identity of the PCell the UE was connected to prior to the failure. |
| ***reestablishmentCause***<br>Indicates the failure cause that triggered the re-establishment procedure. |
| ***ue-Identity***<br>UE identity included to retrieve UE context and to facilitate contention resolution by lower layers. |

## – 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***

```
-- ASN1START

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 {
    deprioritisationReq-r11         SEQUENCE {
        deprioritisationType-r11    ENUMERATED {frequency, e-utra},
```

```
        deprioritisationTimer-r11           ENUMERATED {min5, min10, min15, min30}
    }                                                                   OPTIONAL,  -- Need ON
    nonCriticalExtension            SEQUENCE {}                         OPTIONAL
}


-- ASN1STOP
```

| ***RRCConnectionReject* field descriptions** |
|---|
| ***deprioritisationReq*** <br> Indicates whether the current frequency or RAT is to be de-prioritised. The UE shall be able to store a depriotisation request for up to 8 frequencies (applicable when receiving another frequency specific deprioritisation request before T325 expiry). |
| ***deprioritisationTimer*** <br> Indicates the period for which either the current carrier frequency or E-UTRA is deprioritised. Value *minN* corresponds to N minutes. |
| ***extendedWaitTime*** <br> Value in seconds for the wait time for Delay Tolerant access requests. |
| ***waitTime*** <br> Wait time value in seconds. |

## – RRCConnectionRelease

The *RRCConnectionRelease* message is used to command the release of an RRC connection.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

***RRCConnectionRelease message***

```
-- ASN1START


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

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

RRCConnectionRelease-v890-IEs ::=  SEQUENCE {
    lateNonCriticalExtension            OCTET STRING (CONTAINING RRCConnectionRelease-v9e0-IEs)
    OPTIONAL,
    nonCriticalExtension            RRCConnectionRelease-v920-IEs       OPTIONAL
}

-- Late non critical extensions
RRCConnectionRelease-v9e0-IEs ::= SEQUENCE {
    redirectedCarrierInfo-v9e0          RedirectedCarrierInfo-v9e0          OPTIONAL,  -- Cond NoRedirect-r8
    idleModeMobilityControlInfo-v9e0    IdleModeMobilityControlInfo-v9e0    OPTIONAL,  -- Cond
IdleInfoEUTRA
    nonCriticalExtension            SEQUENCE {}                         OPTIONAL
}

-- Regular non critical extensions
RRCConnectionRelease-v920-IEs ::=  SEQUENCE {
    cellInfoList-r9                 CHOICE {
        geran-r9                    CellInfoListGERAN-r9,
        utra-FDD-r9                     CellInfoListUTRA-FDD-r9,
        utra-TDD-r9                     CellInfoListUTRA-TDD-r9,
        ...,
        utra-TDD-r10                CellInfoListUTRA-TDD-r10
    }                                                       OPTIONAL,  -- Cond Redirection
    nonCriticalExtension        RRCConnectionRelease-v1020-IEs      OPTIONAL
}

RRCConnectionRelease-v1020-IEs ::=SEQUENCE {
    extendedWaitTime-r10                INTEGER (1..1800)       OPTIONAL,  -- Need ON
    nonCriticalExtension        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-HRPD                   CarrierFreqCDMA2000,
    cdma2000-1xRTT                  CarrierFreqCDMA2000,
    ...,
                                            utra-TDD-r10                CarrierFreqListUTRA-TDD-r10
}

RedirectedCarrierInfo-v9e0 ::=  SEQUENCE {
    eutra-v9e0                      ARFCN-ValueEUTRA-v9e0
}

CarrierFreqListUTRA-TDD-r10 ::=         SEQUENCE (SIZE (1..maxFreqUTRA-TDD-r10)) OF ARFCN-
ValueUTRA

IdleModeMobilityControlInfo ::= SEQUENCE {
    freqPriorityListEUTRA           FreqPriorityListEUTRA       OPTIONAL,   -- Need ON
    freqPriorityListGERAN           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

FreqsPriorityGERAN ::=              SEQUENCE {
    carrierFreqs                    CarrierFreqsGERAN,
    cellReselectionPriority             CellReselectionPriority
}

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

FreqPriorityUTRA-FDD ::=            SEQUENCE {
```

```
    carrierFreq                 ARFCN-ValueUTRA,
    cellReselectionPriority     CellReselectionPriority
}

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

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

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

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

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

BandClassPriority1XRTT ::=      SEQUENCE {
    bandClass                   BandclassCDMA2000,
    cellReselectionPriority     CellReselectionPriority
}

CellInfoListGERAN-r9 ::=    SEQUENCE (SIZE (1..maxCellInfoGERAN-r9)) OF CellInfoGERAN-r9

CellInfoGERAN-r9 ::=        SEQUENCE {
    physCellId-r9           PhysCellIdGERAN,
    carrierFreq-r9          CarrierFreqGERAN,
    systemInformation-r9        SystemInfoListGERAN
}

CellInfoListUTRA-FDD-r9 ::=     SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-FDD-r9
```

```
CellInfoUTRA-FDD-r9 ::=             SEQUENCE {
    physCellId-r9                   PhysCellIdUTRA-FDD,
    utra-BCCH-Container-r9              OCTET STRING
}

CellInfoListUTRA-TDD-r9 ::=         SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-TDD-r9

CellInfoUTRA-TDD-r9 ::=             SEQUENCE {
    physCellId-r9                   PhysCellIdUTRA-TDD,
    utra-BCCH-Container-r9              OCTET STRING
}

CellInfoListUTRA-TDD-r10 ::=        SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-TDD-r10

CellInfoUTRA-TDD-r10 ::=            SEQUENCE {
    physCellId-r10                  PhysCellIdUTRA-TDD,
    carrierFreq-r10                 ARFCN-ValueUTRA,
    utra-BCCH-Container-r10             OCTET STRING
}

-- ASN1STOP
```

| ***RRCConnectionRelease* 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 r*edirectedCarrierInfo* 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*.<br>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]. |

| Conditional presence | Explanation |
|---|---|
| *EARFCN-max* | The field is mandatory present if the corresponding *carrierFreq* (i.e. without suffix) is set to *maxEARFCN*. Otherwise the field is not present. |
| *IdleInfoEUTRA* | 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. |
| *NoRedirect-r8* | The field is optionally present, need OP, if the *redirectedCarrierInfo* (i.e. without suffix) is not included; otherwise the field is not present. |
| *Redirection* | 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. |

## – RRCConnectionRequest

The *RRCConnectionRequest* message is used to request the establishment of an RRC connection.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to E-UTRAN

***RRCConnectionRequest message***

```
-- ASN1START

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, spare2, spare1}

-- ASN1STOP
```

| *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***

```
-- ASN1START

RRCConnectionSetup ::=              SEQUENCE {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions              CHOICE {
        c1                          CHOICE {
            rrcConnectionSetup-r8           RRCConnectionSetup-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture    SEQUENCE {}
    }
}

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

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

```
    nonCriticalExtension            SEQUENCE {}                     OPTIONAL
}


-- ASN1STOP
```

## – RRCConnectionSetupComplete

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***

```
-- ASN1START


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


RRCConnectionSetupComplete-r8-IEs ::= SEQUENCE {
    selectedPLMN-Identity           INTEGER (1..maxPLMN-r11),
    registeredMME                   RegisteredMME                   OPTIONAL,
    dedicatedInfoNAS                DedicatedInfoNAS,
    nonCriticalExtension            RRCConnectionSetupComplete-v8a0-IEs OPTIONAL
}


RRCConnectionSetupComplete-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension        OCTET STRING                    OPTIONAL,
```

```
    nonCriticalExtension            RRCConnectionSetupComplete-v1020-IEs    OPTIONAL
}

RRCConnectionSetupComplete-v1020-IEs ::= SEQUENCE {
    gummei-Type-r10                 ENUMERATED {native, mapped}             OPTIONAL,
    rlf-InfoAvailable-r10           ENUMERATED {true}                       OPTIONAL,
    logMeasAvailable-r10            ENUMERATED {true}                       OPTIONAL,
    rn-SubframeConfigReq-r10        ENUMERATED {required, notRequired} OPTIONAL,
    nonCriticalExtension            RRCConnectionSetupComplete-v1130-IEs    OPTIONAL
}

RRCConnectionSetupComplete-v1130-IEs ::= SEQUENCE {
    connEstFailInfoAvailable-r11    ENUMERATED {true}               OPTIONAL,
    nonCriticalExtension            RRCConnectionSetupComplete-v1250-IEs    OPTIONAL
}

RRCConnectionSetupComplete-v1250-IEs ::= SEQUENCE {
    mobilityState-r12               ENUMERATED {normal, medium, high, spare} OPTIONAL,
    mobilityHistoryAvail-r12        ENUMERATED {true}               OPTIONAL,
    logMeasAvailableMBSFN-r12       ENUMERATED {true}               OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                     OPTIONAL
}

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

-- ASN1STOP
```

| ***RRCConnectionSetupComplete* field descriptions** |
|---|
| ***gummei-Type***<br>This field is used to indicate whether the GUMMEI included is native (assigned by EPC) or mapped (from 2G/3G identifiers). |
| ***mmegi***<br>Provides the Group Identity of the registered MME within the PLMN, as provided by upper layers, see TS 23.003 [27]. |
| ***mobilityState***<br>This field indicates the UE mobility state (as defined in TS 36.304 5.2.4.3 [4]) just prior to UE going into RRC_CONNECTED state. The values of *medium* and *high* respectively correspond to the UE being in Medium-mobility and High-mobility states. Otherwise the UE is in *normal* state. |
| ***registeredMME***<br>This field is used to transfer the GUMMEI of the MME where the UE is registered, as provided by upper layers. |
| ***rn-SubframeConfigReq***<br>If present, this field indicates that the connection establishment is for an RN and whether a subframe configuration is requested or not. |
| ***selectedPLMN-Identity***<br>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          SEQUENCE {}                       OPTIONAL
}
```

```
FailureReportSCG-r12 ::=            SEQUENCE {
    failureType-r12                     ENUMERATED {t313-Expiry, randomAccessProblem,
                                            rlc-MaxNumRetx, scg-ChangeFailure },
    measResultServFreqList-r12          MeasResultServFreqList-r10      OPTIONAL,
    measResultNeighCells-r12        MeasResultList2EUTRA-r9         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.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

***SecurityModeComplete message***

```
-- ASN1START

SecurityModeComplete ::=        SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier,
    criticalExtensions              CHOICE {
        securityModeComplete-r8             SecurityModeComplete-r8-IEs,
        criticalExtensionsFuture    SEQUENCE {}
    }
}

SecurityModeComplete-r8-IEs ::=     SEQUENCE {
    nonCriticalExtension        SecurityModeComplete-v8a0-IEs                   OPTIONAL
}
```

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

-- ASN1STOP
```

### – SecurityModeFailure

The *SecurityModeFailure* message is used to indicate an unsuccessful completion of a security mode command.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

***SecurityModeFailure message***

```
-- ASN1START

SecurityModeFailure ::=             SEQUENCE {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        securityModeFailure-r8              SecurityModeFailure-r8-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

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

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

```
-- ASN1STOP
```

## – 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***

```
-- ASN1START

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))

-- ASN1STOP
```

| ***SidelinkUEInformation* field descriptions** |
|---|
| ***commRxInterestedFreq***<br>Indicates the frequency on which the UE is interested to receive sidelink direct communication. |
| ***commTxResourceReq***<br>Indicates indicates the frequency on which the UE is interested to transmit sidelink direct communication as well as the sidelink direct communication transmission destination(s) for which the UE requests E-UTRAN to assign dedicated resources. |
| ***destinationInfoList***<br>Indicates the destination which is identified by the ProSe Layer-2 Group ID as specified in TS 23.303 [68]. |
| ***discRxInterest***<br>Indicates that the UE is interested to monitor sidelink direct discovery announcements. |
| ***discTxResourceReq***<br>Indicates the number of resources the UE requires every discovery period for transmitting sidelink direct discovery announcement. It concerns the number of separate discovery message(s) the UE wants to transmit every discovery period. |

## – 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},
        intraFreqReselection        ENUMERATED {allowed, notAllowed},
        csg-Indication                  BOOLEAN,
        csg-Identity                CSG-Identity        OPTIONAL   -- Need OR
    },
    cellSelectionInfo           SEQUENCE {
        q-RxLevMin                      Q-RxLevMin,
        q-RxLevMinOffset                INTEGER (1..8)      OPTIONAL   -- Need OP
    },
    p-Max                       P-Max                   OPTIONAL,       -- Need OP
    freqBandIndicator               FreqBandIndicator,
    schedulingInfoList              SchedulingInfoList,
    tdd-Config                      TDD-Config              OPTIONAL,  -- Cond TDD
    si-WindowLength                 ENUMERATED {
                                    ms1, ms2, ms5, ms10, ms15, ms20,
                                    ms40},
    systemInfoValueTag              INTEGER (0..31),
    nonCriticalExtension        SystemInformationBlockType1-v890-IEs  OPTIONAL
}

SystemInformationBlockType1-v890-IEs::=   SEQUENCE {
    lateNonCriticalExtension        OCTET STRING (CONTAINING SystemInformationBlockType1-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            SEQUENCE {}                   OPTIONAL
}

-- Regular non critical extensions
SystemInformationBlockType1-v920-IEs ::= SEQUENCE {
    ims-EmergencySupport-r9             ENUMERATED {true}         OPTIONAL, -- Need OR
    cellSelectionInfo-v920              CellSelectionInfo-v920    OPTIONAL, -- Cond RSRQ
    nonCriticalExtension            SystemInformationBlockType1-v1130-IEs    OPTIONAL
}

SystemInformationBlockType1-v1130-IEs ::=    SEQUENCE {
    tdd-Config-v1130                TDD-Config-v1130          OPTIONAL, -- Cond TDD-OR
    cellSelectionInfo-v1130         CellSelectionInfo-v1130   OPTIONAL, -- Cond WB-RSRQ
    nonCriticalExtension        SystemInformationBlockType1-v1250-IEs    OPTIONAL
}

SystemInformationBlockType1-v1250-IEs ::=    SEQUENCE {
    cellAccessRelatedInfo-v1250                 SEQUENCE {
        category0Allowed-r12                    ENUMERATED {true}     OPTIONAL  -- Need OP
    },
    cellSelectionInfo-v1250             CellSelectionInfo-v1250   OPTIONAL, -- Cond RSRQ2
    freqBandIndicatorPriority-r12       ENUMERATED {true}         OPTIONAL, -- Cond mFBI
    nonCriticalExtension        SEQUENCE {}                   OPTIONAL
```

```
}

PLMN-IdentityList ::=                SEQUENCE (SIZE (1..maxPLMN-r11)) OF PLMN-IdentityInfo

PLMN-IdentityInfo ::=                SEQUENCE {
    plmn-Identity                    PLMN-Identity,
    cellReservedForOperatorUse           ENUMERATED {reserved, notReserved}
}

SchedulingInfoList ::= SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo

SchedulingInfo ::=    SEQUENCE {
    si-Periodicity                   ENUMERATED {
                                         rf8, rf16, rf32, rf64, rf128, rf256, rf512},
    sib-MappingInfo                  SIB-MappingInfo
}

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***<br>The presence of this field indicates category 0 UEs are allowed to access the cell. |
| ***cellBarred***<br>barred means the cell is barred, as defined in TS 36.304 [4]. |
| ***cellReservedForOperatorUse***<br>As defined in TS 36.304 [4]. |
| ***csg-Identity***<br>Identity of the Closed Subscriber Group the cell belongs to. |
| ***csg-Indication***<br>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***<br>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.* |
| ***ims-EmergencySupport***<br>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***<br>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***<br>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. |
| ***plmn-IdentityList***<br>List of PLMN identities. The first listed *PLMN-Identity* is the primary PLMN. |
| ***p-Max***<br>Value applicable for the cell. If absent the UE applies the maximum power according to the UE capability. |
| ***q-QualMin***<br>Parameter '$Q_{qualmin}$' in TS 36.304 [4]. If *cellSelectionInfo-v920* is not present, the UE applies the (default) value of negative infinity for $Q_{qualmin}$. NOTE 1. |
| ***q-QualMinRSRQ-OnAllSymbols***<br>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***<br>Parameter '$Q_{qualminoffset}$' in TS 36.304 [4]. Actual value $Q_{qualminoffset}$ = 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 $Q_{qualminoffset}$. Affects the minimum required quality level in the cell. |
| ***q-QualMinWB***<br>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***<br>Parameter $Q_{rxlevminoffset}$ in TS 36.304 [4]. Actual value $Q_{rxlevminoffset}$ = IE value * 2 [dB]. If absent, the UE applies the (default) value of 0 dB for $Q_{rxlevminoffset}$. Affects the minimum required Rx level in the cell. |
| ***sib-MappingInfo***<br>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***<br>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***<br>Common SI scheduling window for all SIs. Unit in milliseconds, where ms1 denotes 1 millisecond, ms2 denotes 2 milliseconds and so on. |
| ***systemInfoValueTag***<br>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***<br>A *trackingAreaCode* that is common for all the PLMNs listed. |

NOTE 1: The value the UE applies for parameter '$Q_{qualmin}$' 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).

| q-QualMinRSRQ-OnAllSymbols | q-QualMinWB | Value of parameter '$Q_{qualmin}$' in TS 36.304 [4] |
|---|---|---|
| Included | Included | *q-QualMinRSRQ-OnAllSymbols* – (*q-QualMin* – *q-QualMinWB*) |
| Included | Not included | *q-QualMinRSRQ-OnAllSymbols* |
| Not included | Included | *q-QualMinWB* |
| Not included | Not included | *q-QualMin* |

| 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 and the UE shall delete any existing value for this field. |
| *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***

```
-- ASN1START


UEAssistanceInformation-r11 ::=             SEQUENCE {
    criticalExtensions              CHOICE {
        c1                          CHOICE {
            ueAssistanceInformation-r11         UEAssistanceInformation-r11-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture    SEQUENCE {}
    }
}
```

```
UEAssistanceInformation-r11-IEs ::=     SEQUENCE {
    powerPrefIndication-r11             ENUMERATED {normal, lowPowerConsumption}  OPTIONAL,
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

| ***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***

```
-- ASN1START

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

UECapabilityEnquiry-r8-IEs ::=      SEQUENCE {
    ue-CapabilityRequest            UE-CapabilityRequest,
```

```
    nonCriticalExtension            UECapabilityEnquiry-v8a0-IEs      OPTIONAL
}

UECapabilityEnquiry-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension        OCTET STRING                      OPTIONAL,
    nonCriticalExtension            UECapabilityEnquiry-v1180-IEs                 OPTIONAL
}

UECapabilityEnquiry-v1180-IEs ::= SEQUENCE {
    requestedFrequencyBands-r11     SEQUENCE (SIZE (1..16)) OF FreqBandIndicator-r11
    OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                       OPTIONAL
}

UE-CapabilityRequest ::=        SEQUENCE (SIZE (1..maxRAT-Capabilities)) OF RAT-Type

-- ASN1STOP
```

| ***UECapabilityEnquiry* field descriptions** |
|---|
| ***ue-CapabilityRequest***<br>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***<br>List of frequency bands for which the UE is requested to provide supported CA band combinations and non CA bands. |

## – UECapabilityInformation

The *UECapabilityInformation* message is used to transfer of UE radio access capabilities requested by the E-UTRAN.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

***UECapabilityInformation message***

```
-- ASN1START

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

```
            ueCapabilityInformation-r8          UECapabilityInformation-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
    }
}

UECapabilityInformation-r8-IEs ::=  SEQUENCE {
    ue-CapabilityRAT-ContainerList      UE-CapabilityRAT-ContainerList,
    nonCriticalExtension            UECapabilityInformation-v8a0-IEs    OPTIONAL
}

UECapabilityInformation-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,
    nonCriticalExtension            UECapabilityInformation-v1250-IEs   OPTIONAL
}

UECapabilityInformation-v1250-IEs ::= SEQUENCE {
    ue-RadioPagingInfo-r12              UE-RadioPagingInfo-r12              OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

| ***UECapabilityInformation* field descriptions** |
|---|
| ***ue-RadioPagingInfo*** <br> This field contains information used for paging of category 0 UEs. The UE shall include this field when category 0 has been indicated by *ue-Category-v1250* in *UE-EUTRA-Capability.* |

## – UEInformationRequest

The *UEInformationRequest* is the command used by E-UTRAN to retrieve information from the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

***UEInformationRequest message***

```
-- ASN1START

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

UEInformationRequest-r9-IEs ::= SEQUENCE {
    rach-ReportReq-r9 BOOLEAN,
    rlf-ReportReq-r9 BOOLEAN,
    nonCriticalExtension UEInformationRequest-v930-IEs OPTIONAL
}

UEInformationRequest-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    nonCriticalExtension UEInformationRequest-v1020-IEs OPTIONAL
}

UEInformationRequest-v1020-IEs ::= SEQUENCE {
    logMeasReportReq-r10 ENUMERATED {true} OPTIONAL, -- Need ON
    nonCriticalExtension UEInformationRequest-v1130-IEs OPTIONAL
}

UEInformationRequest-v1130-IEs ::= SEQUENCE {
    connEstFailReportReq-r11 ENUMERATED {true} OPTIONAL, -- Need ON
    nonCriticalExtension UEInformationRequest-v1250-IEs OPTIONAL
}
```

```
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              UEInformationResponse-r9-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture              SEQUENCE {}
    }
}

UEInformationResponse-r9-IEs ::=      SEQUENCE {
    rach-Report-r9                        SEQUENCE {
        numberOfPreamblesSent-r9              NumberOfPreamblesSent-r11,
        contentionDetected-r9                 BOOLEAN
```

```
    }                                                   OPTIONAL,
    rlf-Report-r9                   RLF-Report-r9       OPTIONAL,
    nonCriticalExtension            UEInformationResponse-v930-IEs          OPTIONAL
}

-- Late non critical extensions
UEInformationResponse-v9e0-IEs ::= SEQUENCE {
    rlf-Report-v9e0                 RLF-Report-v9e0             OPTIONAL,
    nonCriticalExtension        SEQUENCE {}                 OPTIONAL
}

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

UEInformationResponse-v1020-IEs ::= SEQUENCE {
    logMeasReport-r10               LogMeasReport-r10           OPTIONAL,
    nonCriticalExtension        UEInformationResponse-v1130-IEs     OPTIONAL
}

UEInformationResponse-v1130-IEs ::= SEQUENCE {
    connEstFailReport-r11           ConnEstFailReport-r11       OPTIONAL,
    nonCriticalExtension        UEInformationResponse-v1250-IEs OPTIONAL
}

UEInformationResponse-v1250-IEs ::= SEQUENCE {
    mobilityHistoryReport-r12       MobilityHistoryReport-r12   OPTIONAL,
    nonCriticalExtension        SEQUENCE {}                 OPTIONAL
}

RLF-Report-r9 ::=               SEQUENCE {
    measResultLastServCell-r9           SEQUENCE {
```

```
        rsrpResult-r9                   RSRP-Range,
        rsrqResult-r9                   RSRQ-Range          OPTIONAL
    },
    measResultNeighCells-r9             SEQUENCE {
        measResultListEUTRA-r9              MeasResultList2EUTRA-r9         OPTIONAL,
        measResultListUTRA-r9               MeasResultList2UTRA-r9          OPTIONAL,
        measResultListGERAN-r9              MeasResultListGERAN             OPTIONAL,
        measResultsCDMA2000-r9              MeasResultList2CDMA2000-r9      OPTIONAL
    }   OPTIONAL,
    ...,
    [[  locationInfo-r10            LocationInfo-r10    OPTIONAL,
        failedPCellId-r10               CHOICE {
            cellGlobalId-r10                CellGlobalIdEUTRA,
            pci-arfcn-r10                   SEQUENCE {
                physCellId-r10                  PhysCellId,
                carrierFreq-r10                 ARFCN-ValueEUTRA
            }
        }                                                   OPTIONAL,
        reestablishmentCellId-r10       CellGlobalIdEUTRA           OPTIONAL,
        timeConnFailure-r10             INTEGER (0..1023)       OPTIONAL,
        connectionFailureType-r10       ENUMERATED {rlf, hof}       OPTIONAL,
        previousPCellId-r10             CellGlobalIdEUTRA           OPTIONAL
    ]],
    [[  failedPCellId-v1090             SEQUENCE {
            carrierFreq-v1090               ARFCN-ValueEUTRA-v9e0
        }                                                   OPTIONAL
    ]],
    [[  basicFields-r11                 SEQUENCE {
            c-RNTI-r11                      C-RNTI,
            rlf-Cause-r11                   ENUMERATED {
                                                t310-Expiry, randomAccessProblem,
                                                rlc-MaxNumRetx, t312-Expiry-r12},
            timeSinceFailure-r11            TimeSinceFailure-r11
        }                                                   OPTIONAL,
        previousUTRA-CellId-r11             SEQUENCE {
```

```
            carrierFreq-r11                 ARFCN-ValueUTRA,
            physCellId-r11                  CHOICE {
                fdd-r11                         PhysCellIdUTRA-FDD,
                tdd-r11                         PhysCellIdUTRA-TDD
            },
            cellGlobalId-r11            CellGlobalIdUTRA        OPTIONAL
        }                                                       OPTIONAL,
        selectedUTRA-CellId-r11         SEQUENCE {
            carrierFreq-r11                 ARFCN-ValueUTRA,
            physCellId-r11                  CHOICE {
                fdd-r11                         PhysCellIdUTRA-FDD,
                tdd-r11                         PhysCellIdUTRA-TDD
            }
        }                                                       OPTIONAL
    ]],
    [[  failedPCellId-v1250             SEQUENCE {
            tac-FailedPCell-r12         TrackingAreaCode
        }                                                       OPTIONAL,
        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

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

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

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

LogMeasReport-r10 ::=               SEQUENCE {
    absoluteTimeStamp-r10           AbsoluteTimeInfo-r10,
    traceReference-r10              TraceReference-r10,
    traceRecordingSessionRef-r10    OCTET STRING (SIZE (2)),
    tce-Id-r10                      OCTET STRING (SIZE (1)),
    logMeasInfoList-r10             LogMeasInfoList-r10,
    logMeasAvailable-r10            ENUMERATED {true}           OPTIONAL,
    ...
```

```
}

LogMeasInfoList-r10 ::=          SEQUENCE (SIZE (1..maxLogMeasReport-r10)) OF LogMeasInfo-r10

LogMeasInfo-r10 ::=          SEQUENCE {
    locationInfo-r10                LocationInfo-r10      OPTIONAL,
    relativeTimeStamp-r10           INTEGER (0..7200),
    servCellIdentity-r10            CellGlobalIdEUTRA,
    measResultServCell-r10          SEQUENCE {
        rsrpResult-r10                  RSRP-Range,
        rsrqResult-r10                  RSRQ-Range
    },
    measResultNeighCells-r10        SEQUENCE {
        measResultListEUTRA-r10         MeasResultList2EUTRA-r9     OPTIONAL,
        measResultListUTRA-r10          MeasResultList2UTRA-r9      OPTIONAL,
        measResultListGERAN-r10         MeasResultList2GERAN-r10    OPTIONAL,
        measResultListCDMA2000-r10          MeasResultList2CDMA2000-r9     OPTIONAL
    }   OPTIONAL,
    ...,
    [[  measResultListEUTRA-v1090       MeasResultList2EUTRA-v9e0 OPTIONAL
    ]],
    [[  measResultListMBSFN-r12         MeasResultListMBSFN-r12OPTIONAL,
        measResultServCell-v1250        RSRQ-Range-v1250        OPTIONAL,
        servCellRSRQ-Type-r12           RSRQ-Type-r12           OPTIONAL,
        measResultListEUTRA-v1250       MeasResultList2EUTRA-v1250    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-r11                LocationInfo-r10            OPTIONAL,
    measResultFailedCell-r11            SEQUENCE {
        rsrpResult-r11                  RSRP-Range,
        rsrqResult-r11                  RSRQ-Range          OPTIONAL
    },
```

```
    measResultNeighCells-r11            SEQUENCE {
        measResultListEUTRA-r11             MeasResultList2EUTRA-r9         OPTIONAL,
        measResultListUTRA-r11              MeasResultList2UTRA-r9          OPTIONAL,
        measResultListGERAN-r11             MeasResultListGERAN             OPTIONAL,
        measResultsCDMA2000-r11                 MeasResultList2CDMA2000-r9      OPTIONAL
    }   OPTIONAL,
    numberOfPreamblesSent-r11           NumberOfPreamblesSent-r11,
    contentionDetected-r11              BOOLEAN,
    maxTxPowerReached-r11               BOOLEAN,
    timeSinceFailure-r11            TimeSinceFailure-r11,
    measResultListEUTRA-v1130           MeasResultList2EUTRA-v9e0       OPTIONAL,
    ...,
    [[  measResultFailedCell-v1250      RSRQ-Range-v1250            OPTIONAL,
        failedCellRSRQ-Type-r12         RSRQ-Type-r12               OPTIONAL,
        measResultListEUTRA-v1250       MeasResultList2EUTRA-v1250      OPTIONAL
    ]]
}

NumberOfPreamblesSent-r11::=            INTEGER (1..200)

TimeSinceFailure-r11 ::=                INTEGER (0..172800)

MobilityHistoryReport-r12 ::=  VisitedCellInfoList-r12

-- ASN1STOP
```

| *UEInformationResponse* field descriptions |
|---|
| ***absoluteTimeStamp***<br>Indicates the absolute time when the logged measurement configuration logging is provided, as indicated by E-UTRAN within *absoluteTimeInfo*. |
| ***bler***<br>Indicates the measured BLER value.<br>The coding of BLER value is defined in TS 36.133 [16]. |
| ***blocksReceived***<br>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]. |
| ***carrierFreq***<br>In case the UE includes *carrierFreq-v9e0* and/ or *carrierFreq-v1090*, the UE shall set the corresponding entry of *carrierFreq-r9* and/ or *carrierFreq-r10* respectively to *maxEARFCN*. For E-UTRA and UTRA frequencies, the UE sets the ARFCN according to the band used when obtaining the concerned measurement results. |
| ***connectionFailureType***<br>This field is used to indicate whether the connection failure is due to radio link failure or handover failure. |
| ***contentionDetected***<br>This field is used to indicate that contention was detected for at least one of the transmitted preambles, see TS 36.321 [6]. |
| ***c-RNTI***<br>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. |
| ***dataBLER-MCH-ResultList***<br>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*. |
| ***failedCellId***<br>This field is used to indicate the cell in which connection establishment failed. |
| ***failedPCellId***<br>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. |
| ***maxTxPowerReached***<br>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]. |
| ***mch-Index***<br>Indicates the MCH by referring to the entry as listed in *pmch-InfoList* within *MBSFNAreaConfiguration*. |
| ***measResultFailedCell***<br>This field refers to the last measurement results taken in the cell, where connection establishment failure happened. |
| ***measResultLastServCell***<br>This field refers to the last measurement results taken in the PCell, where radio link failure or handover failure happened. |
| ***measResultListEUTRA***<br>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. |
| ***measResultListEUTRA-v1250***<br>If included in *RLF-Report-r9* the UE shall include the same number of entries, and listed in the same order, as in *measResultListEUTRA-r9*;<br>If included in *LogMeasInfo-r10* the UE shall include the same number of entries, and listed in the same order, as in *measResultListEUTRA-r10*;<br>If included in *ConnEstFailReport-r11* the UE shall include the same number of entries, and listed in the same order, as in *measResultListEUTRA-r11*; |
| ***mobilityHistoryReport***<br>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. |
| ***numberOfPreamblesSent***<br>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]. |
| ***previousPCellId***<br>This field is used to indicate the source PCell of the last handover (source PCell when the last *RRC-Connection-Reconfiguration* message including *mobilityControlInfo*was received). |
| ***previousUTRA-CellId***<br>This field is used to indicate the source UTRA cell of the last successful handover to E-UTRAN, when RLF occurred at the target PCell. The UE sets the ARFCN according to the band used for transmission/ reception on the concerned cell. |
| ***reestablishmentCellId***<br>This field is used to indicate the cell in which the re-establishment attempt was made after connection failure. |
| ***relativeTimeStamp***<br>Indicates the time of logging measurement results, measured relative to the *absoluteTimeStamp*. Value in seconds. |

| *UEInformationResponse* field descriptions |
|---|
| ***rlf-Cause***<br>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***<br>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***<br>Includes a BLER result of MBSFN subframes using *signallingMCS*. |
| ***tac-FailedPCell***<br>This field is used to indicate the Tracking Area Code of the PCell in which RLF is detected. |
| ***tce-Id***<br>Parameter Trace Collection Entity Id: See TS 32.422 [58]. |
| ***timeConnFailure***<br>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***<br>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***<br>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 {
        c1                              CHOICE {
            ulHandoverPreparationTransfer-r8      ULHandoverPreparationTransfer-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}


ULHandoverPreparationTransfer-r8-IEs ::= SEQUENCE {
    cdma2000-Type                   CDMA2000-Type,
    meid                            BIT STRING (SIZE (56))    OPTIONAL,
```

```
    dedicatedInfo                DedicatedInfoCDMA2000,
    nonCriticalExtension         ULHandoverPreparationTransfer-v8a0-IEs     OPTIONAL
}

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

-- ASN1STOP
```

| ***ULHandoverPreparationTransfer* field descriptions** |
|---|
| ***meid*** <br> The 56 bit mobile identification number provided by the CDMA2000 Upper layers. |

## – ULInformationTransfer

The *ULInformationTransfer* message is used for the uplink transfer of NAS or non-3GPP dedicated information.

Signalling radio bearer: SRB2 or SRB1(only if SRB2 not established yet). If SRB2 is suspended, the UE does not send this message until SRB2 is resumed

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

***ULInformationTransfer message***

```
-- ASN1START

ULInformationTransfer ::=          SEQUENCE {
    criticalExtensions                  CHOICE {
        c1                              CHOICE {
            ulInformationTransfer-r8            ULInformationTransfer-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
    }
}

ULInformationTransfer-r8-IEs ::=  SEQUENCE {
```

```
    dedicatedInfoType           CHOICE {
        dedicatedInfoNAS                DedicatedInfoNAS,
        dedicatedInfoCDMA2000-1XRTT     DedicatedInfoCDMA2000,
        dedicatedInfoCDMA2000-HRPD      DedicatedInfoCDMA2000
    },
    nonCriticalExtension            ULInformationTransfer-v8a0-IEs          OPTIONAL
}

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

-- ASN1STOP
```

# 6.3 RRC information elements

## 6.3.1 System information blocks

### – SystemInformationBlockType2

The IE *SystemInformationBlockType2* contains radio resource configuration information that is common for all UEs.

NOTE: UE timers and constants related to functionality for which parameters are provided in another SIB are included in the corresponding SIB.

***SystemInformationBlockType2 information element***

```
-- ASN1START

SystemInformationBlockType2 ::=     SEQUENCE {
    ac-BarringInfo                  SEQUENCE {
        ac-BarringForEmergency          BOOLEAN,
        ac-BarringForMO-Signalling      AC-BarringConfig        OPTIONAL,  -- Need OP
        ac-BarringForMO-Data            AC-BarringConfig        OPTIONAL   -- Need OP
    }                                                           OPTIONAL,  -- Need OP
    radioResourceConfigCommon       RadioResourceConfigCommonSIB,
    ue-TimersAndConstants           UE-TimersAndConstants,
    freqInfo                        SEQUENCE {
```

```
        ul-CarrierFreq                  ARFCN-ValueEUTRA            OPTIONAL,  -- Need OP
        ul-Bandwidth                    ENUMERATED {n6, n15, n25, n50, n75, n100}
                                                                    OPTIONAL,  -- Need OP
        additionalSpectrumEmission      AdditionalSpectrumEmission
    },
    mbsfn-SubframeConfigList        MBSFN-SubframeConfigList        OPTIONAL,  -- Need OR
    timeAlignmentTimerCommon        TimeAlignmentTimer,
    ...,
    lateNonCriticalExtension        OCTET STRING (CONTAINING SystemInformationBlockType2-v8h0-IEs)
                OPTIONAL,
    [[  ssac-BarringForMMTEL-Voice-r9   AC-BarringConfig            OPTIONAL,  -- Need OP
        ssac-BarringForMMTEL-Video-r9   AC-BarringConfig            OPTIONAL   -- Need OP
    ]],
    [[  ac-BarringForCSFB-r10           AC-BarringConfig            OPTIONAL   -- Need OP
    ]],
                                                                    [[
        ac-BarringSkipForMMTELVoice-r12 ENUMERATED {true}       OPTIONAL,  -- Need OP
      ac-BarringSkipForMMTELVideo-r12 ENUMERATED {true}       OPTIONAL,  -- Need OP
      ac-BarringSkipForSMS-r12        ENUMERATED {true}       OPTIONAL,  -- Need OP
      ac-BarringPerPLMN-List-r12      AC-BarringPerPLMN-List-r12 OPTIONAL   -- Need OP
    ]]
}

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
    }                                                   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
    ac-BarringForCSFB-r12           AC-BarringConfig        OPTIONAL,  -- Need OP
    ssac-BarringForMMTEL-Voice-r12      AC-BarringConfig        OPTIONAL,  -- Need OP
    ssac-BarringForMMTEL-Video-r12      AC-BarringConfig        OPTIONAL   -- Need OP
}

-- ASN1STOP
```

| ***SystemInformationBlockType2* field descriptions** |
|---|
| ***ac-BarringFactor***<br>If the random number drawn by the UE is lower than this value, access is allowed. Otherwise the access is barred. The values are interpreted in the range [0,1): p00 = 0, p05 = 0.05, p10 = 0.10,…, p95 = 0.95. Values other than p00 can only be set if all bits of the corresponding *ac-BarringForSpecialAC* are set to 0. |
| ***ac-BarringForCSFB***<br>Access class barring for mobile originating CS fallback. |
| ***ac-BarringForEmergency***<br>Access class barring for AC 10. |
| ***ac-BarringForMO-Data***<br>Access class barring for mobile originating calls. |
| ***ac-BarringForMO-Signalling***<br>Access class barring for mobile originating signalling. |
| ***ac-BarringForSpecialAC***<br>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***<br>Mean access barring time value in seconds. |
| ***additionalSpectrumEmission***<br>The UE requirements related to IE *AdditionalSpectrumEmission* are defined in TS 36.101 [42, table 6.2.4.1]**.** |
| ***mbsfn-SubframeConfigList***<br>Defines the subframes that are reserved for MBSFN in downlink. |
| ***multiBandInfoList***<br>A list of *additionalSpectrumEmission* i.e. one for each additional frequency band included in *multiBandInfoList* in *SystemInformationBlockType1,* listed in the same order*.* |
| ***plmn-IdentityIndex***<br>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***<br>Service specific access class barring for MMTEL video originating calls. |
| ***ssac-BarringForMMTEL-Voice***<br>Service specific access class barring for MMTEL voice originating calls. |
| ***ul-Bandwidth***<br>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***<br>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.<br>For TDD: This parameter is absent and it is equal to the downlink frequency. |

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

## – SystemInformationBlockType3

The IE *SystemInformationBlockType3* contains cell re-selection information common for intra-frequency, inter-frequency and/ or inter-RAT cell re-selection (i.e. applicable for more than one type of cell re-selection but not necessarily all) as well as intra-frequency cell re-selection information other than neighbouring cell related.

**SystemInformationBlockType3 information element**

```
-- ASN1START


SystemInformationBlockType3 ::=     SEQUENCE {
    cellReselectionInfoCommon           SEQUENCE {
        q-Hyst                          ENUMERATED {
                                            dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
```

```
                                    dB12, dB14, dB16, dB18, dB20, dB22, dB24},
    speedStateReselectionPars       SEQUENCE {
        mobilityStateParameters         MobilityStateParameters,
        q-HystSF                    SEQUENCE {
            sf-Medium                   ENUMERATED {
                                            dB-6, dB-4, dB-2, dB0},
            sf-High                     ENUMERATED {
                                            dB-6, dB-4, dB-2, dB0}
        }
    }                                               OPTIONAL    -- Need OP
},
cellReselectionServingFreqInfo  SEQUENCE {
    s-NonIntraSearch            ReselectionThreshold    OPTIONAL,   -- Need OP
    threshServingLow                ReselectionThreshold,
    cellReselectionPriority         CellReselectionPriority
},
intraFreqCellReselectionInfo    SEQUENCE {
    q-RxLevMin                      Q-RxLevMin,
    p-Max                       P-Max                   OPTIONAL,   -- Need OP
    s-IntraSearch               ReselectionThreshold    OPTIONAL,   -- Need OP
    allowedMeasBandwidth            AllowedMeasBandwidth    OPTIONAL,   -- Need OP
    presenceAntennaPort1            PresenceAntennaPort1,
    neighCellConfig                 NeighCellConfig,
    t-ReselectionEUTRA                  T-Reselection,
    t-ReselectionEUTRA-SF               SpeedStateScaleFactors  OPTIONAL    -- Need OP
},
...,
lateNonCriticalExtension            OCTET STRING        OPTIONAL,
[[  s-IntraSearch-v920              SEQUENCE {
        s-IntraSearchP-r9           ReselectionThreshold,
        s-IntraSearchQ-r9               ReselectionThresholdQ-r9
    }                                               OPTIONAL,   -- Need OP
    s-NonIntraSearch-v920           SEQUENCE {
        s-NonIntraSearchP-r9            ReselectionThreshold,
        s-NonIntraSearchQ-r9            ReselectionThresholdQ-r9
```

```
        }                                                   OPTIONAL,       -- Need OP
        q-QualMin-r9                    Q-QualMin-r9        OPTIONAL,       -- Need OP
        threshServingLowQ-r9            ReselectionThresholdQ-r9 OPTIONAL   -- Need OP
    ]],
    [[  q-QualMinWB-r11                 Q-QualMin-r9        OPTIONAL   -- Cond WB-RSRQ
    ]],
                                                                                [[ q-
QualMinRSRQ-OnAllSymbols-r12                                                        Q-
QualMin-r9
                                                                                OPTIONAL
                                                                                  -- Cond
RSRQ
    ]]
}


-- ASN1STOP
```

| ***SystemInformationBlockType3* field descriptions** |
|---|
| ***allowedMeasBandwidth***<br>If absent, the value corresponding to the downlink bandwidth indicated by the *dl-Bandwidth* included in *MasterInformationBlock* applies. |
| ***cellReselectionInfoCommon***<br>Cell re-selection information common for cells. |
| ***cellReselectionServingFreqInfo***<br>Information common for Cell re-selection to inter-frequency and inter-RAT cells. |
| ***intraFreqcellReselectionInfo***<br>Cell re-selection information common for intra-frequency cells. |
| ***p-Max***<br>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***<br>Parameter $Q_{hyst}$ in 36.304 [4], Value in dB. Value dB1 corresponds to 1 dB, dB2 corresponds to 2 dB and so on. |
| ***q-HystSF***<br>Parameter 'Speed dependent ScalingFactor for $Q_{hyst}$' in TS 36.304 [4]. The sf-Medium and sf-High concern the additional hysteresis to be applied, in Medium and High Mobility state respectively, to $Q_{hyst}$ 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***<br>Parameter '$Q_{qualmin}$' in TS 36.304 [4], applicable for intra-frequency neighrbour cells. If the field is not present, the UE applies the (default) value of negative infinity for $Q_{qualmin}$. NOTE 1. |
| ***q-QualMinRSRQ-OnAllSymbols***<br>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***<br>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***<br>Parameter '$Q_{rxlevmin}$' in TS 36.304 [4], applicable for intra-frequency neighbour cells. |
| ***s-IntraSearch***<br>Parameter '$S_{IntraSearchP}$' in TS 36.304 [4]. If the field *s-IntraSearchP* is present, the UE applies the value of *s-IntraSearchP* instead. Otherwise if neither *s-IntraSearch* nor *s-IntraSearchP* is present, the UE applies the (default) value of infinity for $S_{IntraSearchP}$. |
| ***s-IntraSearchP***<br>Parameter '$S_{IntraSearchP}$' in TS 36.304 [4]. See descriptions under *s-IntraSearch*. |
| ***s-IntraSearchQ***<br>Parameter '$S_{IntraSearchQ}$' in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of 0 dB for $S_{IntraSearchQ}$. |
| ***s-NonIntraSearch***<br>Parameter '$S_{nonIntraSearchP}$' 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 $S_{nonIntraSearchP}$. |
| ***s-NonIntraSearchP***<br>Parameter '$S_{nonIntraSearchP}$' in TS 36.304 [4]. See descriptions under *s-NonIntraSearch*. |
| ***s-NonIntraSearchQ***<br>Parameter '$S_{nonIntraSearchQ}$' in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of 0 dB for $S_{nonIntraSearchQ}$. |
| ***speedStateReselectionPars***<br>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***<br>Parameter '$Thresh_{Serving,\ LowP}$' in TS 36.304 [4]. |
| ***threshServingLowQ***<br>Parameter '$Thresh_{Serving,\ LowQ}$' in TS 36.304 [4]. |
| ***t-ReselectionEUTRA***<br>Parameter '$Treselection_{EUTRA}$' in TS 36.304 [4]. |
| ***t-ReselectionEUTRA-SF***<br>Parameter 'Speed dependent ScalingFactor for $Treselection_{EUTRA}$' in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4]. |

NOTE 1: The value the UE applies for parameter '$Q_{qualmin}$' 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).

| q-QualMinRSRQ-OnAllSymbols | q-QualMinWB | Value of parameter '$Q_{qualmin}$' in TS 36.304 [4] |
|---|---|---|
| Included | Included | *q-QualMinRSRQ-OnAllSymbols* – (*q-QualMin* – *q-QualMinWB*) |
| Included | Not included | *q-QualMinRSRQ-OnAllSymbols* |
| Not included | Included | *q-QualMinWB* |
| Not included | Not included | *q-QualMin* |

| Conditional presence | Explanation |
|---|---|
| *RSRQ* | The field is optionally present, Need OR, if *threshServingLowQ* is present in SIB3; otherwise it is not present. |
| *WB-RSRQ* | The field is optionally present, need OP if the measurement bandwidth indicated by *allowedMeasBandwidth* is 50 resource blocks or larger; otherwise it is not present. |

## – SystemInformationBlockType4

The IE *SystemInformationBlockType4* contains neighbouring cell related information relevant only for intra-frequency cell re-selection. The IE includes cells with specific re-selection parameters as well as blacklisted cells.

***SystemInformationBlockType4 information element***

```
-- ASN1START

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

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

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

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

-- ASN1STOP
```

| *SystemInformationBlockType4* field descriptions |
|---|
| ***csg-PhysCellIdRange***<br>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***<br>List of blacklisted intra-frequency neighbouring cells. |
| ***intraFreqNeighbCellList***<br>List of intra-frequency neighbouring cells with specific cell re-selection parameters. |
| ***q-OffsetCell***<br>Parameter '$Qoffset_{s,n}$' in TS 36.304 [4]. |

| Conditional presence | Explanation |
|---|---|
| *CSG* | This field is optional, need OP, for non-CSG cells, and mandatory for CSG cells. |

## – SystemInformationBlockType5

The IE *SystemInformationBlockType5* contains information relevant only for inter-frequency cell re-selection i.e. information about other E-UTRA frequencies and inter-frequency neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.

***SystemInformationBlockType5 information element***

```
-- ASN1START


SystemInformationBlockType5 ::=     SEQUENCE {

    interFreqCarrierFreqList          InterFreqCarrierFreqList,

    ...,

    lateNonCriticalExtension                OCTET STRING(CONTAINING SystemInformationBlockType5-v8h0-IEs)
                OPTIONAL,

    [[  interFreqCarrierFreqList-v1250InterFreqCarrierFreqList-v1250     OPTIONAL,  -- Need OR

        interFreqCarrierFreqListExt-r12     InterFreqCarrierFreqListExt-r12     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
```

```
SEQUENCE {}                         OPTIONAL
}

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

InterFreqCarrierFreqList-v1250 ::=SEQUENCE (SIZE (1.. maxFreq)) OF InterFreqCarrierFreqInfo-v1250

InterFreqCarrierFreqListExt-r12 ::=    SEQUENCE (SIZE (1.. maxFreq)) OF InterFreqCarrierFreqInfo-r12

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,
    interFreqNeighCellList          InterFreqNeighCellList      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-QualMinWB-r11             Q-QualMin-r9                OPTIONAL  -- Cond WB-RSRQ
    ]]
}
```

```
InterFreqCarrierFreqInfo-v8h0 ::=     SEQUENCE {
    multiBandInfoList                 MultiBandInfoList              OPTIONAL   -- Need OR
}

InterFreqCarrierFreqInfo-v9e0 ::=  SEQUENCE {
    dl-CarrierFreq-v9e0               ARFCN-ValueEUTRA-v9e0    OPTIONAL,  -- Cond dl-FreqMax
    multiBandInfoList-v9e0            MultiBandInfoList-v9e0 OPTIONAL   -- Need OR
}

InterFreqCarrierFreqInfo-v1250 ::=        SEQUENCE {
    reducedMeasPerformance-r12      ENUMERATED {true}      OPTIONAL,      -- Need OP
    q-QualMinRSRQ-OnAllSymbols-r12  Q-QualMin-r9                  OPTIONAL   -- Cond RSRQ2
}

InterFreqCarrierFreqInfo-r12 ::=      SEQUENCE {
    dl-CarrierFreq-r12                ARFCN-ValueEUTRA-r9,
    q-RxLevMin-r12                    Q-RxLevMin,
    p-Max-r12                         P-Max                       OPTIONAL,      -- Need OP
    t-ReselectionEUTRA-r12                T-Reselection,
    t-ReselectionEUTRA-SF-r12             SpeedStateScaleFactors          OPTIONAL,      -- Need OP
    threshX-High-r12                  ReselectionThreshold,
    threshX-Low-r12                   ReselectionThreshold,
    allowedMeasBandwidth-r12              AllowedMeasBandwidth,
    presenceAntennaPort1-r12          PresenceAntennaPort1,
    cellReselectionPriority-r12       CellReselectionPriority         OPTIONAL,      -- Need OP
    neighCellConfig-r12               NeighCellConfig,
    q-OffsetFreq-r12                Q-OffsetRange                 DEFAULT dB0,
    interFreqNeighCellList-r12        InterFreqNeighCellList          OPTIONAL,      -- Need OR
    interFreqBlackCellList-r12        InterFreqBlackCellList          OPTIONAL,      -- Need OR
    q-QualMin-r12                     Q-QualMin-r9                    OPTIONAL,      -- 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 OP
    q-QualMinRSRQ-OnAllSymbols-r12      Q-QualMin-r9                    OPTIONAL,  -- Cond RSRQ2
...
}

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

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

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

-- ASN1STOP
```

| ***SystemInformationBlockType5* field descriptions** |
|---|
| ***interFreqBlackCellList***<br>List of blacklisted inter-frequency neighbouring cells. |
| ***interFreqCarrierFreqList***<br>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***<br>List of additional neighbouring inter-frequencies, i.e. extending the size of the inter-frequency carrier list using the general principles specified in 5.1.2. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the E-ARFCN used to indicate this. EUTRAN may include *interFreqCarrierFreqListExt* even if *interFreqCarrierFreqList* (i.e without suffix) does not include *maxFreq* entries. |
| ***interFreqNeighCellList***<br>List of inter-frequency neighbouring cells with specific cell re-selection parameters. |
| ***multiBandInfoList***<br>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). |
| ***p-Max***<br>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***<br>Parameter '$Qoffset_{s,n}$' in TS 36.304 [4]. |
| ***q-OffsetFreq***<br>Parameter '$Qoffset_{frequency}$' in TS 36.304 [4]. |
| ***q-QualMin***<br>Parameter '$Q_{qualmin}$' in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of negative infinity for $Q_{qualmin}$. NOTE 1. |
| ***q-QualMinRSRQ-OnAllSymbols***<br>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***<br>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***<br>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***<br>Parameter '$Thresh_{X, HighP}$' in TS 36.304 [4]. |
| ***threshX-HighQ***<br>Parameter '$Thresh_{X, HighQ}$' in TS 36.304 [4]. |
| ***threshX-Low***<br>Parameter '$Thresh_{X, LowP}$' in TS 36.304 [4]. |
| ***threshX-LowQ***<br>Parameter '$Thresh_{X, LowQ}$' in TS 36.304 [4]. |
| ***t-ReselectionEUTRA***<br>Parameter '$Treselection_{EUTRA}$' in TS 36.304 [4]. |
| ***t-ReselectionEUTRA-SF***<br>Parameter 'Speed dependent ScalingFactor for $Treselection_{EUTRA}$' in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4]. |

NOTE 1: The value the UE applies for parameter '$Q_{qualmin}$' 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).

| q-QualMinRSRQ-OnAllSymbols | q-QualMinWB | Value of parameter '$Q_{qualmin}$' in TS 36.304 [4] |
|---|---|---|
| Included | Included | *q-QualMinRSRQ-OnAllSymbols* – (*q-QualMin* – *q-QualMinWB*) |
| Included | Not included | *q-QualMinRSRQ-OnAllSymbols* |
| Not included | Included | *q-QualMinWB* |
| Not included | Not included | *q-QualMin* |

| Conditional presence | Explanation |
|---|---|
| *dl-FreqMax* | The field is mandatory present if, for the corresponding entry in *InterFreqCarrierFreqList* (i.e. without suffix), *dl-CarrierFreq* (i.e. without suffix) is set to *maxEARFCN*. Otherwise the field is not present. |
| *RSRQ* | The field is mandatory present if *threshServingLowQ* is present in *systemInformationBlockType3*; otherwise it is not present. |
| *RSRQ2* | The field is mandatory present for all EUTRA carriers listed in SIB5 if *q-QualMinRSRQ-OnAllSymbols* is present in SIB3; otherwise it is not present and the UE shall delete any existing value for this field. |
| *WB-RSRQ* | The field is optionally present, need OP if the measurement bandwidth indicated by *allowedMeasBandwidth* is 50 resource blocks or larger; otherwise it is not present. |

## – 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***

```
-- 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-v1250       OPTIONAL,  -- Cond UTRA-FDD
        carrierFreqListUTRA-TDD-v1250 SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF
                                    CarrierFreqInfoUTRA-v1250       OPTIONAL,  -- Cond UTRA-TDD
        carrierFreqListUTRA-FDD-Ext-r12    CarrierFreqListUTRA-FDD-Ext-r12 OPTIONAL,    -- Cond UTRA-FDD
        carrierFreqListUTRA-TDD-Ext-r12    CarrierFreqListUTRA-TDD-Ext-r12 OPTIONAL         -- Cond UTRA-
TDD
    ]]
}


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

```
}

CarrierFreqInfoUTRA-v1250 ::=       SEQUENCE {
    reducedMeasPerformance-r12      ENUMERATED {true}      OPTIONAL       -- Need OP
}

CarrierFreqListUTRA-FDD ::=     SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqUTRA-FDD

CarrierFreqUTRA-FDD ::=             SEQUENCE {
    carrierFreq                     ARFCN-ValueUTRA,
    cellReselectionPriority         CellReselectionPriority         OPTIONAL,      -- Need OP
    threshX-High                    ReselectionThreshold,
    threshX-Low                     ReselectionThreshold,
    q-RxLevMin                      INTEGER (-60..-13),
    p-MaxUTRA                       INTEGER (-50..33),
    q-QualMin                       INTEGER (-24..0),
    ...,
    [[  threshX-Q-r9                SEQUENCE {
            threshX-HighQ-r9            ReselectionThresholdQ-r9,
            threshX-LowQ-r9             ReselectionThresholdQ-r9
        }                                                       OPTIONAL       -- Cond RSRQ
    ]]
}

CarrierFreqInfoUTRA-FDD-v8h0 ::=        SEQUENCE {
    multiBandInfoList               SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-UTRA-FDD
                OPTIONAL   -- Need OR
}

CarrierFreqListUTRA-FDD-Ext-r12 ::=    SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF
                                CarrierFreqUTRA-FDD-Ext-r12

CarrierFreqUTRA-FDD-Ext-r12 ::=             SEQUENCE {
    carrierFreq-r12                 ARFCN-ValueUTRA,
    cellReselectionPriority-r12     CellReselectionPriority         OPTIONAL,  -- Need OP
```

```
    threshX-High-r12                ReselectionThreshold,
    threshX-Low-r12                 ReselectionThreshold,
    q-RxLevMin-r12                  INTEGER (-60..-13),
    p-MaxUTRA-r12                   INTEGER (-50..33),
    q-QualMin-r12                   INTEGER (-24..0),
    threshX-Q-r12                   SEQUENCE {
        threshX-HighQ-r12               ReselectionThresholdQ-r9,
        threshX-LowQ-r12                ReselectionThresholdQ-r9
    }                                                       OPTIONAL,       -- Cond RSRQ
    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-r12

CarrierFreqUTRA-TDD-r12 ::=     SEQUENCE {
    carrierFreq-r12                 ARFCN-ValueUTRA,
    cellReselectionPriority-r12     CellReselectionPriority     OPTIONAL,       -- Need OP
    threshX-High-r12                ReselectionThreshold,
    threshX-Low-r12                 ReselectionThreshold,
```

```
    q-RxLevMin-r12                  INTEGER (-60..-13),
    p-MaxUTRA-r12                   INTEGER (-50..33),
    reducedMeasPerformance-r12      ENUMERATED {true}           OPTIONAL,  -- Need OP
    ...
}

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

-- ASN1STOP
```

| ***SystemInformationBlockType6* field descriptions** |
|---|
| ***carrierFreqListUTRA-FDD***<br>List of carrier frequencies of UTRA FDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. If E-UTRAN includes *carrierFreqListUTRA-FDD-v8h0* and/or *carrierFreqListUTRA-FDD-v1250*, it includes the same number of entries, and listed in the same order, as in *carrierFreqListUTRA-FDD* (i.e. without suffix). See Annex D for more descriptions. |
| ***carrierFreqListUTRA-FDD-Ext***<br>List of additional carrier frequencies of UTRA FDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. EUTRAN may include *carrierFreqListUTRA-FDD-Ext* even if *carrierFreqListUTRA-FDD* (i.e without suffix) does not include *maxUTRA-FDD-Carrier* entries. |
| ***carrierFreqListUTRA-TDD***<br>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). |
| ***carrierFreqListUTRA-TDD-Ext***<br>List of additional carrier frequencies of UTRA TDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. EUTRAN may include *carrierFreqListUTRA-TDD-Ext* even if *carrierFreqListUTRA-TDD* (i.e without suffix) does not include *maxUTRA-TDD-Carrier* entries. |
| ***multiBandInfoList***<br>Indicates the list of frequency bands in addition to the band represented by *carrierFreq* in the *CarrierFreqUTRA-FDD* for which UTRA cell reselection parameters are common. |
| ***p-MaxUTRA***<br>The maximum allowed transmission power on the (uplink) carrier frequency, see TS 25.304 [40]. In dBm |
| ***q-QualMin***<br>Parameter '$Q_{qualmin}$' in TS 25.304 [40]. Actual value = IE value [dB]. |
| ***q-RxLevMin***<br>Parameter '$Q_{rxlevmin}$' in TS 25.304 [40]. Actual value = IE value * 2+1 [dBm]. |
| ***reducedMeasPerformance***<br>Value *TRUE* indicates that the UTRA carrier frequency is configured for reduced measurement performance, see TS 36.133 [16]. If the field is not included, the UTRA carrier frequency is configured for normal measurement performance, see TS 36.133 [16]. |
| ***t-ReselectionUTRA***<br>Parameter 'Treselection$_{UTRAN}$' in TS 36.304 [4]. |
| ***t-ReselectionUTRA-SF***<br>Parameter 'Speed dependent ScalingFactor for Treselection$_{UTRA}$' in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4]. |
| ***threshX-High***<br>Parameter 'Thresh$_{X, HighP}$' in TS 36.304 [4]. |
| ***threshX-HighQ***<br>Parameter 'Thresh$_{X, HighQ}$' in TS 36.304 [4]. |
| ***threshX-Low***<br>Parameter 'Thresh$_{X, LowP}$' in TS 36.304 [4]. |
| ***threshX-LowQ***<br>Parameter 'Thresh$_{X, LowQ}$' in TS 36.304 [4]. |

| Conditional presence | Explanation |
|---|---|
| *RSRQ* | The field is mandatory present if the *threshServingLowQ* is present in *systemInformationBlockType3*; otherwise it is not present. |
| *UTRA-FDD* | The field is optionally present, need OR, if the *carrierFreqListUTRA-FDD* is present. Otherwise it is not present. |
| *UTRA-TDD* | The field is optionally present, need OR, if the *carrierFreqListUTRA-TDD* is present. Otherwise it is not present. |

## – SystemInformationBlockType7

The IE *SystemInformationBlockType7* contains information relevant only for inter-RAT cell re-selection i.e. information about GERAN frequencies relevant for cell re-selection. The IE includes cell re-selection parameters for each frequency.

***SystemInformationBlockType7 information element***

```
-- ASN1START

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

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

CarrierFreqsInfoGERAN ::=           SEQUENCE {
    carrierFreqs                    CarrierFreqsGERAN,
    commonInfo                          SEQUENCE {
        cellReselectionPriority             CellReselectionPriority     OPTIONAL,  -- Need OP
        ncc-Permitted                   BIT STRING (SIZE (8)),
        q-RxLevMin                          INTEGER (0..45),
        p-MaxGERAN                              INTEGER (0..39)                 OPTIONAL,  -- Need OP
        threshX-High                    ReselectionThreshold,
        threshX-Low                         ReselectionThreshold
    },
    ...
}

-- ASN1STOP
```

| ***SystemInformationBlockType7* field descriptions** |
|---|
| ***carrierFreqs***<br>The list of GERAN carrier frequencies organised into one group of GERAN carrier frequencies. |
| ***carrierFreqsInfoList***<br>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***<br>Defines the set of cell reselection parameters for the group of GERAN carrier frequencies. |
| ***ncc-Permitted***<br>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***<br>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***<br>Parameter '$Q_{rxlevmin}$' in TS 36.304 [1], minimum required RX level in the GSM cell. The actual value of $Q_{rxlevmin}$ in dBm = (IE value * 2) – 115. |
| ***threshX-High***<br>Parameter '$Thresh_{X, HighP}$' in TS 36.304 [4]. |
| ***threshX-Low***<br>Parameter '$Thresh_{X, LowP}$' in TS 36.304 [4]. |
| ***t-ReselectionGERAN***<br>Parameter '$Treselection_{GERAN}$' in TS 36.304 [4]. |
| ***t-ReselectionGERAN-SF***<br>Parameter 'Speed dependent ScalingFactor for $Treselection_{GERAN}$' 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                  SEQUENCE {
        preRegistrationInfoHRPD             PreRegistrationInfoHRPD,
        cellReselectionParametersHRPD       CellReselectionParametersCDMA2000    OPTIONAL -- Need OR
    }                                                                    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
```

```
    }                                                                   OPTIONAL,  -- Need OR

    ...,

    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,

    [[  csfb-SupportForDualRxUEs-r9         BOOLEAN                         OPTIONAL,  -- Need OR

        cellReselectionParametersHRPD-v920CellReselectionParametersCDMA2000-v920 OPTIONAL,  -- Cond
NCL-HRPD

        cellReselectionParameters1XRTT-v920   CellReselectionParametersCDMA2000-v920 OPTIONAL,  -- Cond
NCL-1XRTT

        csfb-RegistrationParam1XRTT-v920  CSFB-RegistrationParam1XRTT-v920        OPTIONAL,  -- Cond
REG-1XRTT

        ac-BarringConfig1XRTT-r9        AC-BarringConfig1XRTT-r9    OPTIONAL   -- Cond REG-1XRTT

    ]],

    [[  csfb-DualRxTxSupport-r10        ENUMERATED {true}           OPTIONAL   -- Cond REG-1XRTT

    ]],

    [[  sib8-PerPLMN-List-r11           SIB8-PerPLMN-List-r11       OPTIONAL   -- Need OR

    ]]

}


CellReselectionParametersCDMA2000 ::= SEQUENCE {

    bandClassList                   BandClassListCDMA2000,

    neighCellList                   NeighCellListCDMA2000,

                                                t-ReselectionCDMA2000           T-Reselection,

                t-ReselectionCDMA2000-SF        SpeedStateScaleFactors          OPTIONAL   -- Need OP

}


CellReselectionParametersCDMA2000-r11 ::= SEQUENCE {

    bandClassList                   BandClassListCDMA2000,

    neighCellList-r11                   SEQUENCE (SIZE (1..16)) OF NeighCellCDMA2000-r11,

                                                t-ReselectionCDMA2000               T-Reselection,

                t-ReselectionCDMA2000-SF        SpeedStateScaleFactors          OPTIONAL   -- Need OP

}


CellReselectionParametersCDMA2000-v920 ::= SEQUENCE {

    neighCellList-v920                  NeighCellListCDMA2000-v920

}
```

```
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
        longCodeState1XRTT-r11              BIT STRING (SIZE (42))  OPTIONAL, -- Cond PerPLMN-LC
        cellReselectionParameters1XRTT-r11 CellReselectionParametersCDMA2000-r11   OPTIONAL, -- 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
    }       OPTIONAL,  -- Need OR
    ...
}

-- ASN1STOP
```

| ***SystemInformationBlockType8* field descriptions** |
|---|
| ***ac-BarringConfig1XRTT***<br>Contains the access class barring parameters the UE uses to calculate the access class barring factor, see C.S0097 [53]. |
| ***ac-Barring0to9***<br>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. |
| ***ac-BarringEmg***<br>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]. |
| ***ac-BarringMsg***<br>Parameter used for modifying the access class barring factor for message transmissions. It is the parameter 'MSG_PSIST' in C.S0004 [34]. |
| ***ac-BarringN***<br>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. |
| ***ac-BarringReg***<br>Parameter used for modifying the access class barring factor for autonomous registrations. It is the parameter 'REG_PSIST' in C.S0004 [34]. |
| ***bandClass***<br>Identifies the Frequency Band in which the Carrier can be found. Details can be found in C.S0057 [24, Table 1.5]. |
| ***bandClassList***<br>List of CDMA2000 frequency bands. |
| ***cellReselectionParameters1XRTT***<br>Cell reselection parameters applicable only to CDMA2000 1xRTT system. |
| ***cellReselectionParameters1XRTT-Ext***<br>Cell reselection parameters applicable for cell reselection to CDMA2000 1XRTT system. |
| ***cellReselectionParameters1XRTT-v920***<br>Cell reselection parameters applicable for cell reselection to CDMA2000 1XRTT system. The field is not present if *cellReselectionParameters1XRTT* is not present; otherwise it is optionally present. |
| ***cellReselectionParametersHRPD***<br>Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system |
| ***cellReselectionParametersHRPD-Ext***<br>Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system. |
| ***cellReselectionParametersHRPD-v920***<br>Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system. The field is not present if *cellReselectionParametersHRPD* is not present; otherwise it is optionally present. |
| ***csfb-DualRxTxSupport***<br>Value TRUE indicates that the network supports dual Rx/Tx enhanced 1xCSFB, which enables UEs capable of dual Rx/Tx enhanced 1xCSFB to switch off their 1xRTT receiver/transmitter while camped in E-UTRAN [51]. |
| ***csfb-RegistrationParam1XRTT***<br>Contains the parameters the UE will use to determine if it should perform a CDMA2000 1xRTT Registration/Re-Registration. This field is included if either CSFB or enhanced CS fallback to CDMA2000 1xRTT is supported. |
| **csfb-SupportForDualRxUEs**<br>Value TRUE indicates that the network supports dual Rx CSFB [51]. |
| ***longCodeState1XRTT***<br>The state of long code generation registers in CDMA2000 1XRTT system as defined in C.S0002 [12, Section 1.3] at $\lceil t/10 \rceil \times 10 + 320$ ms, where *t* equals to the *cdma-SystemTime*. This field is required for SRVCC handover and enhanced CS fallback to CDMA2000 1xRTT operation. Otherwise this IE is not needed. This field is excluded when estimating changes in system information, i.e. changes of *longCodeState1XRTT* should neither result in system information change notifications nor in a modification of *systemInfoValueTag* in SIB1. |
| ***neighCellList***<br>List of CDMA2000 neighbouring cells. The total number of neighbouring cells in neighCellList for each RAT (1XRTT or HRPD) is limited to 32. |
| ***neighCellList-v920***<br>Extended List of CDMA2000 neighbouring cells. The combined total number of CDMA2000 neighbouring cells in both *neighCellList* and *neighCellList-v920* is limited to 32 for HRPD and 40 for 1xRTT. |

| ***SystemInformationBlockType8* field descriptions** |
|---|
| ***neighCellsPerFreqList*** |
| List of carrier frequencies and neighbour cell ids in each frequency within a CDMA2000 Band, see C.S0002 [12] or C.S0024 [26]. |
| ***neighCellsPerFreqList-v920*** |
| Extended list of neighbour cell ids, in the same CDMA2000 Frequency Band as the corresponding instance in 'NeighCellListCDMA2000'. |
| ***parameters1XRTT*** |
| Parameters applicable for interworking with CDMA2000 1XRTT system. |
| ***parametersCDMA2000*** |
| Provides the corresponding SIB8 parameters for the CDMA2000 network associated with the PLMN indicated in *plmn-Identity*. A choice is used to indicate whether for this PLMN the parameters are signalled explicitly or set to the (default) values common for all PLMNs i.e. the values not included in *sib8-PerPLMN-List*. |
| ***parametersHRPD*** |
| Parameters applicable only for interworking with CDMA2000 HRPD systems. |
| ***physCellIdList*** |
| Identifies the list of CDMA2000 cell ids, see C.S0002 [12] or C.S0024 [26]. |
| ***physCellIdList-v920*** |
| Extended list of CDMA2000 cell ids, in the same CDMA2000 ARFCN as the corresponding instance in 'NeighCellsPerBandclassCDMA2000'. |
| ***plmn-Identity*** |
| Indicates the PLMN associated with this CDMA2000 network. Value 1 indicates the PLMN listed 1st in *plmn-IdentityList* included in SIB1, value 2 indicates the PLMN listed 2nd in *plmn-IdentityList* included in SIB1 and so on. A PLMN which identity is not indicated in the *sib8-PerPLMN-List*, does not support inter-working with CDMA2000. |
| ***preRegistrationInfoHRPD*** |
| The CDMA2000 HRPD Pre-Registration Information tells the UE if it should pre-register with the CDMA2000 HRPD network and identifies the Pre-registration zone to the UE. |
| ***searchWindowSize*** |
| The search window size is a CDMA2000 parameter to be used to assist in searching for the neighbouring pilots. For values see C.S0005 [25, Table 2.6.6.2.1-1] and C.S0024 [26, Table 8.7.6.2-4]. This field is required for a UE with *rx-ConfigHRPD= single* and/ or *rx-Config1XRTT= single* to perform handover, cell re-selection, UE measurement based redirection and enhanced 1xRTT CS fallback from E-UTRAN to CDMA2000 according to this specification and TS 36.304 [4]. |
| ***sib8-PerPLMN-List*** |
| This field provides the values for the interworking CDMA2000 networks corresponding, if any, to the UE"s RPLMN. |
| ***systemTimeInfo*** |
| Information on CDMA2000 system time. This field is required for a UE with *rx-ConfigHRPD= single* and/ or *rx-Config1XRTT= single* to perform handover, cell re-selection, UE measurement based redirection and enhanced 1xRTT CS fallback from E-UTRAN to CDMA2000 according to this specification and TS 36.304 [4]. This field is excluded when estimating changes in system information, i.e. changes of *systemTimeInfo* should neither result in system information change notifications nor in a modification of *systemInfoValueTag* in SIB1.<br>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 'Thresh$_{X, HighP}$' 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 $\log_{10}$ $E_c/I_o$) in units of 0.5 dB, as defined in C.S0005 [25]. |
| ***threshX-Low*** |
| Parameter 'Thresh$_{X, LowP}$' 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 $\log_{10}$ $E_c/I_o$) in units of 0.5 dB, as defined in C.S0005 [25]. |
| ***t-ReselectionCDMA2000*** |
| Parameter 'Treselection$_{CDMA_HRPD}$' or 'Treselection$_{CDMA_1xRTT}$' in TS 36.304 [4]. |
| ***t-ReselectionCDMA2000-SF*** |
| Parameter 'Speed dependent ScalingFactor for Treselection$_{CDMA\text{-}HRPD}$' or Treselection$_{CDMA\text{-}1xRTT}$' in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4]. |

| Conditional presence | Explanation |
|---|---|
| *NCL-1XRTT* | The field is optional present, need OR, if *cellReselectionParameters1xRTT* is present; otherwise it is not present. |
| *NCL-HRPD* | The field is optional present, need OR, if *cellReselectionParametersHRPD* is present; otherwise it is not present. |
| *PerPLMN-LC* | The field is optional present, need OR, when *systemTimeInfo* is included in *SIB8PerPLMN* for this CDMA2000 network; otherwise it is not present. |
| *REG-1XRTT* | The field is optional present, need OR, if *csfb-RegistrationParam1XRTT* is present; otherwise it is not present. |
| *REG-1XRTT-PerPLMN* | The field is optional present, need OR, if *csfb-RegistrationParam1XRTT* is included in *SIB8PerPLMN* for this CDMA2000 network; otherwise it is not present. |

## – SystemInformationBlockType9

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

***SystemInformationBlockType9 information element***

```
-- ASN1START

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

-- ASN1STOP
```

| ***SystemInformationBlockType9* field descriptions** |
|---|
| ***hnb-Name*** |
| Carries the name of the home eNB, coded in UTF-8 with variable number of bytes per character, see TS 22.011 [10]. |

## – SystemInformationBlockType10

The IE *SystemInformationBlockType10* contains an ETWS primary notification.

***SystemInformationBlockType10 information element***

```
-- ASN1START

SystemInformationBlockType10 ::=    SEQUENCE {
    messageIdentifier                   BIT STRING (SIZE (16)),
    serialNumber                    BIT STRING (SIZE (16)),
    warningType                         OCTET STRING (SIZE (2)),
    dummy                               OCTET STRING (SIZE (50))   OPTIONAL,      -- Need OP
    ...,
```

```
    lateNonCriticalExtension            OCTET STRING            OPTIONAL

}


-- ASN1STOP
```

| ***SystemInformationBlockType10* field descriptions** |
|---|
| ***messageIdentifier*** |
| Identifies the source and type of ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.44]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.1], while the trailing bit contains bit 0 of the second octet of the same equivalent IE. |
| ***serialNumber*** |
| Identifies variations of an ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.45]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.2], while the trailing bit contains bit 0 of the second octet of the same equivalent IE. |
| ***dummy*** |
| This field is not used in the specification. If received it shall be ignored by the UE. |
| ***warningType*** |
| Identifies the warning type of the ETWS primary notification and provides information on emergency user alert and UE popup. The first octet (which is equivalent to the first octet of the equivalent IE defined in TS 36.413 [39, 9.2.1.50]) contains the first octet of the equivalent IE defined in and encoded according to TS 23.041 [37, 9.3.24], and so on. |

## – SystemInformationBlockType11

The IE *SystemInformationBlockType11* contains an ETWS secondary notification.

***SystemInformationBlockType11 information element***

```
-- ASN1START


SystemInformationBlockType11 ::=    SEQUENCE {
    messageIdentifier                   BIT STRING (SIZE (16)),
    serialNumber                    BIT STRING (SIZE (16)),
    warningMessageSegmentType           ENUMERATED {notLastSegment, lastSegment},
    warningMessageSegmentNumber             INTEGER (0..63),
    warningMessageSegment               OCTET STRING,
    dataCodingScheme                OCTET STRING (SIZE (1))         OPTIONAL,  -- Cond Segment1
    ...,
    lateNonCriticalExtension            OCTET STRING            OPTIONAL
}


-- ASN1STOP
```

| ***SystemInformationBlockType11* field descriptions** |
|---|
| ***dataCodingScheme*** |
| Identifies the alphabet/coding and the language applied variations of an ETWS notification. The octet (which is equivalent to the octet of the equivalent IE defined in TS 36.413 [39, 9.2.1.52]) contains the octet of the equivalent IE defined in TS 23.041 [37, 9.4.3.2.3] and encoded according to TS 23.038 [38]. |
| ***messageIdentifier*** |
| Identifies the source and type of ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.44]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.1], while the trailing bit contains bit 0 of second octet of the same equivalent IE. |
| ***serialNumber*** |
| Identifies variations of an ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.45]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.2], while the trailing bit contains bit 0 of second octet of the same equivalent IE. |
| ***warningMessageSegment*** |
| Carries a segment of the *Warning Message Contents* IE defined in TS 36.413 [39, 9.2.1.53]. The first octet of the *Warning Message Contents* IE is equivalent to the first octet of the *CB data* IE defined in and encoded according to TS 23.041 [37, 9.4.2.2.5] and so on. |
| ***warningMessageSegmentNumber*** |
| Segment number of the ETWS warning message segment contained in the SIB. A segment number of zero corresponds to the first segment, one corresponds to the second segment, and so on. |
| ***warningMessageSegmentType*** |
| Indicates whether the included ETWS warning message segment is the last segment or not. |

| Conditional presence | Explanation |
|---|---|
| *Segment1* | 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***<br>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***<br>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***<br>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***<br>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***<br>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***<br>Indicates whether the included CMAS warning message segment is the last segment or not. |

| Conditional presence | Explanation |
|---|---|
| *Segment1* | The field is mandatory present in the first segment of SIB12, otherwise it is not present. |

## – SystemInformationBlockType13

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

***SystemInformationBlockType13 information element***

```
-- ASN1START


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


-- ASN1STOP
```

## – SystemInformationBlockType14

The IE *SystemInformationBlockType14* contains the EAB parameters.

***SystemInformationBlockType14 information element***

```
-- ASN1START
```

```
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,
    ...
}

EAB-ConfigPLMN-r11 ::=             SEQUENCE {
    eab-Config-r11                 EAB-Config-r11          OPTIONAL -- Need OR
}

EAB-Config-r11 ::=                 SEQUENCE {
    eab-Category-r11               ENUMERATED {a, b, c},
    eab-BarringBitmap-r11              BIT STRING (SIZE (10))
}

-- ASN1STOP
```

| ***SystemInformationBlockType14*** **field descriptions** |
|---|
| ***eab-BarringBitmap*** <br> 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*** <br> 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*** <br> The EAB parameters applicable for all PLMN(s). |
| ***eab-PerPLMN-List*** <br> The EAB parameters per PLMN, listed in the same order as the PLMN(s) occur in *plmn-IdentityList* in *SystemInformationBlockType1*. |

## – SystemInformationBlockType15

The IE *SystemInformationBlockType15* contains the MBMS Service Area Identities (SAI) of the current and/ or neighbouring carrier frequencies.

### *SystemInformationBlockType15 information element*

```
-- ASN1START


SystemInformationBlockType15-r11 ::=   SEQUENCE {
```

```
    mbms-SAI-IntraFreq-r11              MBMS-SAI-List-r11           OPTIONAL,  -- Need OR
    mbms-SAI-InterFreqList-r11          MBMS-SAI-InterFreqList-r11  OPTIONAL,  -- Need OR
    lateNonCriticalExtension            OCTET STRING                OPTIONAL,
    ...,
    [[  mbms-SAI-InterFreqList-v1140    MBMS-SAI-InterFreqList-v1140 OPTIONAL  -- Cond InterFreq
    ]]
}

MBMS-SAI-List-r11 ::=               SEQUENCE (SIZE (1..maxSAI-MBMS-r11)) OF MBMS-SAI-r11

MBMS-SAI-r11 ::=                    INTEGER (0..65535)

MBMS-SAI-InterFreqList-r11 ::=      SEQUENCE (SIZE (1..maxFreq)) OF MBMS-SAI-InterFreq-r11

MBMS-SAI-InterFreqList-v1140 ::=    SEQUENCE (SIZE (1..maxFreq)) OF MBMS-SAI-InterFreq-v1140

MBMS-SAI-InterFreq-r11 ::=          SEQUENCE {
    dl-CarrierFreq-r11              ARFCN-ValueEUTRA-r9,
    mbms-SAI-List-r11               MBMS-SAI-List-r11
}

MBMS-SAI-InterFreq-v1140 ::=        SEQUENCE {
        multiBandInfoList-r11       MultiBandInfoList-r11       OPTIONAL  -- Need OR
}


-- ASN1STOP
```

| ***SystemInformationBlockType15*** **field descriptions** |
|---|
| ***mbms-SAI-InterFreqList*** <br> Contains a list of neighboring frequencies including additional bands, if any, that provide MBMS services and the corresponding MBMS SAIs. |
| ***mbms-SAI-IntraFreq*** <br> Contains the list of MBMS SAIs for the current frequency. A duplicate MBMS SAI indicates that this and all following SAIs 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 SAIs listed in *mbms-SAI-IntraFreq* to derive the MBMS frequencies of interest. |
| ***mbms-SAI-List*** <br> Contains a list of MBMS SAIs for a specific frequency. |
| ***multiBandInfoList*** <br> A list of additional frequency bands applicable for the cells participating in the MBSFN transmission. |

| Conditional presence | Explanation |
|---|---|
| *InterFreq* | The field is optionally present, need OR, if the *mbms-SAI-InterFreqList-r11* is present. Otherwise it is not present. |

## – SystemInformationBlockType16

The IE *SystemInformationBlockType16* contains information related to GPS time and Coordinated Universal Time (UTC). The UE may use the parameters provided in this system information block to obtain the UTC, the GPS and the local time.

NOTE: The UE may use the time information for numerous purposes, possibly involving upper layers e.g. to assist GPS initialisation, to synchronise the UE clock (a.o. to determine MBMS session start/ stop).

***SystemInformationBlockType16 information element***

```
-- ASN1START


SystemInformationBlockType16-r11 ::=        SEQUENCE {
    timeInfo-r11                        SEQUENCE {
        timeInfoUTC-r11                     INTEGER (0..549755813887),
        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
    }                                                                 OPTIONAL,  -- Need OR
    lateNonCriticalExtension            OCTET STRING              OPTIONAL,
    ...
}


-- ASN1STOP
```

| ***SystemInformationBlockType16* field descriptions** |
|---|
| ***dayLightSavingTime*** |
| It indicates if and how daylight saving time (DST) is applied to obtain the local time. The semantics is the same as the semantics of the *Daylight Saving Time* IE in TS 24.301 [35] and TS 24.008 [49]. The first/leftmost bit of the bit string contains the b2 of octet 3, i.e. the value part of the *Daylight Saving Time* IE, and the second bit of the bit string contains b1 of octet 3. |
| ***leapSeconds*** |
| Number of leap seconds offset between GPS Time and UTC. UTC and GPS time are related i.e. GPS time - *leapSeconds* = UTC time. |
| ***localTimeOffset*** |
| Offset between UTC and local time in units of 15 minutes. Actual value = 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), including leap seconds and other additions prior to 1972. NOTE 1.<br>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: For the sake of the field definition, it is assumed UTC existed prior to 1 January 1972. As this field counts total elapsed time, conversion to calendar UTC time needs to allow for leap second and other calendar adjustments since 1 January 1900. For example, time 00:00 on 1 January 1972 UTC corresponds to a *timeInfoUTC* of 2,272,060,800 seconds.

## – SystemInformationBlockType17

The IE *SystemInformationBlockType17* contains information relevant for traffic steering between E-UTRAN and WLAN.

***SystemInformationBlockType17 information element***

```
-- ASN1START


SystemInformationBlockType17-r12 ::=   SEQUENCE {
    wlan-OffloadInfoPerPLMN-List-r12        SEQUENCE (SIZE (1..maxPLMN-r11)) OF
                                    WLAN-OffloadInfoPerPLMN-r12         OPTIONAL, -- Need OR
    lateNonCriticalExtension                OCTET STRING                OPTIONAL,
    ...
}


WLAN-OffloadInfoPerPLMN-r12 ::=         SEQUENCE {
        wlan-OffloadConfigCommon-r12    WLAN-OffloadConfig-r12      OPTIONAL,  -- Need OR
        wlan-Id-List-r12                WLAN-Id-List-r12            OPTIONAL,  -- Need OR
        ...
}


WLAN-Id-List-r12 ::=                SEQUENCE (SIZE (1..maxWLAN-Id-r12)) OF WLAN-Identifiers-r12
```

```
WLAN-Identifiers-r12 ::=            SEQUENCE {
    ssid-r12                        OCTET STRING (SIZE (1..32))        OPTIONAL,  -- Need OR
    bssid-r12                       OCTET STRING (SIZE (6))            OPTIONAL,  -- Need OR
    hessid-r12                      OCTET STRING (SIZE (6))            OPTIONAL,  -- Need OR
    ...
}

-- ASN1STOP
```

| ***SystemInformationBlockType17* field descriptions** |
|---|
| ***bssid***<br>Basic Service Set Identifier (BSSID) defined in IEEE 802.11-2012 [67]. |
| ***hessid***<br>Homogenous Extended Service Set Identifier (HESSID) defined in IEEE 802.11-2012 [67]. |
| ***ssid***<br>Service Set Identifier (SSID) defined in IEEE 802.11-2012 [67]. |
| ***wlan-OffloadInfoPerPLMN-List***<br>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 SidelinkUE information procedure and may contain sidelink direct communication related resource configuration information.

***SystemInformationBlockType18* information element**

```
-- ASN1START

SystemInformationBlockType18-r12 ::= SEQUENCE {
    commConfig-r12                  SEQUENCE {
        commRxPool-r12                      SL-CommRxPoolList-r12,
        commTxPoolNormalCommon-r12          SL-CommTxPoolList-r12          OPTIONAL,  -- Need OR
        commTxPoolExceptional-r12           SL-CommTxPoolList-r12          OPTIONAL,  -- Need OR
        commSyncConfig-r12                  SL-SyncConfigList-r12      OPTIONAL   -- Need OR
    }                                                                  OPTIONAL,  -- Need OR
    lateNonCriticalExtension        OCTET STRING                       OPTIONAL,
    ...
}

-- ASN1STOP
```

| ***SystemInformationBlockType18*** **field descriptions** |
|---|
| ***commRxPool*** <br> Indicates the resources by which the UE is allowed to receive sidelink direct communication while in RRC_IDLE and while in RRC_CONNECTED. |
| ***commSyncConfig*** <br> 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*** <br> Indicates the resources by which the UE is allowed to transmit sidelink direct communication in exceptional conditions, as specified in 5.10.4. |
| ***commTxPoolNormalCommon*** <br> Indicates the resources by which the UE is allowed to transmit sidelink direct 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 direct discovery related resource configuration information.

***SystemInformationBlockType19*** **information element**

```
-- ASN1START


SystemInformationBlockType19-r12 ::= SEQUENCE {
    discConfig-r12                  SEQUENCE {
        discRxPool-r12                  SL-DiscRxPoolList-r12,
        discTxPoolCommon-r12                SL-DiscTxPoolList-r12           OPTIONAL,  -- Need OR
        discTxPowerInfo-r12             SL-DiscTxPowerInfoList-r12    OPTIONAL,  -- Cond Tx
        discSyncConfig-r12              SL-SyncConfigList-r12       OPTIONAL   -- Need OR
    }                                                               OPTIONAL,  -- Need OR
    discInterFreqList-r12           SL-CarrierFreqInfoList-r12      OPTIONAL,  -- Need OR
    lateNonCriticalExtension        OCTET STRING                        OPTIONAL,
    ...
}


SL-CarrierFreqInfoList-r12 ::= SEQUENCE (SIZE (1..maxFreq)) OF SL-CarrierFreqInfo-r12


SL-CarrierFreqInfo-r12::=       SEQUENCE {
    carrierFreq-r12                 ARFCN-ValueEUTRA-r9,
    plmn-IdentityList-r12           PLMN-IdentityList4-r12          OPTIONAL   -- Need OP
}
```

```
PLMN-IdentityList4-r12 ::=SEQUENCE (SIZE (1..maxPLMN-r11)) OF  PLMN-IdentityInfo2-r12


PLMN-IdentityInfo2-r12 ::=          CHOICE  {
    plmn-Index-r12                  INTEGER (1..maxPLMN-r11),
    plmnIdentity-r12              PLMN-Identity
}


-- ASN1STOP
```

| ***SystemInformationBlockType19* field descriptions** |
|---|
| ***discInterFreqList*** <br> Indicates the neighbouring frequencies on which sidelink direct discovery announcement is supported. |
| ***discRxPool*** <br> Indicates the resources by which the UE is allowed to receive sidelink direct discovery announcements while in RRC_IDLE and while in RRC_CONNECTED. |
| ***discSyncConfig*** <br> 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*** <br> Indicates the resources by which the UE is allowed to transmit sidelink direct discovery announcements while in RRC_IDLE. |
| ***plmn-IdentityList*** <br> 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*** <br> 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***

```
-- ASN1START


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


AntennaInfoDedicated ::=          SEQUENCE {
```

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

AntennaInfoDedicated-v920 ::=       SEQUENCE {
    codebookSubsetRestriction-v920      CHOICE {
        n2TxAntenna-tm8-r9              BIT STRING (SIZE (6)),
        n4TxAntenna-tm8-r9              BIT STRING (SIZE (32))
    }       OPTIONAL                                        -- Cond TM8
}

AntennaInfoDedicated-r10 ::=        SEQUENCE {
    transmissionMode-r10            ENUMERATED {
                                    tm1, tm2, tm3, tm4, tm5, tm6, tm7, tm8-v920,
                                    tm9-v1020, tm10-v1130, spare6, spare5, spare4,
                                    spare3, spare2, spare1},
    codebookSubsetRestriction-r10   BIT STRING      OPTIONAL,       -- Cond TMX
    ue-TransmitAntennaSelection     CHOICE{
        release                     NULL,
        setup                       ENUMERATED {closedLoop, openLoop}
```

```
    }
}

AntennaInfoDedicated-v1250 ::=        SEQUENCE {
    alternativeCodebookEnabledFor4TX-r12  BOOLEAN
}

-- ASN1STOP
```

| ***AntennaInfo* field descriptions** |
|---|
| ***alternativeCodebookEnabledFor4TX*** <br> 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* or *tm9*, b) PMI/RI reporting and c) 4 CRS ports. |
| ***antennaPortsCount*** <br> 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*** <br> 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. |
| ***transmissionMode*** <br> 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*** <br> 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 | Explanation |
|---|---|
| *TM* | The field is mandatory present if the *transmissionMode* 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. |
| *TM8* | The field is optional present, need OR, if *AntennaInfoDedicated* is included and *transmissionMode* is set to *tm8*. If *AntennaInfoDedicated* is included and *transmissionMode* 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. |
| *TMX* | The field is mandatory present if the *transmissionMode-r10* is set to *tm3*, *tm4*, *tm5* or *tm6*. The field is optionally present, need OR, if the *transmissionMode-r10* is set to *tm8* or *tm9*. Otherwise the field is not present and the UE shall delete any existing value for this field. |

## – AntennaInfoUL

The IE *AntennaInfoUL* is used to specify the UL antenna configuration.

***AntennaInfoUL* information elements**

```
-- ASN1START

AntennaInfoUL-r10 ::=       SEQUENCE {
    transmissionModeUL-r10              ENUMERATED {tm1, tm2, spare6, spare5,
```

```
                                    spare4, spare3, spare2, spare1} OPTIONAL,  -- Need OR
    fourAntennaPortActivated-r10        ENUMERATED {setup}          OPTIONAL       -- Need OR
}


-- ASN1STOP
```

| ***AntennaInfoUL* field descriptions** |
|---|
| ***fourAntennaPortActivated*** |
| Parameter indicates if four antenna ports are used. See TS 36.213 [23, 8.2]. E-UTRAN optionally configures *fourAntennaPortActivated* only if *transmissionModeUL* is set to *tm2*. |
| ***transmissionModeUL*** |
| Points to one of UL Transmission modes defined in TS 36.213 [23, 8.0] where tm1 refers to transmission mode 1, tm2 to transmission mode 2 etc. |

## – CQI-ReportConfig

The IE *CQI-ReportConfig* is used to specify the CQI reporting configuration.

***CQI-ReportConfig* information elements**

```
-- ASN1START


CQI-ReportConfig ::=            SEQUENCE {
    cqi-ReportModeAperiodic         CQI-ReportModeAperiodic OPTIONAL,          -- Need OR
    nomPDSCH-RS-EPRE-Offset             INTEGER (-1..6),
    cqi-ReportPeriodic              CQI-ReportPeriodic  OPTIONAL               -- Need ON
}


CQI-ReportConfig-v920 ::=     SEQUENCE {
    cqi-Mask-r9                     ENUMERATED {setup}      OPTIONAL,      -- Cond cqi-Setup
    pmi-RI-Report-r9                ENUMERATED {setup}      OPTIONAL       -- Cond PMIRI
}


CQI-ReportConfig-r10 ::=   SEQUENCE {
    cqi-ReportAperiodic-r10             CQI-ReportAperiodic-r10         OPTIONAL,  -- Need ON
    nomPDSCH-RS-EPRE-Offset         INTEGER (-1..6),
    cqi-ReportPeriodic-r10          CQI-ReportPeriodic-r10      OPTIONAL,  -- Need ON
    pmi-RI-Report-r9                ENUMERATED {setup}              OPTIONAL,  -- Cond PMIRIPCell
    csi-SubframePatternConfig-r10   CHOICE {
        release                     NULL,
        setup                       SEQUENCE {
```

```
            csi-MeasSubframeSet1-r10        MeasSubframePattern-r10,
            csi-MeasSubframeSet2-r10        MeasSubframePattern-r10
        }
    }                                                   OPTIONAL   -- Need ON
}

CQI-ReportConfig-v1130 ::=    SEQUENCE {
    cqi-ReportPeriodic-v1130            CQI-ReportPeriodic-v1130,
    cqi-ReportBoth-r11                  CQI-ReportBoth-r11
}

CQI-ReportConfig-v1250 ::=        SEQUENCE {
    csi-SubframePatternConfig-r12     CHOICE {
        release                       NULL,
        setup                         SEQUENCE {
            csi-MeasSubframeSets-r12        BIT STRING (SIZE (10))
        }
    }                                                   OPTIONAL,  -- Need ON
    cqi-ReportBoth-v1250                CQI-ReportBoth-v1250      OPTIONAL,  -- Need ON
    cqi-ReportAperiodic-v1250 CQI-ReportAperiodic-v1250         OPTIONAL,  -- Need ON
    altCQI-Table-r12          ENUMERATED {
                                  allSubframes, csi-SubframeSet1,
                                  csi-SubframeSet2, spare1}       OPTIONAL       -- Need OP
}

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

CQI-ReportPeriodic ::=      CHOICE {
    release                       NULL,
    setup                         SEQUENCE {
```

```
        cqi-PUCCH-ResourceIndex             INTEGER (0..1185),
        cqi-pmi-ConfigIndex                 INTEGER (0..1023),
        cqi-FormatIndicatorPeriodic             CHOICE {
            widebandCQI                         NULL,
            subbandCQI                          SEQUENCE {
                k                               INTEGER (1..4)
            }
        },
        ri-ConfigIndex                      INTEGER (0..1023) OPTIONAL,             -- Need OR
        simultaneousAckNackAndCQI           BOOLEAN
    }
}

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

```
                ri-ConfigIndex2-r10             INTEGER (0..1023)       OPTIONAL        -- Need OR
            }
        }       OPTIONAL                                                        -- Need ON
    }
}


CQI-ReportPeriodic-v1130 ::=  SEQUENCE {
    simultaneousAckNackAndCQI-Format3-r11       ENUMERATED {setup}          OPTIONAL,  -- Need OR
    cqi-ReportPeriodicProcExtToReleaseList-r11 CQI-ReportPeriodicProcExtToReleaseList-r11    OPTIONAL,  --
Need ON
    cqi-ReportPeriodicProcExtToAddModList-r11    CQI-ReportPeriodicProcExtToAddModList-r11  OPTIONAL  --
Need ON
}


CQI-ReportPeriodicProcExtToAddModList-r11 ::=       SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF CQI-
ReportPeriodicProcExt-r11


CQI-ReportPeriodicProcExtToReleaseList-r11 ::=    SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF CQI-
ReportPeriodicProcExtId-r11


CQI-ReportPeriodicProcExt-r11 ::=         SEQUENCE {
    cqi-ReportPeriodicProcExtId-r11   CQI-ReportPeriodicProcExtId-r11,
    cqi-pmi-ConfigIndex-r11             INTEGER (0..1023),
    cqi-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-ConfigToReleaseList-r11      CSI-IM-ConfigToReleaseList-r11  OPTIONAL,  -- Need ON
    csi-IM-ConfigToAddModList-r11       CSI-IM-ConfigToAddModList-r11OPTIONAL,  -- Need ON
    csi-ProcessToReleaseList-r11        CSI-ProcessToReleaseList-r11  OPTIONAL,  -- Need ON
    csi-ProcessToAddModList-r11         CSI-ProcessToAddModList-r11         OPTIONAL   -- Need ON
}

CQI-ReportBoth-v1250 ::=            SEQUENCE {
    csi-IM-ConfigToReleaseListExt-r12       CSI-IM-ConfigId-v1250OPTIONAL,  -- Need ON
    csi-IM-ConfigToAddModListExt-r12        CSI-IM-ConfigExt-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 set1, and value *csi-SubframeSet2* means the alternative CQI table applies to CSI subframe set2. EUTRAN sets the value to *csi-SubframeSet1* or *csi-SubframeSet2* only if *transmissionMode* is set in range *tm1* to *tm9* and *csi-SubframePatternConfig-r10* is configured for the concerned serving cell and different CQI tables apply to the two CSI subframe sets; otherwise EUTRAN sets the value to *allSubframes*. If this field is not present, the UE shall use Table 7.2.3-1 in TS 36.213 [23] for all subframes and CSI processes, if configured. |
| ***aperiodicCSI-Trigger*** |
| Indicates for which serving cell(s) the aperiodic CSI report is triggered when one or more SCells are configured. *trigger1* corresponds to the CSI request field 10 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* $I_{CQI/PMI}$*,* 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* $I_{CQI/PMI}$*,* 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 $n_{\mathrm{PUCCH}}^{(2,p)}$ 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. |
| ***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 $C_{CSI,0}$ in TS 36.213 [23, 7.2] and CSI subframe set 2 refers to $C_{CSI,1}$ 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 $C_{CSI,0}$ in TS 36.213 [23, 7.2] and *csi-MeasSubframeSet2* refers to $C_{CSI,1}$ 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***<br>For a serving frequency E-UTRAN configures one or more *CSI-Process* only when transmission mode 10 is configured for the serving cell on this carrier frequency. |
| ***csi-ReportMode***<br>Parameter: *PUCCH_format1-1_CSI_reporting_mode,* see TS 36.213 [23, 7.2.2]. |
| ***K***<br>Parameter: K, see TS 36.213 [23, 7.2.2]. |
| ***nomPDSCH-RS-EPRE-Offset***<br>Parameter: $\Delta_{offset}$ *see* TS 36.213 [23, 7.2.3]. Actual value = IE value * 2 [dB]. |
| ***periodicityFactor***<br>Parameter: $H'$, see TS 36.213 [23, 7.2.2]. |
| ***pmi-RI-Report***<br>See TS 36.213 [23, 7.2]. The presence of this field means PMI/RI reporting is configured; otherwise the PMI/RI reporting is not configured. EUTRAN configures this field only when *transmissionMode* is set to *tm8, tm9* or *tm10*. The UE shall ignore *pmi-RI-Report-r9*/ *pmi-RI-Report-r10* when transmission mode 10 is configured for the serving cell on this carrier frequency. |
| ***ri-ConfigIndex***<br>Parameter: *RI Config Index* $I_{RI}$, 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***<br>Parameter: *RI Config Index* $I_{RI}$, see TS 36.213 [23, 7.2.2-1B]. The parameter applies to the subframe pattern corresponding to *csi-MeasSubframeSet2* or corresponding to the CSI subframe set 2 indicated by *csi-MeasSubframeSets-r12.* E-UTRAN configures *ri-ConfigIndex2* only if *ri-ConfigIndex* is configured. |
| ***ri-Ref-CSI-ProcessId***<br>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, 7.2.1, 7.2.2]. |
| ***simultaneousAckNackAndCQI***<br>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 this field is not applicable and the UE shall ignore the value. |
| ***simultaneousAckNackAndCQI-Format3***<br>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 this field is not applicable and the UE shall ignore the value. |
| ***trigger01***<br>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***<br>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***<br>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 7.2.1-1A]. Value s1 corresponds to CSI subframe set 1 and value s2 corresponds to CSI subframe set 2. |
| ***trigger1-SubframeSetIndicator***<br>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 7.2.1-1A].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 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***<br>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 7.2.1-1A].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 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 | Explanation |
|---|---|
| *cqi-Setup* | This field is not present for an Scell, while it is conditionally present for the Pcell 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. |
| *PMIRI* | 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. |
| *PMIRIPCell* | The field is optional present, need OR, if *cqi-ReportPeriodic* is included in the *CQI-ReportConfig-r10* and set to *setup*, or *cqi-ReportAperiodic* is included in the *CQI-ReportConfig-r10* and set to *setup*. If the field *cqi-ReportPeriodic* is present in the *CQI-ReportConfig-r10* and set to *release* and *cqi-ReportAperiodic* is included in the *CQI-ReportConfig-r10* and set to *release*, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present. |
| *PMIRISCell* | 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. |

## – 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 scheduling
            cif-Presence-r10                    BOOLEAN
        },
        other-r10                           SEQUENCE {              -- Cross carrier scheduling
```

```
            schedulingCellId-r10            ServCellIndex-r10,
            pdsch-Start-r10                 INTEGER (1..4)
        }
    }
}


-- ASN1STOP
```

| ***CrossCarrierSchedulingConfig* field descriptions** |
|---|
| ***cif-Presence***<br>The field is used to indicate whether carrier indicator field is present (value TRUE) or not (value FALSE) in PDCCH/ EPDCCH DCI formats, see TS 36.212 [22, 5.3.3.1]. |
| ***pdsch-Start***<br>The starting OFDM symbol of PDSCH for the concerned SCell, see TS 36.213 [23. 7.1.6.4]. Values 1, 2, 3 are applicable when *dl-Bandwidth* for the concerned SCell is greater than 10 resource blocks, values 2, 3, 4 are applicable when *dl-Bandwidth* for the concerned SCell is less than or equal to 10 resource blocks, see TS 36.211 [21, Table 6,7-1]. |
| ***schedulingCellId***<br>Indicates which cell signals the downlink allocations and uplink grants, if applicable, for the concerned SCell. In case the UE is configured with DC, the scheduling cell is part of the same cell group (i.e. MCG or SCG) as the scheduled cell. |

## – CSI-IM-Config

The IE *CSI-IM-Config* is the CSI Interference Measurement (IM) configuration that E-UTRAN may configure on a serving frequency, see TS 36.213 [23, 7.2.6].

### *CSI-IM-Config* information elements

```
-- ASN1START


CSI-IM-Config-r11 ::=       SEQUENCE {
    csi-IM-ConfigId-r11         CSI-IM-ConfigId-r11,
    resourceConfig-r11          INTEGER (0..31),
    subframeConfig-r11          INTEGER (0..154),
    ...
}


CSI-IM-ConfigExt-r12 ::=        SEQUENCE {
    csi-IM-ConfigId-v1250           CSI-IM-ConfigId-v1250,
    resourceConfig-r12          INTEGER (0..31),
    subframeConfig-r12          INTEGER (0..154),
    ...
}
```

```
-- ASN1STOP
```

| ***CSI-IM-Config* field descriptions** |
|---|
| ***resourceConfig*** |
| Parameter: CSI reference signal configuration, see TS 36.213 [23, 7.2.6] and TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2] for 4 REs. |
| ***subframeConfig*** |
| Parameter: $I_{\mathrm{CSI-RS}}$, see TS 36.213 [23, 7.2.6] and TS 36.211 [21, table 6.10.5.3-1]. |

## – CSI-IM-ConfigId

The IE *CSI-IM-ConfigId* is used to identify a CSI-IM configuration that is configured by the IE *CSI-IM-Config*. The identity is unique within the scope of a carrier frequency.

**_CSI-IM-ConfigId_ information elements**

```
-- ASN1START

CSI-IM-ConfigId-r11 ::=                 INTEGER (1..maxCSI-IM-r11)

CSI-IM-ConfigId-r12 ::=                 INTEGER (1..maxCSI-IM-r12)

CSI-IM-ConfigId-v1250 ::=               INTEGER (maxCSI-IM-r12)


-- ASN1STOP
```

## – CSI-Process

The IE *CSI-Process* is the CSI process configuration that E-UTRAN may configure on a serving frequency.

**_CSI-Process_ information elements**

```
-- ASN1START


CSI-Process-r11 ::=     SEQUENCE {
    csi-ProcessId-r11           CSI-ProcessId-r11,
    csi-RS-ConfigNZPId-r11          CSI-RS-ConfigNZPId-r11,
    csi-IM-ConfigId-r11             CSI-IM-ConfigId-r11,
    p-C-AndCBSRList-r11   SEQUENCE (SIZE (1..2)) OF P-C-AndCBSR-r11,
    cqi-ReportBothProc-r11      CQI-ReportBothProc-r11              OPTIONAL,       -- Need OR
    cqi-ReportPeriodicProcId-r11    INTEGER (0..maxCQI-ProcExt-r11)     OPTIONAL,       -- Need OR
    cqi-ReportAperiodicProc-r11     CQI-ReportAperiodicProc-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-AndCBSR-r11 ::=   SEQUENCE {
    p-C-r11                         INTEGER (-8..15),
    codebookSubsetRestriction-r11 BIT STRING
}

-- ASN1STOP
```

| ***CSI-Process* field descriptions** |
|---|
| ***alternativeCodebookEnabledFor4TXProc***<br>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***<br>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-ReportAperiodicProc2***<br>*cqi-ReportAperiodicProc2* is configured only if *csi-MeasSubframeSets-r12* is configured for the same frequency as the CSI process. *cqi-ReportAperiodicProc2* is for CSI subframe set 2. E-UTRAN shall set *cqi-ReportModeAperiodic-r11* in *cqi-ReportAperiodicProc2* the same as in *cqi-ReportAperiodicProc*. |
| ***cqi-ReportBothProc***<br>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***<br>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***<br>Refers to a CSI-IM configuration that is configured for the same frequency as the CSI process. |
| ***csi-IM-ConfigIdList***<br>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***<br>Refers to a CSI RS configuration using non-zero power transmission that is configured for the same frequency as the CSI process. |
| ***p-C***<br>Parameter: $P_C$ , see TS 36.213 [23, 7.2.5]. |
| ***p-C-AndCBSRList***<br>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-r10                  CHOICE {
        release                     NULL,
        setup                       SEQUENCE {
            antennaPortsCount-r10           ENUMERATED {an1, an2, an4, an8},
            resourceConfig-r10              INTEGER (0..31),
            subframeConfig-r10              INTEGER (0..154),
            p-C-r10                         INTEGER (-8..15)
        }
    }                                                   OPTIONAL,           -- Need ON
    zeroTxPowerCSI-RS-r10       ZeroTxPowerCSI-RS-Conf-r12          OPTIONAL            -- Need ON
}

CSI-RS-Config-v1250 ::=     SEQUENCE {
    zeroTxPowerCSI-RS2-r12      ZeroTxPowerCSI-RS-Conf-r12          OPTIONAL,           -- Need ON
    ds-ZeroTxPowerCSI-RS-r12        CHOICE {
        release                     NULL,
        setup                       SEQUENCE {
            zeroTxPowerCSI-RS-List-r12      SEQUENCE (SIZE (1..maxDS-ZTP-CSI-RS-r12)) OF ZeroTxPowerCSI-
RS-r12
        }
    }                                                   OPTIONAL                -- Need ON
}

ZeroTxPowerCSI-RS-Conf-r12 ::=      CHOICE {
        release                     NULL,
        setup                       ZeroTxPowerCSI-RS-r12
}

ZeroTxPowerCSI-RS-r12 ::=   SEQUENCE {
    zeroTxPowerResourceConfigList-r12       BIT STRING (SIZE (16)),
    zeroTxPowerSubframeConfig-r12           INTEGER (0..154)
```

```
}


-- ASN1STOP
```

| ***CSI-RS-Config* field descriptions** |
|---|
| ***antennaPortsCount***<br>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***<br>Parameter for additional *zeroTxPowerCSI-RS* for a serving cell, concerning the CSI-RS included in discovery signals. |
| ***zeroTxPowerCSI-RS2***<br>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***<br>Parameter: $P_C$ , see TS 36.213 [23, 7.2.5]. |
| ***resourceConfig***<br>Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2]. |
| ***subframeConfig***<br>Parameter: $I_{\text{CSI-RS}}$ , see TS 36.211 [21, table 6.10.5.3-1]. |
| ***zeroTxPowerResourceConfigList***<br>Parameter: *ZeroPowerCSI-RS,* see TS 36.213 [23, 7.2.7]. |
| ***zeroTxPowerSubframeConfig***<br>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**

```
-- ASN1START


CSI-RS-ConfigNZP-r11 ::=     SEQUENCE {
    csi-RS-ConfigNZPId-r11          CSI-RS-ConfigNZPId-r11,
    antennaPortsCount-r11           ENUMERATED {an1, an2, an4, an8},
    resourceConfig-r11              INTEGER (0..31),
    subframeConfig-r11              INTEGER (0..154),
    scramblingIdentity-r11          INTEGER (0..503),
    qcl-CRS-Info-r11                SEQUENCE {
        qcl-ScramblingIdentity-r11      INTEGER (0..503),
        crs-PortsCount-r11              ENUMERATED {n1, n2, n4, spare1},
        mbsfn-SubframeConfigList-r11CHOICE {
            release                     NULL,
            setup                       SEQUENCE {
                subframeConfigList          MBSFN-SubframeConfigList
```

```
                }
            }                                                   OPTIONAL   -- Need ON
        }                                                       OPTIONAL,  -- Need OR
        ...
}


-- ASN1STOP
```

| ***CSI-RS-ConfigNZP* field descriptions** |
|---|
| ***antennaPortsCount*** <br> 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*** <br> 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*** <br> Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2]. |
| ***subframeConfig*** <br> Parameter: $I_{\mathrm{CSI-RS}}$, see TS 36.211 [21, table 6.10.5.3-1]. |
| ***scramblingIdentity*** <br> Parameter: Pseudo-random sequence generator parameter, $n_{\mathrm{ID}}$, 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

```
-- ASN1START


CSI-RS-ConfigNZPId-r11 ::=              INTEGER (1..maxCSI-RS-NZP-r11)


-- ASN1STOP
```

## – 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

```
-- ASN1START


CSI-RS-ConfigZP-r11 ::=         SEQUENCE {
    csi-RS-ConfigZPId-r11       CSI-RS-ConfigZPId-r11,
```

```
    resourceConfigList-r11      BIT STRING (SIZE (16)),
    subframeConfig-r11          INTEGER (0..154),
    ...
}

-- ASN1STOP
```

| ***CSI-RS-ConfigZP* field descriptions** |
|---|
| ***resourceConfigList*** |
| Parameter: *ZeroPowerCSI-RS*, see TS 36.213 [23, 7.2.7]. |
| ***subframeConfig*** |
| Parameter: $I_{\text{CSI-RS}}$, see TS 36.211 [21, table 6.10.5.3-1]. |

## – CSI-RS-ConfigZPId

The IE *CSI-RS-ConfigZPId* is used to identify a CSI-RS resource configuration for which UE assumes zero transmission power, as configured by the IE *CSI-RS-ConfigZP*. The identity is unique within the scope of a carrier frequency.

***CSI-RS-ConfigZPId* information elements**

```
-- 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**

```
-- ASN1START

DMRS-Config-r11 ::=         CHOICE {
    release                 NULL,
    setup                   SEQUENCE {
        scramblingIdentity-r11      INTEGER (0..503),
        scramblingIdentity2-r11     INTEGER (0..503)
    }
}
```

```
-- ASN1STOP
```

| ***DMRS-Config* field descriptions** |
|---|
| ***scramblingIdentity, scramblingIdentity2*** |
| Parameter: $n_{ID}^{DMRS,i}$, see TS 36.211 [21, 6.10.3.1]. |

## – DRB-Identity

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

***DRB-Identity* information elements**

```
-- ASN1START


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


-- ASN1STOP
```

## – 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***

```
-- 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-r11EPDCCH-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***<br>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***<br>The DMRS scrambling sequence initialization parameter $n_{\mathrm{ID},i}^{\mathrm{EPDCCH}}$ defined in TS 36.211[21, 6.10.3A.1]. |
| ***EPDCCH-SetConfig***<br>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***<br>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***<br>PUCCH format 1a and 1b resource starting offset for the EPDCCH set. See TS 36.213 [23, 10.1.1.2]. |
| ***re-MappingQCL-ConfigId***<br>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***<br>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***<br>Indicates the identity of the EPDCCH configuration set. |
| ***startSymbol***<br>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***<br>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***<br>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**

```
-- ASN1START

EIMTA-MainConfig-r12 ::=    CHOICE {
    release                 NULL,
    setup                   SEQUENCE {
        eimta-RNTI-r12          C-RNTI,
        eimta-CommandPeriodicity-r12ENUMERATED {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
                }
        }
    }
}


-- ASN1STOP
```

| ***EIMTA-MainConfig* field descriptions** |
|---|
| ***eimta-CommandPeriodicity***<br>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***<br>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***<br>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***<br>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***<br>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**

```
-- ASN1START


LogicalChannelConfig ::=            SEQUENCE {
```

```
    ul-SpecificParameters               SEQUENCE {
        priority                        INTEGER (1..16),
        prioritisedBitRate                  ENUMERATED {
                                            kBps0, kBps8, kBps16, kBps32, kBps64, kBps128,
                                            kBps256, infinity, kBps512-v1020, kBps1024-v1020,
                                            kBps2048-v1020, spare5, spare4, spare3, spare2,
                                            spare1},
        bucketSizeDuration                  ENUMERATED {
                                            ms50, ms100, ms150, ms300, ms500, ms1000, spare2,
                                            spare1},
        logicalChannelGroup                     INTEGER (0..3)          OPTIONAL            -- Need OR
    }       OPTIONAL,                                                                       -- Cond UL
    ...,
    [[  logicalChannelSR-Mask-r9        ENUMERATED {setup}      OPTIONAL        -- Cond SRmask
    ]],
    [[  logicalChannelSR-Prohibit-r12   BOOLEAN                 OPTIONAL        -- Need ON
    ]]
}


-- ASN1STOP
```

| LogicalChannelConfig field descriptions |
|---|
| ***bucketSizeDuration***<br>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***<br>Mapping of logical channel to logical channel group for BSR reporting in TS 36.321 [6]. |
| ***logicalChannelSR-Mask***<br>Controlling SR triggering on a logical channel basis when an uplink grant is configured. See TS 36.321 [6]. |
| ***logicalChannelSR-Prohibit***<br>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***<br>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***<br>Logical channel priority in TS 36.321 [6]. Value is an integer. |

| Conditional presence | Explanation |
|---|---|
| *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. |

## – 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**

```
-- ASN1START


MAC-MainConfig ::=                SEQUENCE {
    ul-SCH-Config                 SEQUENCE {
        maxHARQ-Tx                    ENUMERATED {
                                    n1, n2, n3, n4, n5, n6, n7, n8,
                                    n10, n12, n16, n20, n24, n28,
                                    spare2, spare1}        OPTIONAL,  -- Need ON
        periodicBSR-Timer           PeriodicBSR-Timer-r12 OPTIONAL,  -- Need ON
        retxBSR-Timer               RetxBSR-Timer-r12,
        ttiBundling                 BOOLEAN
    }                                                      OPTIONAL,  -- Need ON
    drx-Config                    DRX-Config                   OPTIONAL,  -- Need ON
    timeAlignmentTimerDedicated       TimeAlignmentTimer,
    phr-Config                    CHOICE {
        release                   NULL,
        setup                     SEQUENCE {
            periodicPHR-Timer           ENUMERATED {sf10, sf20, sf50, sf100, sf200,
                                              sf500, sf1000, infinity},
            prohibitPHR-Timer           ENUMERATED {sf0, sf10, sf20, sf50, sf100,
                                                  sf200, sf500, sf1000},
            dl-PathlossChange           ENUMERATED {dB1, dB3, dB6, infinity}
        }
    }                                                      OPTIONAL,  -- Need ON
    ...,
    [[  sr-ProhibitTimer-r9         INTEGER (0..7)          OPTIONAL   -- Need ON
    ]],
    [[  mac-MainConfig-v1020        SEQUENCE {
            sCellDeactivationTimer-r10      ENUMERATED {
                                        rf2, rf4, rf8, rf16, rf32, rf64, rf128,
```

```
                                        spare}          OPTIONAL,  -- Need OP
            extendedBSR-Sizes-r10       ENUMERATED {setup}          OPTIONAL,  -- Need OR
            extendedPHR-r10             ENUMERATED {setup}          OPTIONAL   -- Need OR
        }                                                           OPTIONAL   -- Need ON
    ]],
    [[  stag-ToReleaseList-r11      STAG-ToReleaseList-r11    OPTIONAL,  -- Need ON
        stag-ToAddModList-r11       STAG-ToAddModList-r11  OPTIONAL,  -- Need ON
        drx-Config-v1130            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),
        sf40                    INTEGER(0..39),
        sf64                    INTEGER(0..63),
        sf80                    INTEGER(0..79),
        sf128                   INTEGER(0..127),
        sf160                   INTEGER(0..159),
        sf256                   INTEGER(0..255),
        sf320                   INTEGER(0..319),
        sf512                   INTEGER(0..511),
        sf640                   INTEGER(0..639),
        sf1024                  INTEGER(0..1023),
        sf1280                  INTEGER(0..1279),
        sf2048                  INTEGER(0..2047),
        sf2560                  INTEGER(0..2559)
    },
    shortDRX                    SEQUENCE {
```

```
            shortDRX-Cycle                  ENUMERATED {
                                            sf2, sf5, sf8, sf10, sf16, sf20,
                                            sf32, sf40, sf64, sf80, sf128, sf160,
                                            sf256, sf320, sf512, sf640},
            drxShortCycleTimer              INTEGER (1..16)
        }       OPTIONAL                                        -- Need OR
    }
}

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-r11TimeAlignmentTimer,
    ...
```

```
}

STAG-Id-r11::=                INTEGER (1..maxSTAG-r11)

-- ASN1STOP
```

| ***MAC-MainConfig* field descriptions** |
|---|
| ***dl-PathlossChange***<br>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***<br>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***<br>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***<br>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***<br>Timer for DRX in TS 36.321 [6]. Value in multiples of shortDRX-Cycle. A value of 1 corresponds to shortDRX-Cycle, a value of 2 corresponds to 2 * shortDRX-Cycle and so on. |
| ***e-HARQ-Pattern***<br>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***<br>If value *setup* is configured, the BSR index indicates extended BSR size levels as defined in TS 36.321 [6, Table 6.1.3.1-2]. |
| ***extendedPHR***<br>Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value *setup*). Otherwise the power headroom shall be reported using the Power Headroom Report MAC control element defined in TS 36.321 [6]. E-UTRAN always configures the value *setup* if more than one Serving Cell with uplink is configured. E-UTRAN configures *extendedPHR* only if *phr-Config* is configured. The UE shall release *extendedPHR* if *phr-Config* is released. |
| ***logicalChannelSR-ProhibitTimer***<br>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***<br>*longDRX-Cycle* and *drxStartOffset* in TS 36.321 [6]. The value of l*ongDRX-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***<br>Maximum number of transmissions for UL HARQ in TS 36.321 [6]. |
| ***onDurationTimer***<br>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***<br>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***<br>Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on. |
| ***phr-ModeOtherCG***<br>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***<br>Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes, sf100 corresponds to 100 subframes and so on. |
| ***retxBSR-Timer***<br>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. |
| ***sCellDeactivationTimer***<br>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). |

| ***MAC-MainConfig* field descriptions** |
|---|
| ***shortDRX-Cycle***<br>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***<br>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***<br>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***<br>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***<br>Indicates the value of the time alignment timer for an STAG, see TS 36.321 [6]. |
| ***ttiBundling***<br>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, ms1500, infinity
    }                                       OPTIONAL,       -- Cond Setup
    rlc-AM                      SEQUENCE {
        statusReportRequired        BOOLEAN
    }                                       OPTIONAL,       -- Cond Rlc-AM
    rlc-UM                      SEQUENCE {
        pdcp-SN-Size            ENUMERATED {len7bits, len12bits}
    }                                       OPTIONAL,       -- Cond Rlc-UM
    headerCompression           CHOICE {
        notUsed                     NULL,
        rohc                    SEQUENCE {
            maxCID                      INTEGER (1..16383)          DEFAULT 15,
```

```
            profiles                        SEQUENCE {
                profile0x0001                   BOOLEAN,
                profile0x0002                   BOOLEAN,
                profile0x0003                   BOOLEAN,
                profile0x0004                   BOOLEAN,
                profile0x0006                   BOOLEAN,
                profile0x0101                   BOOLEAN,
                profile0x0102                   BOOLEAN,
                profile0x0103                   BOOLEAN,
                profile0x0104                   BOOLEAN
            },
            ...
        }
    },
    ...,
    [[  rn-IntegrityProtection-r10      ENUMERATED {enabled} OPTIONAL   -- Cond RN
    ]],
    [[  pdcp-SN-Size-v1130              ENUMERATED {len15bits}    OPTIONAL   -- Cond Rlc-AM2
    ]],
    [[  ul-DataSplitDRB-ViaSCG-r12      BOOLEAN         OPTIONAL,  -- Need ON
        t-Reordering-r12                ENUMERATED {
                                        ms0, ms20, ms40, ms60, ms80, ms100, ms120, ms140,
                                        ms160, ms180, ms200, ms220, ms240, ms260, ms280, ms300,
                                        ms500, ms750, spare14, spare13, spare12, spare11, spare10,
                                        spare9, spare8, spare7, spare6, spare5, spare4, spare3,
                                        spare2, spare1}                 OPTIONAL   -- Cond SetupS
    ]]
}

-- ASN1STOP
```

| ***PDCP-Config* field descriptions** |
|---|
| ***discardTimer***<br>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***<br>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. |
| ***maxCID***<br>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***<br>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***<br>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***<br>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***<br>Indicates that integrity protection or verification shall be applied for all subsequent packets received and sent by the RN on the DRB. |
| ***statusReportRequired***<br>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***<br>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 | Explanation |
|---|---|
| *Rlc-AM* | 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. |
| *Rlc-AM2* | 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. |
| *Rlc-UM* | 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. |
| *RN* | The field is optionally present when signalled to the RN, need OR. Otherwise the field is not present. |
| *Setup* | The field is mandatory present in case of radio bearer setup. Otherwise the field is optionally present, need ON. |
| *SetupS* | 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. |

## – PDSCH-Config

The IE *PDSCH-ConfigCommon* and the IE *PDSCH-ConfigDedicated* are used to specify the common and the UE specific PDSCH configuration respectively.

### *PDSCH-Config* information element

```
-- ASN1START
```

```
PDSCH-ConfigCommon ::=          SEQUENCE {
    referenceSignalPower            INTEGER (-60..50),
    p-b                             INTEGER (0..3)
}

PDSCH-ConfigDedicated::=        SEQUENCE {
    p-a                             ENUMERATED {
                                        dB-6, dB-4dot77, dB-3, dB-1dot77,
                                        dB0, dB1, dB2, dB3}
}

PDSCH-ConfigDedicated-v1130 ::=         SEQUENCE {
    dmrs-ConfigPDSCH-r11                DMRS-Config-r11                 OPTIONAL,  -- Need ON
    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-ConfigId-r11

PDSCH-RE-MappingQCL-Config-r11 ::=      SEQUENCE {
    pdsch-RE-MappingQCL-ConfigId-r11 PDSCH-RE-MappingQCL-ConfigId-r11,
    optionalSetOfFields-r11             SEQUENCE {
        crs-PortsCount-r11                  ENUMERATED {n1, n2, n4, spare1},
        crs-FreqShift-r11               INTEGER (0..5),
        mbsfn-SubframeConfigList-r11    CHOICE {
            release                         NULL,
            setup                           SEQUENCE {
                subframeConfigList                  MBSFN-SubframeConfigList
            }
```

```
        }                                                   OPTIONAL,  -- Need ON
        pdsch-Start-r11                 ENUMERATED {reserved, n1, n2, n3, n4, assigned}
    }                                                       OPTIONAL,  -- Need OP
    csi-RS-ConfigZPId-r11           CSI-RS-ConfigZPId-r11,
    qcl-CSI-RS-ConfigNZPId-r11      CSI-RS-ConfigNZPId-r11          OPTIONAL,  -- Need OR
    ...
}


-- ASN1STOP
```

| ***PDSCH-Config* field descriptions** |
|---|
| ***optionalSetOfFields***<br>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***<br>Parameter: $P_A$ , see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4dot77 corresponds to -4.77 dB etc. |
| ***p-b***<br>Parameter: $P_B$ , see TS 36.213 [23, Table 5.2-1]. |
| ***pdsch-Start***<br>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. |
| ***qcl-CSI-RS-ConfigNZPId***<br>Indicates the CSI-RS resource that is quasi co-located with the PDSCH antenna ports, see TS 36.213 [23, 7.1.9]. E-UTRAN configures this field if and only if the UE is configured with *qcl-Operation* set to *typeB*. |
| ***qcl-Operation***<br>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***<br>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***<br>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. |

## – 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**

```
-- ASN1START


PDSCH-RE-MappingQCL-ConfigId-r11 ::=        INTEGER (1..maxRE-MapQCL-r11)


-- ASN1STOP
```

### – PHICH-Config

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

***PHICH-Config* information element**

```
-- ASN1START

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

-- ASN1STOP
```

| ***PHICH-Config* field descriptions** |
|---|
| ***phich-Duration***<br>Parameter: *PHICH-Duration*, see TS 36.211 [21, Table 6.9.3-1]. |
| ***phich-Resource***<br>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***

```
-- ASN1START

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
    ]],
    [[  antennaInfo-r10                 CHOICE {
            explicitValue-r10           AntennaInfoDedicated-r10,
            defaultValue                NULL
        }       OPTIONAL,                                           -- Cond AI-r10
        antennaInfoUL-r10               AntennaInfoUL-r10           OPTIONAL,   -- Need ON
        cif-Presence-r10            BOOLEAN                         OPTIONAL,  -- Need ON
        cqi-ReportConfig-r10            CQI-ReportConfig-r10        OPTIONAL,   -- Cond CQI-r10
        csi-RS-Config-r10               CSI-RS-Config-r10           OPTIONAL,   -- Need ON
        pucch-ConfigDedicated-v1020     PUCCH-ConfigDedicated-v1020     OPTIONAL,   -- Need ON
        pusch-ConfigDedicated-v1020     PUSCH-ConfigDedicated-v1020     OPTIONAL,   -- Need ON
        schedulingRequestConfig-v1020   SchedulingRequestConfig-v1020   OPTIONAL,   -- Need ON
        soundingRS-UL-ConfigDedicated-v1020
                                SoundingRS-UL-ConfigDedicated-v1020     OPTIONAL,   -- Need ON
        soundingRS-UL-ConfigDedicatedAperiodic-r10
                                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-r11OPTIONAL,  -- Need ON
        csi-RS-ConfigNZPToAddModList-r11CSI-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
        epdcch-Config-r11                   EPDCCH-Config-r11               OPTIONAL,  -- Need ON
```

```
        pdsch-ConfigDedicated-v1130         PDSCH-ConfigDedicated-v1130       OPTIONAL,  -- Need ON
    -- UL configuration
        cqi-ReportConfig-v1130              CQI-ReportConfig-v1130            OPTIONAL,  -- Need ON
        pucch-ConfigDedicated-v1130         PUCCH-ConfigDedicated-v1130       OPTIONAL,  -- Need ON
        pusch-ConfigDedicated-v1130         PUSCH-ConfigDedicated-v1130       OPTIONAL,  -- Need ON
        uplinkPowerControlDedicated-v1130   UplinkPowerControlDedicated-v1130 OPTIONAL   -- Need ON
    ]],
    [[  antennaInfo-v1250                   AntennaInfoDedicated-v1250        OPTIONAL,  -- Cond AI-r10
        eimta-MainConfig-r12                EIMTA-MainConfig-r12              OPTIONAL,  -- Need ON
        eimta-MainConfigPCell-r12           EIMTA-MainConfigServCell-r12      OPTIONAL,  -- Need ON
        pucch-ConfigDedicated-v1250         PUCCH-ConfigDedicated-v1250       OPTIONAL,  -- Need ON
        cqi-ReportConfigPCell-v1250         CQI-ReportConfig-v1250            OPTIONAL,  -- Need ON
        uplinkPowerControlDedicated-v1250   UplinkPowerControlDedicated-v1250 OPTIONAL,  -- Need ON
        pusch-ConfigDedicated-v1250         PUSCH-ConfigDedicated-v1250       OPTIONAL,  -- Need ON
        csi-RS-Config-v1250                 CSI-RS-Config-v1250               OPTIONAL   -- Need ON
    ]]
}
PhysicalConfigDedicatedSCell-r10 ::=    SEQUENCE {
    -- DL configuration as well as configuration applicable for DL and UL
    nonUL-Configuration-r10             SEQUENCE {
        antennaInfo-r10                 AntennaInfoDedicated-r10  OPTIONAL,  -- Need ON
        crossCarrierSchedulingConfig-r10    CrossCarrierSchedulingConfig-r10 OPTIONAL,  -- Need ON
        csi-RS-Config-r10               CSI-RS-Config-r10         OPTIONAL,  -- Need ON
        pdsch-ConfigDedicated-r10       PDSCH-ConfigDedicated     OPTIONAL   -- Need ON
    }                                                             OPTIONAL,  -- Cond SCellAdd
    -- UL configuration
    ul-Configuration-r10                SEQUENCE {
        antennaInfoUL-r10               AntennaInfoUL-r10         OPTIONAL,  -- Need ON
        pusch-ConfigDedicatedSCell-r10      PUSCH-ConfigDedicatedSCell-r10      OPTIONAL,  -- Need ON
        uplinkPowerControlDedicatedSCell-r10    UplinkPowerControlDedicatedSCell-r10    OPTIONAL,  -- Need ON
        cqi-ReportConfigSCell-r10       CQI-ReportConfigSCell-r10   OPTIONAL,  -- Need ON
        soundingRS-UL-ConfigDedicated-r10   SoundingRS-UL-ConfigDedicated OPTIONAL,  -- Need ON
        soundingRS-UL-ConfigDedicated-v1020
                                    SoundingRS-UL-ConfigDedicated-v1020 OPTIONAL,   -- Need ON
        soundingRS-UL-ConfigDedicatedAperiodic-r10
```

```
                    SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL   -- Need ON
    }                                                          OPTIONAL,  -- Cond CommonUL
    ...,
    [[  -- 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
        epdcch-Config-r11                   EPDCCH-Config-r11                 OPTIONAL,  -- Need ON
        pdsch-ConfigDedicated-v1130         PDSCH-ConfigDedicated-v1130       OPTIONAL,  -- Need ON
    -- UL configuration
        cqi-ReportConfig-v1130              CQI-ReportConfig-v1130            OPTIONAL,  -- Need ON
        pusch-ConfigDedicated-v1130             PUSCH-ConfigDedicated-v1130   OPTIONAL,  -- Need ON
        uplinkPowerControlDedicatedSCell-v1130    UplinkPowerControlDedicated-v1130 OPTIONAL   -- Need ON
    ]],
    [[  antennaInfo-v1250                   AntennaInfoDedicated-v1250        OPTIONAL,  -- Need ON
        eimta-MainConfigSCell-r12           EIMTA-MainConfigServCell-r12  OPTIONAL,  -- Need ON
        cqi-ReportConfigSCell-v1250           CQI-ReportConfig-v1250            OPTIONAL,  -- Need ON
        uplinkPowerControlDedicatedSCell-v1250    UplinkPowerControlDedicated-v1250 OPTIONAL,  -- Need ON
        csi-RS-Config-v1250                   CSI-RS-Config-v1250               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


-- ASN1STOP
```

| ***PhysicalConfigDedicated* field descriptions** |
|---|
| ***additionalSpectrumEmissionPCell***<br>The UE requirements related to IE *AdditionalSpectrumEmissionPCell* are defined in TS 36.101 [42]**.** EUTRAN does not configure *AdditionalSpectrumEmissionPCell* if there are no other serving cells configured. E-UTRAN does not configure the field in case of contiguous intra-band carrier aggregation. |
| ***antennaInfo***<br>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. |
| ***csi-RS-Config***<br>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. |
| ***csi-RS-ConfigNZPToAddModList***<br>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. EUTRAN 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***). |
| ***csi-RS-ConfigZPToAddModList***<br>For a serving frequency E-UTRAN configures one or more *CSI-RS-ConfigZP* only when transmission mode 10 is configured for the serving cell on this carrier frequency. |
| ***eimta-MainConfigPCell, eimta-MainConfigSCell***<br>If E-UTRAN configures *eimta-MainConfigPCell* or *eimta-MainConfigSCell* for one serving cell in a frequency band, E-UTRAN configures *eimta-MainConfigPCell* or *eimta-MainConfigSCell* for all serving cells residing on the frequency band. E-UTRAN configures *eimta-MainConfigPCell* or *eimta-MainConfigSCell* only if *eimta-MainConfig* is configured. |
| ***epdcch-Config***<br>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*. |
| ***pdsch-ConfigDedicated-v1130***<br>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. |
| ***pusch-ConfigDedicated-v1250***<br>E-UTRAN configures *pusch-ConfigDedicated-v1250* only if *tpc-SubframeSet* is configured. |
| ***tpc-PDCCH-ConfigPUCCH***<br>PDCCH configuration for power control of PUCCH using format 3/3A, see TS 36.212 [22]. |
| ***tpc-PDCCH-ConfigPUSCH***<br>PDCCH configuration for power control of PUSCH using format 3/3A, see TS 36.212 [22]. |
| ***uplinkPowerControlDedicated***<br>E-UTRAN configures *uplinkPowerControlDedicated-v1130* only if *uplinkPowerControlDedicated* (without suffix) is configured. |
| ***uplinkPowerControlDedicatedSCell***<br>E-UTRAN configures *uplinkPowerControlDedicatedSCell-v1130* only if *uplinkPowerControlDedicatedSCell-r10* is configured for this serving cell. |

| Conditional presence | Explanation |
|---|---|
| *AI-r8* | The field is optionally present, need ON, if *antennaInfoDedicated-r10* is absent. Otherwise the field is not present |
| *AI-r10* | The field is optionally present, need ON, if *antennaInfoDedicated* is absent. Otherwise the field is not present |
| *CommonUL* | The field is mandatory present if *ul-Configuration* of *RadioResourceConfigCommonSCell-r10* is present; otherwise it is optional, need ON. |
| *CQI-r8* | The field is optionally present, need ON, if *cqi-ReportConfig-r10* is absent. Otherwise the field is not present |
| *CQI-r10* | The field is optionally present, need ON, if *cqi-ReportConfig* is absent. Otherwise the field is not present |
| *SCellAdd* | The field is mandatory present if *cellIdentification* is present; otherwise it is optional, need ON. |

NOTE 1: During handover, the UE performs a MAC reset, which involves reverting to the default CQI/ SRS/ SR configuration in accordance with subclause 5.3.13 and TS 36.321 [6, 5.9 & 5.2]. Hence, for these parts of the dedicated radio resource configuration, the default configuration (rather than the configuration used in the source PCell) is used as the basis for the delta signalling that is included in the message used to perform handover.

NOTE 2: Since delta signalling is not supported for the common SCell configuration, E-UTRAN can only add or release the uplink of an SCell by releasing and adding the concerned SCell.

### – P-Max

The IE *P-Max* is used to limit the UE's uplink transmission power on a carrier frequency and is used to calculate the parameter *Pcompensation* defined in TS 36.304 [4]. Corresponds to parameter $P_{EMAX}$ or $P_{EMAX,c}$ 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 direct discovery announcements within the coverage of the concerned cell, as specified in TS 36.101 [42, 6.2.5D].

**_P-Max_ information element**

```
-- ASN1START

P-Max ::=               INTEGER (-30..33)

-- ASN1STOP
```

### – PRACH-Config

The IE *PRACH-ConfigSIB* and IE *PRACH-Config* are used to specify the PRACH configuration in the system information and in the mobility control information, respectively.

**_PRACH-Config_ information elements**

```
-- ASN1START

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

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

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

PRACH-ConfigInfo ::=            SEQUENCE {
    prach-ConfigIndex               INTEGER (0..63),
    highSpeedFlag                   BOOLEAN,
```

```
    zeroCorrelationZoneConfig       INTEGER (0..15),
    prach-FreqOffset                INTEGER (0..94)
}


-- ASN1STOP
```

| ***PRACH-Config* field descriptions** |
|---|
| ***highSpeedFlag***<br>Parameter: High-speed-flag, see TS 36.211, [21, 5.7.2].TRUE corresponds to Restricted set and FALSE to Unrestricted set. |
| ***prach-ConfigIndex***<br>Parameter: *prach-ConfigurationIndex*, see TS 36.211 [21, 5.7.1]. |
| ***prach-FreqOffset***<br>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***<br>Parameter: *RACH_ROOT_SEQUENCE*, see TS 36.211 [21, 5.7.1]. |
| ***zeroCorrelationZoneConfig***<br>Parameter: $N_{CS}$ 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**

```
-- ASN1START


PresenceAntennaPort1 ::=            BOOLEAN


-- ASN1STOP
```

## – PUCCH-Config

The IE *PUCCH-ConfigCommon* and IE *PUCCH-ConfigDedicated* are used to specify the common and the UE specific PUCCH configuration respectively.

**_PUCCH-Config_ information elements**

```
-- ASN1START


PUCCH-ConfigCommon ::=              SEQUENCE {
    deltaPUCCH-Shift                ENUMERATED {ds1, ds2, ds3},
    nRB-CQI                         INTEGER (0..98),
    nCS-AN                          INTEGER (0..7),
```

```
    n1PUCCH-AN                      INTEGER (0..2047)
}

PUCCH-ConfigDedicated ::=           SEQUENCE {
    ackNackRepetition               CHOICE{
        release                     NULL,
        setup                       SEQUENCE {
            repetitionFactor            ENUMERATED {n2, n4, n6, spare1},
            n1PUCCH-AN-Rep                  INTEGER (0..2047)
        }
    },
    tdd-AckNackFeedbackMode             ENUMERATED {bundling, multiplexing}     OPTIONAL   -- Cond TDD
}

PUCCH-ConfigDedicated-v1020 ::=     SEQUENCE {
    pucch-Format-r10                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)
                }
            }                                                       OPTIONAL   -- Need ON
        },
        channelSelection-r10            SEQUENCE {
            n1PUCCH-AN-CS-r10               CHOICE {
                release                     NULL,
                setup                       SEQUENCE {
                    n1PUCCH-AN-CS-List-r10          SEQUENCE (SIZE (1..2)) OF N1PUCCH-AN-CS-r10
                }
            }                                                       OPTIONAL   -- Need ON
        }
    }                                                               OPTIONAL,  -- Need OR
    twoAntennaPortActivatedPUCCH-Format1a1b-r10     ENUMERATED {true}       OPTIONAL,  -- Need OR
```

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

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)
        }
    }                                                                 OPTIONAL,  -- Need ON
    nPUCCH-Param-r11                   CHOICE {
        release                        NULL,
        setup                          SEQUENCE {
            nPUCCH-Identity-r11            INTEGER (0..503),
            n1PUCCH-AN-r11                 INTEGER (0..2047)
        }
    }                                                                 OPTIONAL   -- Need ON
}

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***<br>Parameter indicates whether ACK/NACK repetition is configured, see TS 36.213 [23, 10.1]. |
| ***deltaPUCCH-Shift***<br>Parameter: $\Delta_{\text{shift}}^{\text{PUCCH}}$, see 36.211 [21, 5.4.1], where ds1 corresponds to value 1 ds2 to 2 etc. |
| ***n1PUCCH-AN***<br>Parameter: $N_{PUCCH}^{(1)}$, see TS 36.213 [23, 10.1].<br>*n1PUCCH-AN-r11* indicates UE-specific PUCCH AN resource offset, see TS 36.213 [23, 10.1]. |
| ***n1PUCCH-AN-CS-List***<br>Parameter: $n_{\text{PUCCH},\,j}^{(1)}$ for antenna port $p_0$ for PUCCH format 1b with channel selection, see TS 36.213 [23, 10.1.2.2.1, 10.1.3.2.1]. |
| ***n1PUCCH-AN-CS-ListP1***<br>Parameter: $n_{\text{PUCCH},\,j}^{(1,\tilde{p}_1)}$ 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 *pucch-Format* is set to *channelSelection*. |
| ***n1PUCCH-AN-Rep, n1PUCCH-AN-RepP1***<br>Parameter: $n_{\text{PUCCH, ANRep}}^{(1,p)}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1]. |
| ***n3PUCCH-AN-List, n3PUCCH-AN-ListP1***<br>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***<br>Parameter: $N_{cs}^{(1)}$ see TS 36.211 [21, 5.4]. |
| ***nkaPUCCH-AN***<br>Parameter: $N_{\text{PUCCH}}^{\text{K}_\text{A}}$, see TS 36.213 [23, 10.1.3].<br>*nkaPUCCH-AN-r12* indicates PUCCH format 1a/1b starting offset for the subframe set $K^A$, see TS 36.213 [23, 10.1.3]. E-UTRAN configures *nkaPUCCH-AN* only if *eimta-MainConfig* is configured. |
| ***nPUCCH-Identity***<br>Parameter: $n_{\text{ID}}^{\text{PUCCH}}$, see TS 36.211 [21, 5.5.1.5]. |
| ***nRB-CQI***<br>Parameter: $N_{\text{RB}}^{(2)}$, see TS 36.211 [21, 5.4]. |
| ***pucch-Format***<br>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***<br>Parameter $N_{\text{ANRep}}$ see TS 36.213 [23, 10.1] where n2 corresponds to repetition factor 2, n4 to 4. |
| ***simultaneousPUCCH-PUSCH***<br>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***<br>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***<br>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***<br>Indicates whether two antenna ports are configured for PUCCH format 3 for HARQ-ACK, see TS 36.213 [23, 10.1]. |

| Conditional presence | Explanation |
|---|---|
| *TDD* | 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. |

## – PUSCH-Config

The IE *PUSCH-ConfigCommon* is used to specify the common PUSCH configuration and the reference signal configuration for PUSCH and PUCCH. The IE *PUSCH-ConfigDedicated* is used to specify the UE specific PUSCH configuration.

***PUSCH-Config* information element**

```
-- ASN1START

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

PUSCH-ConfigDedicated ::=           SEQUENCE {
    betaOffset-ACK-Index            INTEGER (0..15),
    betaOffset-RI-Index             INTEGER (0..15),
    betaOffset-CQI-Index            INTEGER (0..15)
}

PUSCH-ConfigDedicated-v1020 ::=     SEQUENCE {
    betaOffsetMC-r10                SEQUENCE {
        betaOffset-ACK-Index-MC-r10     INTEGER (0..15),
        betaOffset-RI-Index-MC-r10      INTEGER (0..15),
        betaOffset-CQI-Index-MC-r10     INTEGER (0..15)
    }                                                       OPTIONAL,  -- Need OR
    groupHoppingDisabled-r10        ENUMERATED {true}               OPTIONAL,  -- Need OR
    dmrs-WithOCC-Activated-r10          ENUMERATED {true}               OPTIONAL   -- Need OR
}

PUSCH-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)
}
```

```
-- ASN1STOP
```

| *PUSCH-Config* field descriptions |
|---|
| ***betaOffset-ACK-Index, betaOffset-ACK-Index-MC*** |
| Parameter: $I_{offset}^{HARQ-ACK}$ , for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-1]. One value applies for all serving cells with an uplink 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). |
| ***betaOffset-ACK-Index-SubframeSet2, betaOffset-ACK-Index-MC-SubframeSet2*** |
| Parameter: $I_{offset}^{HARQ-ACK}$ , 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). |
| ***betaOffset-CQI-Index, betaOffset-CQI-Index-MC*** |
| Parameter: $I_{offset}^{CQI}$ , for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-3]. One value applies for all serving cells with an uplink 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). |
| ***betaOffset-CQI-Index-SubframeSet2, betaOffset-CQI-Index-MC-SubframeSet2*** |
| Parameter: $I_{offset}^{CQI}$ , 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). |
| ***betaOffset-RI-Index, betaOffset-RI-Index-MC*** |
| Parameter: $I_{offset}^{RI}$ , for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-2]. One value applies for all serving cells with an uplink 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). |
| ***betaOffset-RI-Index-SubframeSet2, betaOffset-RI-Index-MC-SubframeSet2*** |
| Parameter: $I_{offset}^{RI}$ , 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). |
| ***cyclicShift*** |
| Parameters: *cyclicShift*, see TS 36.211 [21, Table 5.5.2.1.1-2]. |
| ***dmrs-WithOCC-Activated*** |
| Parameter: *Activate-DMRS-with OCC*, see TS 36.211 [21, 5.5.2.1]. |
| ***enable64QAM*** |
| See TS 36.213 [23, 8.6.1]. TRUE indicates that 64QAM is allowed while FALSE indicates that 64QAM is not allowed. |
| ***groupAssignmentPUSCH*** |
| Parameter: *ΔSS* See TS 36.211 [21, 5.5.1.3]. |
| ***groupHoppingDisabled*** |
| Parameter: *Disable-sequence-group-hopping*, see TS 36.211 [21, 5.5.1.3]. |
| ***groupHoppingEnabled*** |
| Parameter: *Group-hopping-enabled*, see TS 36.211 [21, 5.5.1.3]. |
| ***hoppingMode*** |
| Parameter: *Hopping-mode*, see TS 36.211 [21, 5.3.4]. |
| ***nDMRS-CSH-Identity*** |
| Parameter: $N_{\mathrm{ID}}^{\mathrm{csh\_DMRS}}$ , see TS 36.211 [21, 5.5.2.1.1]. |
| ***nPUSCH-Identity*** |
| Parameter: $n_{\mathrm{ID}}^{\mathrm{PUSCH}}$ , see TS 36.211 [21, 5.5.1.5]. |
| ***n-SB*** |
| Parameter: $N_{sb}$ see TS 36.211 [21, 5.3.4]. |
| ***pusch-hoppingOffset*** |
| Parameter: $N_{\mathrm{RB}}^{\mathrm{HO}}$ , see TS 36.211 [21, 5.3.4]. |
| ***sequenceHoppingEnabled*** |
| Parameter: *Sequence-hopping-enabled*, see TS 36.211 [21, 5.5.1.4]. |
| ***ul- ReferenceSignalsPUSCH*** |
| Used to specify parameters needed for the transmission on PUSCH (or PUCCH). |

## – RACH-ConfigCommon

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

***RACH-ConfigCommon* information element**

```
-- ASN1START

RACH-ConfigCommon ::=      SEQUENCE {
    preambleInfo                    SEQUENCE {
        numberOfRA-Preambles                ENUMERATED {
                                        n4, n8, n12, n16 ,n20, n24, n28,
                                        n32, n36, n40, n44, n48, n52, n56,
                                        n60, n64},
        preamblesGroupAConfig               SEQUENCE {
            sizeOfRA-PreamblesGroupA            ENUMERATED {
                                        n4, n8, n12, n16 ,n20, n24, n28,
                                        n32, n36, n40, n44, n48, n52, n56,
                                        n60},
            messageSizeGroupA               ENUMERATED {b56, b144, b208, b256},
            messagePowerOffsetGroupB            ENUMERATED {
                                        minusinfinity, dB0, dB5, dB8, dB10, dB12,
                                        dB15, dB18},
            ...
        }           OPTIONAL                                        -- Need OP
    },
    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),
    ...
```

```
}

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***<br>Number of times that the UE detects T300 expiry on the same cell before applying *connEstFailOffset*. |
| ***connEstFailOffset***<br>Parameter 'Qoffset$_{temp}$' in TS 36.304 [4]. If the field is not present the value of infinity shall be used for 'Qoffset$_{temp}$'. |
| ***connEstFailOffsetValidity***<br>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***<br>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***<br>Maximum number of Msg3 HARQ transmissions in TS 36.321 [6], used for contention based random access. Value is an integer. |
| ***messagePowerOffsetGroupB***<br>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***<br>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***<br>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***<br>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***<br>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***<br>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***<br>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***<br>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***<br>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***<br>Explicitly signalled PRACH Mask Index for RA Resource selection in TS 36.321 [6]. |
| ***ra-PreambleIndex***<br>Explicitly signalled Random Access Preamble for RA Resource selection in TS 36.321 [6]. |

## – 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**

```
-- ASN1START


RadioResourceConfigCommonSIB ::=SEQUENCE {
    rach-ConfigCommon                   RACH-ConfigCommon,
    bcch-Config                 BCCH-Config,
    pcch-Config                 PCCH-Config,
    prach-Config                PRACH-ConfigSIB,
    pdsch-ConfigCommon                  PDSCH-ConfigCommon,
    pusch-ConfigCommon                  PUSCH-ConfigCommon,
    pucch-ConfigCommon                  PUCCH-ConfigCommon,
    soundingRS-UL-ConfigCommon          SoundingRS-UL-ConfigCommon,
    uplinkPowerControlCommon            UplinkPowerControlCommon,
    ul-CyclicPrefixLength               UL-CyclicPrefixLength,
    ...,
    [[  uplinkPowerControlCommon-v1020  UplinkPowerControlCommon-v1020      OPTIONAL  -- Need OR
    ]],
    [[  rach-ConfigCommon-v1250         RACH-ConfigCommon-v1250     OPTIONAL  -- Need OR
    ]]
}


RadioResourceConfigCommon ::=     SEQUENCE {
    rach-ConfigCommon                   RACH-ConfigCommon               OPTIONAL,  -- Need ON
    prach-Config                PRACH-Config,
    pdsch-ConfigCommon                  PDSCH-ConfigCommon                  OPTIONAL,  -- Need ON
    pusch-ConfigCommon                  PUSCH-ConfigCommon,
    phich-Config                PHICH-Config                    OPTIONAL,  -- Need ON
```

```
    pucch-ConfigCommon                  PUCCH-ConfigCommon                  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 ON
    ]],
    [[  tdd-Config-v1130                TDD-Config-v1130                    OPTIONAL   -- Cond TDD3
    ]]
}

RadioResourceConfigCommonPSCell-r12 ::=SEQUENCE {
    basicFields-r12                     RadioResourceConfigCommonSCell-r10,
    pucch-ConfigCommon-r12              PUCCH-ConfigCommon,
    rach-ConfigCommon-r12               RACH-ConfigCommon,
    uplinkPowerControlCommonPSCell-r12  UplinkPowerControlCommonPSCell-r12,
    ...
}

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
        prach-ConfigSCell-r11           PRACH-Config                  OPTIONAL,  -- Cond UL
        tdd-Config-v1130                TDD-Config-v1130          OPTIONAL,  -- Cond TDD2
        uplinkPowerControlCommonSCell-v1130
                                UplinkPowerControlCommonSCell-v1130   OPTIONAL   -- Cond UL
    ]]
}

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***<br>The UE requirements related to IE *AdditionalSpectrumEmissionSCell* are defined in TS 36.101 [42]. |
| ***defaultPagingCycle***<br>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***<br>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***<br>Parameter: nB is used as one of parameters to derive the Paging Frame and Paging Occasion according to TS 36.304 [4]. Value in multiples of 'T' as defined in TS 36.304 [4]. A value of fourT corresponds to 4 * T, a value of twoT corresponds to 2 * T and so on. |
| ***p-Max***<br>Pmax to be used in the target cell. If absent the UE applies the maximum power according to the UE capability. |
| ***ul-Bandwidth***<br>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***<br>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.<br>For TDD: This parameter is absent and it is equal to the downlink frequency. |
| ***UL-CyclicPrefixLength***<br>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. |

| Conditional presence | Explanation |
|---|---|
| *TDD* | The field is optional for TDD, Need ON; it is not present for FDD and the UE shall delete any existing value for this field. |
| *TDD2* | If *tdd-Config-r10* is present, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field. |
| *TDD3* | If *tdd-Config* is present, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field. |
| *TDD-OR-NoR11* | If *prach-ConfigSCell-r11* is absent, the field is optional for TDD, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field. |
| *TDDSCell* | This field is mandatory present for TDD; it is not present for FDD and the UE shall delete any existing value for this field. |
| *UL* | If the SCell is part of the STAG and if *ul-Configuration* is included, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field. |
| *ULSCell* | For the PSCell (IE is included in *RadioResourceConfigCommonPSCell*) the field is absent. Otherwise, if the SCell is part of the STAG and if *ul-Configuration* is included, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field. |

## – RadioResourceConfigDedicated

The IE *RadioResourceConfigDedicated* is used to setup/modify/release RBs, to modify the MAC main configuration, to modify the SPS configuration and to modify dedicated physical configuration.

***RadioResourceConfigDedicated* information element**

```
-- ASN1START


RadioResourceConfigDedicated ::=        SEQUENCE {
    srb-ToAddModList                SRB-ToAddModList        OPTIONAL,       -- Cond HO-Conn
    drb-ToAddModList                DRB-ToAddModList            OPTIONAL,       -- Cond HO-toEUTRA
    drb-ToReleaseList               DRB-ToReleaseList       OPTIONAL,       -- Need ON
    mac-MainConfig                  CHOICE {
            explicitValue           MAC-MainConfig,
            defaultValue            NULL
    }       OPTIONAL,                                                       -- Cond HO-toEUTRA2
    sps-Config                      SPS-Config              OPTIONAL,       -- Need ON
    physicalConfigDedicated             PhysicalConfigDedicated     OPTIONAL,       -- Need ON
    ...,
    [[  rlf-TimersAndConstants-r9   RLF-TimersAndConstants-r9       OPTIONAL   -- Need ON
    ]],
    [[  measSubframePatternPCell-r10 MeasSubframePatternPCell-r10   OPTIONAL   -- Need ON
    ]],
    [[  neighCellsCRS-Info-r11      NeighCellsCRS-Info-r11          OPTIONAL   -- Need ON
    ]],
                                        [[          naics-Info-r12          NAICS-AssistanceInfo-r12
                                        OPTIONAL    -- Need ON
```

```
    ]]}

RadioResourceConfigDedicatedPSCell-r12 ::=          SEQUENCE {
    -- UE specific configuration extensions applicable for an PSCell
    physicalConfigDedicatedPSCell-r12       PhysicalConfigDedicated       OPTIONAL,  -- Need ON
    sps-Config-r12                          SPS-Config                    OPTIONAL,  -- Need ON
                                                naics-Info-r12                NAICS-AssistanceInfo-r12
                                                OPTIONAL,   -- Need ON
    ...
}

RadioResourceConfigDedicatedSCG-r12 ::=       SEQUENCE {
    drb-ToAddModListSCG-r12                 DRB-ToAddModListSCG-r12          OPTIONAL,  -- Need ON
    mac-MainConfigSCG-r12                   MAC-MainConfig                   OPTIONAL,  -- Need ON
    rlf-TimersAndConstantsSCG-r12           RLF-TimersAndConstantsSCG-r12    OPTIONAL,  -- Need ON
    ...
}

RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {
    -- UE specific configuration extensions applicable for an SCell
    physicalConfigDedicatedSCell-r10    PhysicalConfigDedicatedSCell-r10 OPTIONAL,  -- Need ON
    ...,
    [[  mac-MainConfigSCell-r11         MAC-MainConfigSCell-r11          OPTIONAL   -- Cond SCellAdd
    ]],
                                                [[          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 {
    eps-BearerIdentity          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-Setup
    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
        }
    }                                               OPTIONAL,  -- Cond SetupS2
    rlc-ConfigSCG-r12           RLC-Config          OPTIONAL,  -- Cond SetupS
```

```
    rlc-Config-v1250                RLC-Config-v1250          OPTIONAL,  -- Need ON
    logicalChannelIdentitySCG-r12   INTEGER (3..10)           OPTIONAL,  -- Cond 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),
                                    crs-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,
                        transmissionModeList-r12    BIT STRING (SIZE(8)),
                                    resAllocGranularity-r12                 INTEGER (1..4),
                                    ...
}
P-a ::= ENUMERATED {                dB-6, dB-4dot77, dB-3, dB-1dot77,
                            dB0, dB1, dB2, dB3}


-- ASN1STOP
```

| *RadioResourceConfigDedicated* field descriptions |
|---|
| ***crs-PortsCount***<br>Parameter represents the number of antenna ports for cell-specific reference signal used by the signaled neighboring cell where n1 corresponds to 1 antenna port, n2 to 2 antenna ports etc. see TS 36.211 [21, 6.10.1]. |
| ***drb-Identity***<br>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. |
| ***drb-ToAddModListSCG***<br>When an SCG is configured, E-UTRAN configures at least one SCG or split DRB. |
| ***drb-TypeChange***<br>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). |
| ***logicalChannelConfig***<br>For SRBs a choice is used to indicate whether the logical channel configuration is signalled explicitly or set to the default logical channel configuration for SRB1 as specified in 9.2.1.1 or for SRB2 as specified in 9.2.1.2. |
| ***logicalChannelIdentity***<br>The logical channel identity for both UL and DL. |
| ***mac-MainConfig***<br>Although the ASN.1 includes a choice that is used to indicate whether the mac-MainConfig is signalled explicitly or set to the default MAC main configuration as specified in 9.2.2, EUTRAN does not apply "*defaultValue*". |
| ***mbsfn-SubframeConfig***<br>Defines the MBSFN subframe configuration used by the signaled neighboring cell. If absent, UE assumes no MBSFN configuration for the neighboring cell. |
| ***measSubframePatternPCell***<br>Time domain measurement resource restriction pattern for the PCell measurements (RSRP, RSRQ and the radio link monitoring). |
| ***neighCellsCRS-Info***<br>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. |
| ***NeighCellsInfo***<br>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 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. |
| ***P-a***<br>Parameter: $P_A$ , see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4dot77 corresponds to -4.77 dB etc. |
| ***P-aList***<br>Indicates the restricted subset of power offset for QPSK, 16QAM, and 64QAM PDSCH transmissions for the neighbouring cell. |
| ***p-b***<br>Parameter: $P_B$ , indicates the cell-specific ratio used by the signaled neighboring cell, see TS 36.213 [23, Table 5.2-1]. |
| ***physicalConfigDedicated***<br>The default dedicated physical configuration is specified in 9.2.4. |
| ***resAllocGranularity***<br>Indicates the resource allocation and precoding granularity in PRB pair level of the signaled neighboring cell, see TS 36.213 [23, 7.1.6]. |
| ***rlc-Config***<br>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 bearers. |
| ***servCellp-a***<br>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-4dot77 corresponds to -4.77 dB etc. |
| ***sps-Config***<br>The default SPS configuration is specified in 9.2.3. Except for handover or releasing SPS, E-UTRAN does not reconfigure *sps-Config* when there is a configured downlink assignment or a configured uplink grant (see 36.321 [6]). |

| ***RadioResourceConfigDedicated* field descriptions** |
|---|
| ***crs-PortsCount***<br>Parameter represents the number of antenna ports for cell-specific reference signal used by the signaled neighboring cell where n1 corresponds to 1 antenna port, n2 to 2 antenna ports etc. see TS 36.211 [21, 6.10.1]. |
| ***srb-Identity***<br>Value 1 is applicable for SRB1 only.<br>Value 2 is applicable for SRB2 only. |
| ***transmissionModeList***<br>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. The first/ leftmost bit is for transmission mode 1, the second bit is for transmission mode 2, and so on. |

| Conditional presence | Explanation |
|---|---|
| *DRB-Setup* | The field is mandatory present if the corresponding DRB is being set up; otherwise it is not present. |
| *HO-Conn* | The field is mandatory present in case of handover to E-UTRA or when the *fullConfig* is included in the *RRCConnectionReconfiguration* 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. |
| *HO-toEUTRA* | The field is mandatory present in case of handover to E-UTRA or when the *fullConfig* is included in the *RRCConnectionReconfiguration* 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. |
| *HO-toEUTRA2* | The field is mandatory present in case of handover to E-UTRA or when the *fullConfig* is included in the *RRCConnectionReconfiguration* message; otherwise the field is optionally present, need ON. |
| *PDCP* | The field is mandatory present if the corresponding DRB is being setup; the field is optionally present, need ON, upon reconfiguration of the corresponding split DRB, upon the corresponding DRB type change from split to MCG bearer, upon handover within E-UTRA and upon the first reconfiguration after re-establishment but in all these cases only when fullConfig is not included in the RRCConnectionReconfiguration message; otherwise it is not present. |
| *PDCP-S* | The field is mandatory present if the corresponding DRB is being setup; the field is optionally present, need ON, upon SCG change; otherwise it is not present. |
| *RLC-Setup* | This field is optionally present if the corresponding DRB is being setup, need ON; otherwise it is not present. |
| *SCellAdd* | The field is optionally present, need ON, upon SCell addition; otherwise it is not present. |
| *Setup* | The field is mandatory present if the corresponding SRB/DRB is being setup; otherwise the field is optionally present, need ON. |
| *SetupM* | The field is mandatory present upon setup of an MCG or split DRB; otherwise the field is optionally present, need ON. |
| *SetupS* | 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. |
| *SetupS2* | 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. |

## – RLC-Config

The IE *RLC-Config* is used to specify the RLC configuration of SRBs and DRBs.

***RLC-Config* information element**

```
-- ASN1START


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 {
                                    ms5, ms10, ms15, ms20, ms25, ms30, ms35,
                                    ms40, ms45, ms50, ms55, ms60, ms65, ms70,
                                    ms75, ms80, ms85, ms90, ms95, ms100, ms105,
                                    ms110, ms115, ms120, ms125, ms130, ms135,
                                    ms140, ms145, ms150, ms155, ms160, ms165,
                                    ms170, ms175, ms180, ms185, ms190, ms195,
                                    ms200, ms205, ms210, ms215, ms220, ms225,
                                    ms230, ms235, ms240, ms245, ms250, ms300,
                                    ms350, ms400, ms450, ms500, spare9, spare8,
                                    spare7, spare6, spare5, spare4, spare3,
                                    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 {
                                    ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35,
                                    ms40, ms45, ms50, ms55, ms60, ms65, ms70,
                                    ms75, ms80, ms85, ms90, ms95, ms100, ms110,
                                    ms120, ms130, ms140, ms150, ms160, ms170,
```

```
                    ms180, ms190, ms200, spare1}

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

-- ASN1STOP
```

| ***RLC-Config* field descriptions** |
|---|
| ***dl-extended-RLC-LI-Field, ul-extended-RLC-LI-Field***<br>Indicates the RLC LI field size. Value *TRUE* means that 15 bit LI length shall be used, otherwise 11 bit LI length shall be used; see TS 36.322 [7]. E-UTRAN enables this field only when *RLC-Config* (without suffix) is set to *am.* |
| ***maxRetxThreshold***<br>Parameter for RLC AM in TS 36.322 [7]. Value t1 corresponds to 1 retransmission, t2 to 2 retransmissions and so on. |
| ***pollByte***<br>Parameter for RLC AM in TS 36.322 [7]. Value kB25 corresponds to 25 kBytes, kB50 to 50 kBytes and so on. kBInfinity corresponds to an infinite amount of kBytes. |
| ***pollPDU***<br>Parameter for RLC AM in TS 36.322 [7]. Value p4 corresponds to 4 PDUs, p8 to 8 PDUs and so on. pInfinity corresponds to an infinite number of PDUs. |
| ***sn-FieldLength***<br>Indicates the UM RLC SN field size, see TS 36.322 [7], in bits. Value size5 means 5 bits, size10 means 10 bits. |
| ***t-PollRetransmit***<br>Timer for RLC AM in TS 36.322 [7], in milliseconds. Value ms5 means 5ms, ms10 means 10ms and so on. |
| ***t-Reordering***<br>Timer for reordering in TS 36.322 [7], in milliseconds. Value ms0 means 0ms, ms5 means 5ms and so on. |
| ***t-StatusProhibit***<br>Timer for status reporting in TS 36.322 [7], in milliseconds. Value ms0 means 0ms, ms5 means 5ms and so on. |

## – RLF-TimersAndConstants

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

### ***RLF-TimersAndConstants* information element**

```
-- ASN1START
```

```
RLF-TimersAndConstants-r9 ::=           CHOICE {
    release                             NULL,
    setup                               SEQUENCE {
        t301-r9                             ENUMERATED {
                                            ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
                                            ms2000},
        t310-r9                             ENUMERATED {
                                            ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
        n310-r9                             ENUMERATED {
                                            n1, n2, n3, n4, n6, n8, n10, n20},
        t311-r9                             ENUMERATED {
                                            ms1000, ms3000, ms5000, ms10000, ms15000,
                                            ms20000, ms30000},
        n311-r9                             ENUMERATED {
                                            n1, n2, n3, n4, n5, n6, n8, n10},
        ...
    }
}

RLF-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***<br>Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on. |
| ***t3xy***<br>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***

```
-- ASN1START


RN-SubframeConfig-r10 ::=          SEQUENCE {
    subframeConfigPattern-r10          CHOICE {
        subframeConfigPatternFDD-r10    BIT STRING (SIZE(8)),
        subframeConfigPatternTDD-r10    INTEGER (0..31)
    }                                                       OPTIONAL,  -- Need ON
    rpdcch-Config-r10                  SEQUENCE {
        resourceAllocationType-r10     ENUMERATED {type0, type1, type2Localized, type2Distributed,
                                                spare4, spare3, spare2, spare1},
        resourceBlockAssignment-r10          CHOICE {
            type01-r10                       CHOICE {
                nrb6-r10                     BIT STRING (SIZE(6)),
                nrb15-r10                    BIT STRING (SIZE(8)),
                nrb25-r10                    BIT STRING (SIZE(13)),
                nrb50-r10                    BIT STRING (SIZE(17)),
                nrb75-r10                    BIT STRING (SIZE(19)),
                nrb100-r10                       BIT STRING (SIZE(25))
            },
            type2-r10                        CHOICE {
                nrb6-r10                     BIT STRING (SIZE(5)),
                nrb15-r10                    BIT STRING (SIZE(7)),
                nrb25-r10                    BIT STRING (SIZE(9)),
                nrb50-r10                    BIT STRING (SIZE(11)),
                nrb75-r10                    BIT STRING (SIZE(12)),
                nrb100-r10                       BIT STRING (SIZE(13))
            },
            ...
```

```
        },
        demodulationRS-r10              CHOICE {
            interleaving-r10            ENUMERATED {crs},
            noInterleaving-r10              ENUMERATED {crs, dmrs}
        },
        pdsch-Start-r10                 INTEGER (1..3),
        pucch-Config-r10                CHOICE {
            tdd                         CHOICE {
                channelSelectionMultiplexingBundling    SEQUENCE {
                    n1PUCCH-AN-List-r10         SEQUENCE (SIZE (1..4)) OF INTEGER (0..2047)
                },
                fallbackForFormat3              SEQUENCE {
                    n1PUCCH-AN-P0-r10               INTEGER (0..2047),
                    n1PUCCH-AN-P1-r10               INTEGER (0..2047)     OPTIONAL   -- Need OR
                }
            },
            fdd                         SEQUENCE {
                n1PUCCH-AN-P0-r10               INTEGER (0..2047),
                n1PUCCH-AN-P1-r10               INTEGER (0..2047)         OPTIONAL   -- Need OR
            }
        },
        ...
    }                                                       OPTIONAL,  -- Need ON
    ...
}

-- ASN1STOP
```

| *RN-SubframeConfig* field descriptions |
|---|
| ***demodulationRS***<br>Indicates which reference signals are used for R-PDCCH demodulation according to TS 36.216 [55, 7.4.1]. Value interleaving corresponds to cross-interleaving and value noInterleaving corresponds to no cross-interleaving according to TS 36.216 [55, 7.4.2 and 7.4.3]. |
| ***n1PUCCH-AN-List***<br>Parameter: $n^{(1)}_{\mathrm{PUCCH},i}$, see TS 36.216, [55, 7.5.1]. This parameter is only applicable for TDD. Configures PUCCH HARQ-ACK resources if the RN is configured to use HARQ-ACK channel selection, HARQ-ACK multiplexing or HARQ-ACK bundling. |
| ***n1PUCCH-AN-P0, n1PUCCH-AN-P1***<br>Parameter: $n^{(1,p)}_{\mathrm{PUCCH}}$, 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***<br>Parameter: *DL-StartSymbol*, see TS 36.216 [55, Table 5.4-1]. |
| ***resourceAllocationType***<br>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***<br>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***<br>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***<br>Parameter: *SubframeConfigurationTDD*, see TS 36.216 [55, Table 5.2-2]. Defines the DL and UL subframe configuration for eNB-RN transmission. |

## – SchedulingRequestConfig

The IE *SchedulingRequestConfig* is used to specify the Scheduling Request related parameters

**SchedulingRequestConfig information element**

```
-- ASN1START


SchedulingRequestConfig ::=     CHOICE {
    release                     NULL,
    setup                       SEQUENCE {
        sr-PUCCH-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***<br>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***<br>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***<br>Parameter: $n_{\mathrm{PUCCH,SRI}}^{(1,p)}$ 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

```
-- ASN1START


SoundingRS-UL-ConfigCommon ::=      CHOICE {
    release                         NULL,
    setup                           SEQUENCE {
        srs-BandwidthConfig                 ENUMERATED {bw0, bw1, bw2, bw3, bw4, bw5, bw6, bw7},
        srs-SubframeConfig                  ENUMERATED {
                                            sc0, sc1, sc2, sc3, sc4, sc5, sc6, sc7,
                                            sc8, sc9, sc10, sc11, sc12, sc13, sc14, sc15},
        ackNackSRS-SimultaneousTransmission  BOOLEAN,
        srs-MaxUpPts                        ENUMERATED {true}       OPTIONAL   -- Cond TDD
    }
}


SoundingRS-UL-ConfigDedicated ::= CHOICE{
    release                         NULL,
    setup                           SEQUENCE {
        srs-Bandwidth                       ENUMERATED {bw0, bw1, bw2, bw3},
        srs-HoppingBandwidth                ENUMERATED {hbw0, hbw1, hbw2, hbw3},
```

```
        freqDomainPosition              INTEGER (0..23),
        duration                        BOOLEAN,
        srs-ConfigIndex                 INTEGER (0..1023),
        transmissionComb                INTEGER (0..1),
        cyclicShift                     ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7}
    }
}

SoundingRS-UL-ConfigDedicated-v1020 ::= SEQUENCE {
    srs-AntennaPort-r10             SRS-AntennaPort
}

SoundingRS-UL-ConfigDedicatedAperiodic-r10 ::= CHOICE{
    release                         NULL,
    setup                           SEQUENCE {
        srs-ConfigIndexAp-r10           INTEGER (0..31),
        srs-ConfigApDCI-Format4-r10         SEQUENCE (SIZE (1..3)) OF SRS-ConfigAp-r10    OPTIONAL,--Need
ON
        srs-ActivateAp-r10              CHOICE {
            release                     NULL,
            setup                       SEQUENCE {
                srs-ConfigApDCI-Format0-r10         SRS-ConfigAp-r10,
                srs-ConfigApDCI-Format1a2b2c-r10        SRS-ConfigAp-r10,
                ...
            }
        }                                                       OPTIONAL   -- Need ON
    }
}

SRS-ConfigAp-r10 ::= SEQUENCE {
    srs-AntennaPortAp-r10           SRS-AntennaPort,
    srs-BandwidthAp-r10             ENUMERATED {bw0, bw1, bw2, bw3},
    freqDomainPositionAp-r10        INTEGER (0..23),
    transmissionCombAp-r10          INTEGER (0..1),
    cyclicShiftAp-r10               ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7}
```

```
}

SRS-AntennaPort ::=             ENUMERATED {an1, an2, an4, spare1}

-- ASN1STOP
```

| ***SoundingRS-UL-Config* field descriptions** |
|---|
| ***ackNackSRS-SimultaneousTransmission***<br>Parameter: *Simultaneous-AN-and-SRS*, see TS 36.213 [23, 8.2]. For SCells this field is not applicable and the UE shall ignore the value. |
| ***cyclicShift, cyclicShiftAp***<br>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. |
| ***duration***<br>Parameter: Duration for periodic sounding reference signal transmission. See TS 36.213 [21, 8.2]. FALSE corresponds to 'single' and value TRUE to 'indefinite'. |
| ***freqDomainPosition, freqDomainPositionAp***<br>Parameter: $n_{\mathrm{RRC}}$ for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3.2]. |
| ***srs-AntennaPort, srs-AntennaPortAp***<br>Indicates the number of antenna ports used for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3]. UE shall release *srs-AntennaPort* if *SoundingRS-UL-ConfigDedicated* is released. |
| ***srs-Bandwidth, srs-BandwidthAp***<br>Parameter: $B_{\mathrm{SRS}}$ 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]. |
| ***srs-BandwidthConfig***<br>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. |
| ***srs-ConfigApDCI-Format0 / srs-ConfigApDCI-Format1a2b2c / srs-ConfigApDCI-Format4***<br>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]. |
| ***srs-ConfigIndex, srs-ConfigIndexAp***<br>Parameter: $I_{\mathrm{SRS}}$ for periodic and aperiodic sounding reference signal transmission respectively. See TS 36.213 [23, table 8.2-1 and table 8.2-2] for periodic and TS 36.213 [23, table 8.2-4 and table 8.2-5] for aperiodic SRS transmission. |
| ***srs-HoppingBandwidth***<br>Parameter: SRS hopping bandwidth $b_{hop} \in \{0,1,2,3\}$ for periodic sounding reference signal transmission, see TS 36.211 [21, 5.5.3.2] where hbw0 corresponds to value 0, hbw1 to value 1 and so on. |
| ***srs-MaxUpPts***<br>Parameter: srsMaxUpPts, see TS 36.211 [21, 5.5.3.2]. If this field is present, reconfiguration of $m_{\mathrm{SRS},0}^{\max}$ applies for UpPts, otherwise reconfiguration does not apply. |
| ***srs-SubframeConfig***<br>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. |
| ***transmissionComb, transmissionCombAp***<br>Parameter: $\bar{k}_{\mathrm{TC}} \in \{0,1\}$ for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3.2]. |

| 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. |

## – SPS-Config

The IE *SPS-Config* is used to specify the semi-persistent scheduling configuration.

***SPS-Config* information element**

```
-- ASN1START

SPS-Config ::=    SEQUENCE {
    semiPersistSchedC-RNTI          C-RNTI                  OPTIONAL,       -- Need OR
    sps-ConfigDL                    SPS-ConfigDL            OPTIONAL,       -- Need ON
    sps-ConfigUL                    SPS-ConfigUL            OPTIONAL        -- Need ON
}

SPS-ConfigDL ::=    CHOICE{
    release                         NULL,
    setup                           SEQUENCE {
        semiPersistSchedIntervalDL          ENUMERATED {
                                            sf10, sf20, sf32, sf40, sf64, sf80,
                                            sf128, sf160, sf320, sf640, spare6,
                                            spare5, spare4, spare3, spare2,
                                            spare1},
        numberOfConfSPS-Processes           INTEGER (1..8),
        n1PUCCH-AN-PersistentList           N1PUCCH-AN-PersistentList,
        ...,
        [[  twoAntennaPortActivated-r10     CHOICE {
                release                     NULL,
                setup                       SEQUENCE {
                    n1PUCCH-AN-PersistentListP1-r10    N1PUCCH-AN-PersistentList
                }
            }                                                       OPTIONAL   -- Need ON
        ]]
    }
}

SPS-ConfigUL ::=    CHOICE {
    release                         NULL,
    setup                           SEQUENCE {
```

```
        semiPersistSchedIntervalUL              ENUMERATED {
                                                sf10, sf20, sf32, sf40, sf64, sf80,
                                                sf128, sf160, sf320, sf640, spare6,
                                                spare5, spare4, spare3, spare2,
                                                spare1},
        implicitReleaseAfter                ENUMERATED {e2, e3, e4, e8},
        p0-Persistent                       SEQUENCE {
            p0-NominalPUSCH-Persistent          INTEGER (-126..24),
            p0-UE-PUSCH-Persistent              INTEGER (-8..7)
        }       OPTIONAL,                                       -- Need OP
        twoIntervalsConfig                  ENUMERATED {true}       OPTIONAL,  -- Cond TDD
        ...,
        [[  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***<br>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***<br>List of parameter: $n_{\mathrm{PUCCH}}^{(1,p)}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1]. Field *n1-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***<br>The number of configured HARQ processes for Semi-Persistent Scheduling, see TS 36.321 [6]. |
| ***p0-NominalPUSCH-Persistent***<br>Parameter: $P_{\mathrm{O\_NOMINAL\_PUSCH}}(0)$ . 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 *tpc-SubframeSet*, this field applies for uplink power control subframe set 1. |
| ***p0-NominalPUSCH-PersistentSubframeSet2***<br>Parameter: $P_{\mathrm{O\_NOMINAL\_PUSCH}}(0)$ . 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 *tpc-SubframeSet*, in which case this field applies for uplink power control subframe set 2. |
| ***p0-UE-PUSCH-Persistent***<br>Parameter: $P_{\mathrm{O\_UE\_PUSCH}}(0)$ . 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 *tpc-SubframeSet*, this field applies for uplink power control subframe set 1. |
| ***p0-UE-PUSCH-PersistentSubframeSet2***<br>Parameter: $P_{\mathrm{O\_UE\_PUSCH}}(0)$ . 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* for *p0-UE-PUSCH-PersistentSubframeSet2.* E-UTRAN configures this field only if uplink power control subframe sets are configured by *tpc-SubframeSet*, in which case this field applies for uplink power control subframe set 2. |
| ***semiPersistSchedC-RNTI***<br>Semi-persistent Scheduling C-RNTI, see TS 36.321 [6]. |
| ***semiPersistSchedIntervalDL***<br>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***<br>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***<br>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 {
                                    ssp0, ssp1, ssp2, ssp3, ssp4,ssp5, ssp6, ssp7,
                                    ssp8}
}

TDD-Config-v1130 ::=            SEQUENCE {
    specialSubframePatterns-v1130   ENUMERATED {ssp7,ssp9}
}

TDD-ConfigSL-r12 ::=    SEQUENCE {
    subframeAssignmentSL-r12        ENUMERATED {
                                    none, sa0, sa1, sa2, sa3, sa4, sa5, sa6}
}

-- ASN1STOP
```

| ***TDD-Config* field descriptions** |
|---|
| ***specialSubframePatterns***<br>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***<br>Indicates DL/UL subframe configuration where sa0 point to Configuration 0, sa1 to Configuration 1 etc. as specified in TS 36.211 [21, table 4.2-2]. E-UTRAN configures the same value for serving cells residing on same frequency band. |
| ***subframeAssignmentSL***<br>Indicates UL/ DL subframe configuration where sa0 point 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.

***TimeAlignmentTimer* information element**

```
-- ASN1START

TimeAlignmentTimer ::=          ENUMERATED {
                                sf500, sf750, sf1280, sf1920, sf2560, sf5120,
```

```
                                    sf10240, infinity}

-- ASN1STOP
```

## – TPC-PDCCH-Config

The IE *TPC-PDCCH-Config* is used to specify the RNTIs and indexes for PUCCH and PUSCH power control according to TS 36.212 [22]. The power control function can either be setup or released with the IE.

***TPC-PDCCH-Config* information element**

```
-- ASN1START


TPC-PDCCH-Config ::=                CHOICE {
    release                         NULL,
    setup                           SEQUENCE {
        tpc-RNTI                        BIT STRING (SIZE (16)),
        tpc-Index                       TPC-Index
    }
}


TPC-Index ::=                       CHOICE {
    indexOfFormat3                      INTEGER (1..15),
    indexOfFormat3A                         INTEGER (1..31)
}


-- ASN1STOP
```

| ***TPC-PDCCH-Config* field descriptions** |
|---|
| ***indexOfFormat3***<br>Index of N when DCI format 3 is used. See TS 36.212 [22, 5.3.3.1.6]. |
| ***IndexOfFormat3A***<br>Index of M when DCI format 3A is used. See TS 36.212 [22, 5.3.3.1.7]. |
| ***tpc-Index***<br>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***<br>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

```
-- ASN1START

UplinkPowerControlCommon ::=        SEQUENCE {
    p0-NominalPUSCH                     INTEGER (-126..24),
    alpha                           Alpha-r12,
    p0-NominalPUCCH                     INTEGER (-127..-96),
    deltaFList-PUCCH                DeltaFList-PUCCH,
    deltaPreambleMsg3               INTEGER (-1..6)
}

UplinkPowerControlCommon-v1020 ::=  SEQUENCE {
    deltaF-PUCCH-Format3-r10            ENUMERATED {deltaF-1, deltaF0, deltaF1, deltaF2,
                                            deltaF3, deltaF4, deltaF5, deltaF6},
    deltaF-PUCCH-Format1bCS-r10         ENUMERATED {deltaF1, deltaF2, spare2, spare1}
}

UplinkPowerControlCommonPSCell-r12 ::=      SEQUENCE {
-- For uplink power control the additional/ missing fields are signalled (compared to SCell)
    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
    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, al1}

DeltaFList-PUCCH ::=            SEQUENCE {
    deltaF-PUCCH-Format1            ENUMERATED {deltaF-2, deltaF0, deltaF2},
    deltaF-PUCCH-Format1b               ENUMERATED {deltaF1, deltaF3, deltaF5},
    deltaF-PUCCH-Format2            ENUMERATED {deltaF-2, deltaF0, 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-Format1a1b-r10      ENUMERATED {dB0, dB-2},
    deltaTxD-OffsetPUCCH-Format22a2b-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***<br>Parameter: Accumulation-enabled, see TS 36.213 [23, 5.1.1.1]. TRUE corresponds to 'enabled' whereas FALSE corresponds to 'disabled'. |
| ***alpha***<br>Parameter: *α* See TS 36.213 [23, 5.1.1.1] where al0 corresponds to 0, al04 corresponds to value 0.4, al05 to 0.5, al06 to 0.6, al07 to 0.7, al08 to 0.8, al09 to 0.9 and al1 corresponds to 1. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by *tpc-SubframeSet*. |
| ***alpha-SubframeSet2***<br>Parameter: *α*. See TS 36.213 [23, 5.1.1.1] where al0 corresponds to 0, al04 corresponds to value 0.4, al05 to 0.5, al06 to 0.6, al07 to 0.7, al08 to 0.8, al09 to 0.9 and al1 corresponds to 1. This field applies for uplink power control subframe set 2 if uplink power control subframe sets are configured by *tpc-SubframeSet*. |
| ***deltaF-PUCCH-FormatX***<br>Parameter: $\Delta_{\mathrm{F\_PUCCH}}(F)$ for the PUCCH formats 1, 1b, 2, 2a, 2b, 3 and 1b with channel selection. See TS 36.213 [23, 5.1.2] where deltaF-2 corresponds to -2 dB, deltaF0 corresponds to 0 dB and so on. |
| ***deltaMCS-Enabled***<br>Parameter: *Ks* See TS 36.213 [23, 5.1.1.1]. en0 corresponds to value 0 corresponding to state 'disabled'. en1 corresponds to value 1.25 corresponding to 'enabled'. |
| ***deltaPreambleMsg3***<br>Parameter: $\Delta_{PREAMBLE\_Msg3}$ *see* TS 36.213 [23, 5.1.1.1]. Actual value = IE value * 2 [dB]. |
| ***deltaTxD-OffsetPUCCH-FormatX***<br>Parameter: $\Delta_{TxD}(F')$ for the PUCCH formats 1, 1a/1b, 1b with channel selection, 2/2a/2b and 3 when two antenna ports are configured for PUCCH transmission. See TS 36.213 [23, 5.1.2.1] where dB0 corresponds to 0 dB, dB-1 corresponds to -1 dB, dB-2 corresponds to -2 dB. EUTRAN configures the field *deltaTxD-OffsetPUCCH-Format1bCS-r11* for the PCell and/or the PSCell only. |
| ***filterCoefficient***<br>Specifies the filtering coefficient for RSRP measurements used to calculate path loss, as specified in TS 36.213 [23, 5.1.1.1]. The same filtering mechanism applies as for *quantityConfig* described in 5.5.3.2. |
| ***p0-NominalPUCCH***<br>Parameter: $P_{\mathrm{O\_NOMINAL\_PUCCH}}$ See TS 36.213 [23, 5.1.2.1], unit dBm. |
| ***p0-NominalPUSCH***<br>Parameter: $P_{\mathrm{O\_NOMINAL\_PUSCH}}(1)$ See TS 36.213 [23, 5.1.1.1], unit dBm. This field is applicable for non-persistent scheduling only. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by *tpc-SubframeSet*. |
| ***p0-NominalPUSCH-SubframeSet2***<br>Parameter: $P_{\mathrm{O\_NOMINAL\_PUSCH}}(1)$. See TS 36.213 [23, 5.1.1.1], 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-PUCCH***<br>Parameter: $P_{\mathrm{O\_UE\_PUCCH}}$ See TS 36.213 [23, 5.1.2.1]. Unit dB |
| ***p0-UE-PUSCH***<br>Parameter: $P_{\mathrm{O\_UE\_PUSCH}}(1)$ See TS 36.213 [23, 5.1.1.1], unit dB. This field is applicable for non-persistent scheduling, only. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by *tpc-SubframeSet*. |
| ***p0-UE-PUSCH-SubframeSet2***<br>Parameter: $P_{\mathrm{O\_UE\_PUSCH}}(1)$ See TS 36.213 [23, 5.1.1.1], 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***<br>Indicates whether the UE shall apply as pathloss reference either the downlink of the PCell or of the SCell that corresponds with this uplink (i.e. according to the *cellIdentification* within the field *sCellToAddMod*). For SCells part of an STAG E-UTRAN sets the value to sCell. |
| ***pSRS-Offset, pSRS-OffsetAp***<br>Parameter: $P_{SRS\_OFFSET}$ for periodic and aperiodic sounding reference signal transmission repectively. See TS 36.213 [23, 5.1.3.1]. For Ks=1.25, the actual parameter value is pSRS-Offset value – 3. For Ks=0, the actual parameter value is -10.5 + 1.5*pSRS-Offset value.<br>If *pSRS-Offset-v1130* is included, the UE ignores *pSRS-Offset* (i.e., without suffix). Likewise, if *pSRS-OffsetAp-v1130* is included, the UE ignores *pSRS-OffsetAp-r10*. For Ks=0, E-UTRAN does not set values larger than 26. |

| ***UplinkPowerControl* field descriptions** |
|---|
| ***tpc-SubframeSet***<br>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. |

## 6.3.3 Security control information elements

### – NextHopChainingCount

The IE *NextHopChainingCount* is used to update the $K_{eNB}$ key and corresponds to parameter NCC: See TS 33.401 [32, 7.2.8.4].

***NextHopChainingCount* information element**

```
-- ASN1START

NextHopChainingCount ::=            INTEGER (0..7)

-- ASN1STOP
```

### – 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**

```
-- ASN1START

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, ...}

-- ASN1STOP
```

| ***SecurityAlgorithmConfig* field descriptions** |
|---|
| ***cipheringAlgorithm***<br>Indicates the ciphering algorithm to be used for SRBs and DRBs, as specified in TS 33.401 [32, 5.1.3.2]. |
| ***integrityProtAlgorithm***<br>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). |

### – 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**

```
-- ASN1START

ShortMAC-I ::=                  BIT STRING (SIZE (16))

-- ASN1STOP
```

## 6.3.4 Mobility control information elements

### – AdditionalSpectrumEmission

***AdditionalSpectrumEmission* information element**

```
-- ASN1START

AdditionalSpectrumEmission ::=      INTEGER (1..32)

-- ASN1STOP
```

### – 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**

```
-- ASN1START

ARFCN-ValueCDMA2000 ::=         INTEGER (0..2047)

-- ASN1STOP
```

### – ARFCN-ValueEUTRA

The IE *ARFCN-ValueEUTRA* is used to indicate the ARFCN applicable for a downlink, uplink or bi-directional (TDD) E-UTRA carrier frequency, as defined in TS 36.101 [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**

```
-- ASN1START

ARFCN-ValueEUTRA ::=              INTEGER (0..maxEARFCN)

ARFCN-ValueEUTRA-v9e0 ::=         INTEGER (maxEARFCN-Plus1..maxEARFCN2)

ARFCN-ValueEUTRA-r9 ::=           INTEGER (0..maxEARFCN2)

-- ASN1STOP
```

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**

```
-- ASN1START

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**

```
-- ASN1START
```

```
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**

```
-- ASN1START

BandclassCDMA2000 ::=           ENUMERATED {
                                    bc0, bc1, bc2, bc3, bc4, bc5, bc6, bc7, bc8,
                                    bc9, bc10, bc11, bc12, bc13, bc14, bc15, bc16,
                                    bc17, bc18-v9a0, bc19-v9a0, bc20-v9a0, bc21-v9a0,
                                    spare10, spare9, spare8, spare7, spare6, spare5, spare4,
                                    spare3, spare2, spare1, ...}

-- ASN1STOP
```

### – BandIndicatorGERAN

The IE *BandIndicatorGERAN* indicates how to interpret an associated GERAN carrier ARFCN, see TS 45.005 [20]. More specifically, the IE indicates the GERAN frequency band in case the ARFCN value can concern either a DCS 1800 or a PCS 1900 carrier frequency. For ARFCN values not associated with one of these bands, the indicator has no meaning.

**_BandIndicatorGERAN_ information element**

```
-- ASN1START

BandIndicatorGERAN ::=          ENUMERATED {dcs1800, pcs1900}

-- ASN1STOP
```

### – CarrierFreqCDMA2000

The IE *CarrierFreqCDMA2000* used to provide the CDMA2000 carrier information.

***CarrierFreqCDMA2000* information element**

```
-- ASN1START

CarrierFreqCDMA2000 ::=         SEQUENCE {
    bandClass                       BandclassCDMA2000,
    arfcn                       ARFCN-ValueCDMA2000
}

-- ASN1STOP
```

## – CarrierFreqGERAN

The IE *CarrierFreqGERAN* is used to provide an unambiguous carrier frequency description of a GERAN cell.

***CarrierFreqGERAN* information element**

```
-- ASN1START

CarrierFreqGERAN ::=        SEQUENCE {
    arfcn                       ARFCN-ValueGERAN,
    bandIndicator               BandIndicatorGERAN
}

-- ASN1STOP
```

| ***CarrierFreqGERAN* field descriptions** |
|---|
| ***arfcn***<br>GERAN ARFCN of BCCH carrier. |
| ***bandIndicator***<br>Indicates how to interpret the ARFCN of the BCCH carrier. |

## – CarrierFreqsGERAN

The IE *CarrierFreqListGERAN* is used to provide one or more GERAN ARFCN values, as defined in TS 44.005 [43], which represents a list of GERAN BCCH carrier frequencies.

***CarrierFreqsGERAN* information element**

```
-- ASN1START

CarrierFreqsGERAN ::=       SEQUENCE {
    startingARFCN                   ARFCN-ValueGERAN,
    bandIndicator               BandIndicatorGERAN,
```

```
    followingARFCNs                 CHOICE {
        explicitListOfARFCNs        ExplicitListOfARFCNs,
        equallySpacedARFCNs             SEQUENCE {
            arfcn-Spacing           INTEGER (1..8),
            numberOfFollowingARFCNs             INTEGER (0..31)
        },
        variableBitMapOfARFCNs          OCTET STRING (SIZE (1..16))
    }
}

ExplicitListOfARFCNs ::=        SEQUENCE (SIZE (0..31)) OF ARFCN-ValueGERAN

-- ASN1STOP
```

| ***CarrierFreqsGERAN* field descriptions** |
|---|
| ***arfcn-Spacing***<br>Space, d, between a set of equally spaced ARFCN values. |
| ***bandIndicator***<br>Indicates how to interpret the ARFCN of the BCCH carrier. |
| ***explicitListOfARFCNs***<br>The remaining ARFCN values in the set are explicitly listed one by one. |
| ***followingARFCNs***<br>Field containing a representation of the remaining ARFCN values in the set. |
| ***numberOfFollowingARFCNs***<br>The number, n, of the remaining equally spaced ARFCN values in the set. The complete set of (n+1) ARFCN values is defined as: {s, ((s + d) mod 1024), ((s + 2*d) mod 1024) ... ((s + n*d) mod 1024)}. |
| ***startingARFCN***<br>The first ARFCN value, s, in the set. |
| ***variableBitMapOfARFCNs***<br>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**

```
-- ASN1START

CarrierFreqListMBMS-r11 ::=     SEQUENCE (SIZE (1..maxFreqMBMS-r11)) OF ARFCN-ValueEUTRA-r9

-- ASN1STOP
```

### – CDMA2000-Type

The IE *CDMA2000-Type* is used to describe the type of CDMA2000 network.

***CDMA2000-Type* information element**

```
-- ASN1START

CDMA2000-Type ::=                ENUMERATED {type1XRTT, typeHRPD}

-- ASN1STOP
```

### – CellIdentity

The IE *CellIdentity* is used to unambiguously identify a cell within a PLMN.

***CellIdentity* information element**

```
-- ASN1START

CellIdentity ::=                 BIT STRING (SIZE (28))

-- ASN1STOP
```

### – CellIndexList

The IE *CellIndexList* concerns a list of cell indices, which may be used for different purposes.

***CellIndexList* information element**

```
-- ASN1START

CellIndexList ::=                SEQUENCE (SIZE (1..maxCellMeas)) OF CellIndex

CellIndex ::=                    INTEGER (1..maxCellMeas)

-- ASN1STOP
```

### – CellReselectionPriority

The IE *CellReselectionPriority* concerns the absolute priority of the concerned carrier frequency/ set of frequencies (GERAN)/ bandclass (CDMA2000), as used by the cell reselection procedure. Corresponds with parameter "priority" in

TS 36.304 [4]. Value 0 means: lowest priority. The UE behaviour for the case the field is absent, if applicable, is specified in TS 36.304 [4].

***CellReselectionPriority* information element**

```
-- ASN1START

CellReselectionPriority ::=             INTEGER (0..7)

-- ASN1STOP
```

## – CSFB-RegistrationParam1XRTT

The IE *CSFB-RegistrationParam1XRTT* is used to indicate whether or not the UE shall perform a CDMA2000 1xRTT pre-registration if the UE does not have a valid / current pre-registration.

```
-- ASN1START

CSFB-RegistrationParam1XRTT ::=     SEQUENCE {
    sid                             BIT STRING (SIZE (15)),
    nid                             BIT STRING (SIZE (16)),
    multipleSID                         BOOLEAN,
    multipleNID                         BOOLEAN,
    homeReg                             BOOLEAN,
    foreignSIDReg                       BOOLEAN,
    foreignNIDReg                       BOOLEAN,
    parameterReg                    BOOLEAN,
    powerUpReg                          BOOLEAN,
    registrationPeriod                  BIT STRING (SIZE (7)),
    registrationZone                BIT STRING (SIZE (12)),
    totalZone                       BIT STRING (SIZE (3)),
    zoneTimer                           BIT STRING (SIZE (3))
}

CSFB-RegistrationParam1XRTT-v920 ::=SEQUENCE {
    powerDownReg-r9                     ENUMERATED {true}
}

-- ASN1STOP
```

| *CSFB-RegistrationParam1XRTT* field descriptions |
|---|
| ***foreignNIDReg***<br>The CDMA2000 1xRTT NID roamer registration indicator. |
| ***foreignSIDReg***<br>The CDMA2000 1xRTT SID roamer registration indicator. |
| ***homeReg***<br>The CDMA2000 1xRTT Home registration indicator. |
| ***multipleNID***<br>The CDMA2000 1xRTT Multiple NID storage indicator. |
| ***multipleSID***<br>The CDMA2000 1xRTT Multiple SID storage indicator. |
| ***nid***<br>Used along with the *sid* as a pair to control when the UE should Register or Re-Register with the CDMA2000 1xRTT network. |
| ***parameterReg***<br>The CDMA2000 1xRTT Parameter-change registration indicator. |
| ***powerDownReg***<br>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***<br>The CDMA2000 1xRTT Power-up registration indicator. |
| ***registrationPeriod***<br>The CDMA2000 1xRTT Registration period. |
| ***registrationZone***<br>The CDMA2000 1xRTT Registration zone. |
| ***sid***<br>Used along with the *nid* as a pair to control when the UE should Register or Re-Register with the CDMA2000 1xRTT network. |
| ***totalZone***<br>The CDMA2000 1xRTT Number of registration zones to be retained. |
| ***zoneTimer***<br>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**

```
-- ASN1START


CellGlobalIdEUTRA ::=           SEQUENCE {
    plmn-Identity               PLMN-Identity,
    cellIdentity                CellIdentity
}


-- ASN1STOP
```

| CellGlobalIdEUTRA field descriptions |
|---|
| ***cellIdentity***<br>Identity of the cell within the context of the PLMN. |
| ***plmn-Identity***<br>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**

```
-- ASN1START

CellGlobalIdUTRA ::=            SEQUENCE {
    plmn-Identity               PLMN-Identity,
    cellIdentity                BIT STRING (SIZE (28))
}

-- ASN1STOP
```

| CellGlobalIdUTRA field descriptions |
|---|
| ***cellIdentity***<br>UTRA Cell Identifier which is unique within the context of the identified PLMN as defined in TS 25.331 [19]. |
| ***plmn-Identity***<br>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**

```
-- ASN1START

CellGlobalIdGERAN ::=           SEQUENCE {
    plmn-Identity               PLMN-Identity,
    locationAreaCode                BIT STRING (SIZE (16)),
    cellIdentity                BIT STRING (SIZE (16))
}

-- ASN1STOP
```

| CellGlobalIdGERAN field descriptions |
|---|
| ***cellIdentity***<br>Cell Identifier which is unique within the context of the GERAN location area as defined in TS 23.003 [27]. |
| ***locationAreaCode***<br>A fixed length code identifying the location area within a PLMN as defined in TS 23.003 [27]. |
| ***plmn-Identity***<br>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**

```
-- ASN1START


CellGlobalIdCDMA2000 ::=            CHOICE {
    cellGlobalId1XRTT               BIT STRING (SIZE (47)),
    cellGlobalIdHRPD                BIT STRING (SIZE (128))
}


-- ASN1STOP
```

| CellGlobalIdCDMA2000 field descriptions |
|---|
| ***cellGlobalId1XRTT***<br>Unique identifier for a CDMA2000 1xRTT cell, corresponds to BASEID, SID and NID parameters (in that order) defined in C.S0005 [25]. |
| ***cellGlobalIdHRPD***<br>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**

```
-- 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**

```
-- 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**

```
-- 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,
                                        ms2000, spare1},
    ue-IdentitySCG-r12              C-RNTI                          OPTIONAL,  -- Cond SCGEst,
    rach-ConfigDedicated-r12        RACH-ConfigDedicated            OPTIONAL,  -- Need OP
    cipheringAlgorithmSCG-r12       CipheringAlgorithm-r12      OPTIONAL,  -- Need ON
    ...
}

CarrierBandwidthEUTRA ::=           SEQUENCE {
    dl-Bandwidth                    ENUMERATED {
                                        n6, n15, n25, n50, n75, n100, spare10,
                                        spare9, spare8, spare7, spare6, spare5,
                                        spare4, spare3, spare2, spare1},
    ul-Bandwidth                    ENUMERATED {
                                        n6, n15, n25, n50, n75, n100, spare10,
                                        spare9, spare8, spare7, spare6, spare5,
                                        spare4, spare3, spare2, spare1}  OPTIONAL -- Need OP
}

CarrierFreqEUTRA ::=                SEQUENCE {
    dl-CarrierFreq                  ARFCN-ValueEUTRA,
    ul-CarrierFreq                  ARFCN-ValueEUTRA                OPTIONAL   -- Cond FDD
}

CarrierFreqEUTRA-v9e0 ::=           SEQUENCE {
    dl-CarrierFreq-v9e0             ARFCN-ValueEUTRA-r9,
    ul-CarrierFreq-v9e0             ARFCN-ValueEUTRA-r9             OPTIONAL   -- Cond FDD
}
```

```
-- ASN1STOP
```

| ***MobilityControlInfo* field descriptions** |
|---|
| ***additionalSpectrumEmission***<br>The UE requirements related to IE *AdditionalSpectrumEmission* are defined in TS 36.101 [42, table 6.2.4.1]**.** |
| ***carrierBandwidth***<br>Provides the parameters *Downlink bandwidth*, and *Uplink bandwidth*, see TS 36.101 [42]. |
| ***carrierFreq***<br>Provides the EARFCN to be used by the UE in the target cell. |
| ***cipheringAlgorithmSCG***<br>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***<br>Parameter: *Downlink bandwidth*, see TS 36.101 [42]. |
| ***drb-ContinueROHC***<br>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***<br>The dedicated random access parameters. If absent the UE applies contention based random access as specified in TS 36.321 [6]. |
| ***t304***<br>Timer T304 as described in section 7.3. ms50 corresponds with 50 ms, ms100 corresponds with 100 ms and so on. |
| ***t307***<br>Timer T307 as described in section 7.3. ms50 corresponds with 50 ms, ms100 corresponds with 100 ms and so on. |
| ***ul-Bandwidth***<br>Parameter: *Uplink bandwidth*, see TS 36.101 [42, table 5.6-1]. For TDD, the parameter is absent and it is equal to downlink bandwidth. If absent for FDD, apply the same value as applies for the downlink bandwidth. |

| Conditional presence | Explanation |
|---|---|
| *FDD* | 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. |
| *HO* | 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. |
| *HO-toEUTRA* | The field is mandatory present in case of inter-RAT handover to E-UTRA; otherwise the field is optionally present, need ON. |
| *HO-toEUTRA2* | 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. |
| *SCGEst* | This field is mandatory present in case of SCG establishment; otherwise the field is optionally present, need ON. |

## – 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***<br>The number of cell changes to enter high mobility state. Corresponds to $N_{CR\_H}$ in TS 36.304 [4]. |
| ***n-CellChangeMedium***<br>The number of cell changes to enter medium mobility state. Corresponds to $N_{CR\_M}$ in TS 36.304 [4]. |
| ***t-Evaluation***<br>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***<br>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-r11 ::=   SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-r11
```

```
MultiBandInfo-v9e0 ::=      SEQUENCE {
    freqBandIndicator-v9e0          FreqBandIndicator-v9e0      OPTIONAL   -- Need OP
}

-- 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**

```
-- ASN1START


PhysCellIdRangeUTRA-FDDList-r9::=       SEQUENCE (SIZE (1..maxPhysCellIdRange-r9)) OF
PhysCellIdRangeUTRA-FDD-r9


PhysCellIdRangeUTRA-FDD-r9 ::=          SEQUENCE {
        start-r9                        PhysCellIdUTRA-FDD,
        range-r9                        INTEGER (2..512)            OPTIONAL   -- Need OP
}


-- ASN1STOP
```

| ***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**

```
-- ASN1START


PhysCellIdCDMA2000 ::=          INTEGER (0..maxPNOffset)


-- ASN1STOP
```

### – PhysCellIdGERAN

The IE *PhysCellIdGERAN* contains the Base Station Identity Code (BSIC).

***PhysCellIdGERAN* information element**

```
-- ASN1START

PhysCellIdGERAN ::=             SEQUENCE {
    networkColourCode               BIT STRING (SIZE (3)),
    baseStationColourCode           BIT STRING (SIZE (3))
}

-- ASN1STOP
```

| ***PhysCellIdGERAN* field descriptions** |
|---|
| ***baseStationColourCode***<br>Base station Colour Code as defined in TS 23.003 [27]. |
| ***networkColourCode***<br>Network Colour Code as defined in TS 23.003 [27]. |

### – PhysCellIdUTRA-FDD

The IE *PhysCellIdUTRA-FDD* is used to indicate the physical layer identity of the cell, i.e. the primary scrambling code, as defined in TS 25.331 [19].

***PhysCellIdUTRA-FDD* information element**

```
-- ASN1START

PhysCellIdUTRA-FDD ::=          INTEGER (0..511)

-- ASN1STOP
```

### – PhysCellIdUTRA-TDD

The IE *PhysCellIdUTRA-TDD* is used to indicate the physical layer identity of the cell, i.e. the cell parameters ID (TDD), as specified in TS 25.331 [19]. Also corresponds to the Initial Cell Parameter Assignment in TS 25.223 [46].

***PhysCellIdUTRA-TDD* information element**

```
-- ASN1START

PhysCellIdUTRA-TDD ::=          INTEGER (0..127)

-- ASN1STOP
```

### – PLMN-Identity

The IE *PLMN-Identity* identifies a Public Land Mobile Network. Further information regarding how to set the IE are specified in TS 23.003 [27].

**_PLMN-Identity_ information element**

```
-- ASN1START

PLMN-Identity ::=               SEQUENCE {
    mcc                             MCC             OPTIONAL,       -- Cond MCC
    mnc                             MNC
}

MCC ::=                         SEQUENCE (SIZE (3)) OF
                                    MCC-MNC-Digit

MNC ::=                         SEQUENCE (SIZE (2..3)) OF
                                    MCC-MNC-Digit

MCC-MNC-Digit ::=                   INTEGER (0..9)


-- ASN1STOP
```

| ***PLMN-Identity* field descriptions** |
|---|
| ***mcc***<br>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***<br>The first element contains the first MNC digit, the second element the second MNC digit and so on. See TS 23.003 [27]. |

| Conditional presence | Explanation |
|---|---|
| *MCC* | 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. |

### – PLMN-IdentityList3

Includes a list of PLMN identities.

***PLMN-IdentityList3* information element**

```
-- ASN1START

PLMN-IdentityList3-r11 ::=              SEQUENCE (SIZE (1..16)) OF PLMN-Identity

-- ASN1STOP
```

## – PreRegistrationInfoHRPD

```
-- ASN1START

PreRegistrationInfoHRPD ::=             SEQUENCE {
    preRegistrationAllowed              BOOLEAN,
    preRegistrationZoneId               PreRegistrationZoneIdHRPD    OPTIONAL, -- cond PreRegAllowed
    secondaryPreRegistrationZoneIdList  SecondaryPreRegistrationZoneIdListHRPD    OPTIONAL -- Need OR
}

SecondaryPreRegistrationZoneIdListHRPD ::=    SEQUENCE (SIZE (1..2)) OF PreRegistrationZoneIdHRPD

PreRegistrationZoneIdHRPD ::=           INTEGER (0..255)

-- ASN1STOP
```

| ***PreRegistrationInfoHRPD* field descriptions** |
|---|
| ***preRegistrationAllowed***<br>TRUE indicates that a UE shall perform a CDMA2000 HRPD pre-registration if the UE does not have a valid / current pre-registration. FALSE indicates that the UE is not allowed to perform CDMA2000 HRPD pre-registration in the current cell. |
| ***preRegistrationZoneID***<br>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. |
| ***secondaryPreRegistrationZoneIdList***<br>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. |

| Conditional presence | Explanation |
|---|---|
| *PreRegAllowed* | *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.* |

## – Q-QualMin

The IE *Q-QualMin* is used to indicate for cell selection/ re-selection the required minimum received RSRQ level in the (E-UTRA) cell. Corresponds to parameter $Q_{qualmin}$ in 36.304 [4]. Actual value $Q_{qualmin}$ = IE value [dB].

***Q-QualMin* information element**

```
-- ASN1START

Q-QualMin-r9 ::=                INTEGER (-34..-3)

-- ASN1STOP
```

## – Q-RxLevMin

The IE *Q-RxLevMin* is used to indicate for cell selection/ re-selection the required minimum received RSRP level in the (E-UTRA) cell. Corresponds to parameter $Q_{rxlevmin}$ in 36.304 [4]. Actual value $Q_{rxlevmin}$ = IE value * 2 [dBm].

***Q-RxLevMin* information element**

```
-- ASN1START

Q-RxLevMin ::=                  INTEGER (-70..-22)

-- ASN1STOP
```

## – Q-OffsetRange

The IE *Q-OffsetRange* is used to indicate a cell, CSI-RS resource or frequency specific offset to be applied when evaluating candidates for cell re-selection or when evaluating triggering conditions for measurement reporting. The value in dB. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.

***Q- OffsetRange* information element**

```
-- ASN1START

Q-OffsetRange ::=               ENUMERATED {
                                    dB-24, dB-22, dB-20, dB-18, dB-16, dB-14,
                                    dB-12, dB-10, dB-8, dB-6, dB-5, dB-4, dB-3,
                                    dB-2, dB-1, dB0, dB1, dB2, dB3, dB4, dB5,
                                    dB6, dB8, dB10, dB12, dB14, dB16, dB18,
                                    dB20, dB22, dB24}

-- ASN1STOP
```

### – Q-OffsetRangeInterRAT

The IE *Q-OffsetRangeInterRAT* is used to indicate a frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value in dB.

**_Q-OffsetRangeInterRAT_ information element**

```
-- ASN1START

Q-OffsetRangeInterRAT ::=                INTEGER (-15..15)

-- ASN1STOP
```

### – ReselectionThreshold

The IE *ReselectionThreshold* is used to indicate an Rx level threshold for cell reselection. Actual value of threshold = IE value * 2 [dB].

**_ReselectionThreshold_ information element**

```
-- ASN1START

ReselectionThreshold ::=                INTEGER (0..31)

-- ASN1STOP
```

### – ReselectionThresholdQ

The IE *ReselectionThresholdQ* is used to indicate a quality level threshold for cell reselection. Actual value of threshold = IE value [dB].

**_ReselectionThresholdQ_ information element**

```
-- ASN1START

ReselectionThresholdQ-r9 ::=            INTEGER (0..31)

-- ASN1STOP
```

### – SCellIndex

The IE *SCellIndex* concerns a short identity, used to identify an SCell.

**_SCellIndex_ information element**

```
-- ASN1START
```

```
SCellIndex-r10 ::=                INTEGER (1..7)

-- ASN1STOP
```

### – ServCellIndex

The IE *ServCellIndex* concerns a short identity, used to identify a serving cell (i.e. the PCell or an SCell). Value 0 applies for the PCell, while the *SCellIndex* that has previously been assigned applies for SCells.

**_ServCellIndex_ information element**

```
-- ASN1START

ServCellIndex-r10 ::=             INTEGER (0..7)

-- ASN1STOP
```

### – SpeedStateScaleFactors

The IE *SpeedStateScaleFactors* concerns factors, to be applied when the UE is in medium or high speed state, used for scaling a mobility control related parameter.

**_SpeedStateScaleFactors_ information element**

```
-- ASN1START

SpeedStateScaleFactors ::=        SEQUENCE {
    sf-Medium                         ENUMERATED {oDot25, oDot5, oDot75, lDot0},
    sf-High                           ENUMERATED {oDot25, oDot5, oDot75, lDot0}
}
-- ASN1STOP
```

| **_SpeedStateScaleFactors_ field descriptions** |
|---|
| ***sf-High*** <br> 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*** <br> The concerned mobility control related parameter is multiplied with this factor if the UE is in Medium Mobility state as defined in TS 36.304 [4]. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5 , oDot75 corresponds to 0.75 and so on. |

### – SystemInfoListGERAN

The IE *SystemInfoListGERAN* contains system information of a GERAN cell.

***SystemInfoListGERAN* information element**

```
-- ASN1START

SystemInfoListGERAN ::=          SEQUENCE (SIZE (1..maxGERAN-SI)) OF
                                 OCTET STRING (SIZE (1..23))

-- ASN1STOP
```

| ***SystemInfoListGERAN* field descriptions** |
|---|
| ***SystemInfoListGERAN*** |
| Each OCTET STRING contains one System Information (SI) message as defined in TS 44.018 [45, table 9.1.1] excluding the L2 Pseudo Length, the RR management Protocol Discriminator and the Skip Indicator or a complete Packet System Information (PSI) message as defined in TS 44.060 [36, table 11.2.1]. |

## – SystemTimeInfoCDMA2000

The IE *SystemTimeInfoCDMA2000* informs the UE about the absolute time in the current cell. The UE uses this absolute time knowledge to derive the CDMA2000 Physical cell identity, expressed as PNOffset, of neighbour CDMA2000 cells.

NOTE: The UE needs the CDMA2000 system time with a certain level of accuracy for performing measurements as well as for communicating with the CDMA2000 network (HRPD or 1xRTT).

***SystemTimeInfoCDMA2000* information element**

```
-- 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:

| FDD/TDD | *cdma-EUTRA-Synchronisation* | *synchronousSystemTime* | *asynchronousSystemTime* |
|---|---|---|---|
| FDD | FALSE | Not Recommended | Recommended |
| FDD | TRUE | Recommended | Not Recommended |
| TDD | FALSE | Not Recommended | Recommended |
| TDD | TRUE | Recommended | Recommended |

### – TrackingAreaCode

The IE *TrackingAreaCode* is used to identify a tracking area within the scope of a PLMN, see TS 24.301 [35].

**_TrackingAreaCode_ information element**

```
-- ASN1START

TrackingAreaCode ::=            BIT STRING (SIZE (16))

-- ASN1STOP
```

### – T-Reselection

The IE *T-Reselection* concerns the cell reselection timer $Treselection_{RAT}$ for E-UTRA, UTRA, GERAN or CDMA2000. Value in seconds.

**_T-Reselection_ information element**

```
-- ASN1START

T-Reselection ::=               INTEGER (0..7)

-- ASN1STOP
```

## 6.3.5 Measurement information elements

### – AllowedMeasBandwidth

The IE *AllowedMeasBandwidth* is used to indicate the maximum allowed measurement bandwidth on a carrier frequency as defined by the parameter Transmission Bandwidth Configuration "$N_{RB}$" TS 36.104 [47]. The values mbw6, mbw15, mbw25, mbw50, mbw75, mbw100 indicate 6, 15, 25, 50, 75 and 100 resource blocks respectively.

***AllowedMeasBandwidth* information element**

```
-- 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].

***CSI-RSRP-Range* information element**

```
-- 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.

***Hysteresis* information element**

```
-- 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.

***LocationInfo* information element**

```
-- ASN1START

LocationInfo-r10 ::= SEQUENCE {
    locationCoordinates-r10                 CHOICE {
        ellipsoid-Point-r10                     OCTET STRING,
        ellipsoidPointWithAltitude-r10          OCTET STRING,
    ...,
        ellipsoidPointWithUncertaintyCircle-r11                 OCTET STRING,
        ellipsoidPointWithUncertaintyEllipse-r11            OCTET STRING,
        ellipsoidPointWithAltitudeAndUncertaintyEllipsoid-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* |
|---|
| ***ellipsoidArc***<br>Parameter *EllipsoidArc* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit. |
| ***ellipsoid-Point***<br>Parameter *Ellipsoid-Point* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit. |
| ***ellipsoidPointWithAltitude***<br>Parameter *EllipsoidPointWithAltitude* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit. |
| ***ellipsoidPointWithAltitudeAndUncertaintyEllipsoid***<br>Parameter *EllipsoidPointWithAltitudeAndUncertaintyEllipsoid* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit. |
| ***ellipsoidPointWithUncertaintyCircle***<br>Parameter *Ellipsoid-PointWithUncertaintyCircle* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit. |
| ***ellipsoidPointWithUncertaintyEllipse***<br>Parameter *EllipsoidPointWithUncertaintyEllipse* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit. |
| ***gnss-TOD-msec***<br>Parameter *Gnss-TOD-msec* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit. |
| ***horizontalVelocity***<br>Parameter *HorizontalVelocity* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit. |
| ***polygon***<br>Parameter *Polygon* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit. |

## – MBSFN-RSRQ-Range

The IE *MBSFN-RSRQ-Range* specifies the value range used in MBSFN RSRQ measurements. Integer value for MBSFN RSRQ measurements according to mapping table in TS 36.133 [16].

***MBSFN-RSRQ-Range* information element**

```
-- 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,
            timeToTrigger-SF                SpeedStateScaleFactors
        }
    }                                                               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** |
|---|
| ***allowInterruptions*** |
| Value TRUE indicates that the UE is allowed to cause interruptions to serving cells when performing measurements of deactivated SCell carriers for *measCycleSCell* of less than 640ms, as specified in TS 36.133 [16]. E-UTRAN enables this field only when an SCell is configured. |
| ***measGapConfig*** |
| Used to setup and release measurement gaps. |
| ***measIdToRemoveList*** |
| List of measurement identities to remove. Field *measIdToRemoveListExt* includes additional measurement identities i.e. extends the size of the measurement identity list using the general principles specified in 5.1.2. |
| ***measObjectToAddModList*** |
| If E-UTRAN includes *measObjectToAddModList-v9e0* it includes the same number of entries, and listed in the same order, as in *measObjectToAddModList* (i.e. without suffix). |
| ***measObjectToRemoveList*** |
| List of measurement objects to remove. |
| ***measRSRQ-OnAllSymbols*** |
| 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]. |
| ***measScaleFactor*** |
| Even if *reducedMeasPerformance* is not included in any *measObjectEUTRA* or *measObjectUTRA*, E-UTRAN may configure this field. The UE behavior is specified in TS 36.133 [16]. |
| ***PreRegistrationInfoHRPD*** |
| The CDMA2000 HRPD Pre-Registration Information tells the UE if it should pre-register with the CDMA2000 HRPD network and identifies the Pre-registration zone to the UE. |
| ***reportConfigToRemoveList*** |
| List of measurement reporting configurations to remove. |
| ***s-Measure*** |
| PCell quality threshold controlling whether or not the UE is required to perform measurements of intra-frequency, inter-frequency and inter-RAT neighbouring cells. Value '0' indicates to disable *s-Measure*. |
| ***timeToTrigger-SF*** |
| The *timeToTrigger* in *ReportConfigEUTRA* and in *ReportConfigInterRAT* are multiplied with the scaling factor applicable for the UE"s speed state. |

## – MeasDS-Config

The IE *MeasDS-Config* specifies information applicable for discovery signals measurement.

***MeasDS-Config* information elements**

```
-- 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 |
|---|
| ***csi-RS-IndividualOffset***<br>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. |
| ***dmtc-PeriodOffset***<br>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. |
| ***ds-OccasionDuration***<br>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. |
| ***measCSI-RS-ToAddModList***<br>List of CSI-RS resources to add/ modify in the CSI-RS resource list for discovery signals measurement. |
| ***measCSI-RS-ToRemoveList***<br>List of CSI-RS resources to remove from the CSI-RS resource list for discovery signals measurement. |
| ***physCellId***<br>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. |
| ***resourceConfig***<br>Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2]. |
| ***scramblingIdentity***<br>Parameter: Pseudo-random sequence generator parameter, $n_{\mathrm{ID}}$, see TS 36.213 [23, 7.2.5]. |
| ***subframeOffset***<br>Indicates the subframe offset between SSS of the cell indicated by physCellId and the CSI-RS resource in a discovery signal occasion. |

## – MeasGapConfig

The IE *MeasGapConfig* specifies the measurement gap configuration and controls setup/ release of measurement gaps.

***MeasGapConfig* information element**

```
-- ASN1START

MeasGapConfig ::=               CHOICE {
                                                release                 NULL,
    setup                       SEQUENCE {
        gapOffset                   CHOICE {
                gp0                         INTEGER (0..39),
                gp1                         INTEGER (0..79),
                ...
        }
    }
}

-- ASN1STOP
```

| ***MeasGapConfig* field descriptions** |
|---|
| ***gapOffset*** |
| Value *gapOffset* of *gp0* corresponds to gap offset of Gap Pattern Id '0' with MGRP = 40ms, *gapOffset* of *gp1* corresponds to gap offset of Gap Pattern Id '1' with MGRP = 80ms. Also used to specify the measurement gap pattern to be applied, as defined in TS 36.133 [16]. |

## – MeasId

The IE *MeasId* is used to identify a measurement configuration, i.e., linking of a measurement object and a reporting configuration.

***MeasId* information element**

```
-- ASN1START

MeasId ::=                      INTEGER (1..maxMeasId)

MeasId-v1250 ::=                INTEGER (maxMeasId-Plus1..maxMeasId-r12)

-- ASN1STOP
```

## – MeasIdToAddModList

The IE *MeasIdToAddModList* concerns a list of measurement identities to add or modify, with for each entry the *measId*, the associated *measObjectId* and the associated *reportConfigId*. 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**

```
-- ASN1START

MeasIdToAddModList ::=          SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddMod

MeasIdToAddModListExt-r12 ::=   SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddModExt-r12

MeasIdToAddMod ::=   SEQUENCE {
    measId                      MeasId,
    measObjectId                MeasObjectId,
    reportConfigId              ReportConfigId
}

MeasIdToAddModExt-r12 ::=  SEQUENCE {
    measId-v1250                MeasId-v1250,
```

```
    measObjectId-r12                MeasObjectId,
    reportConfigId-r12              ReportConfigId
}

-- ASN1STOP
```

## – MeasObjectCDMA2000

The IE *MeasObjectCDMA2000* specifies information applicable for inter-RAT CDMA2000 neighbouring cells.

***MeasObjectCDMA2000* information element**

```
-- ASN1START

MeasObjectCDMA2000 ::=          SEQUENCE {
    cdma2000-Type               CDMA2000-Type,
    carrierFreq                 CarrierFreqCDMA2000,
    searchWindowSize            INTEGER (0..15)                 OPTIONAL,  -- Need ON
    offsetFreq                  Q-OffsetRangeInterRAT           DEFAULT 0,
    cellsToRemoveList           CellIndexList                   OPTIONAL,  -- Need ON
    cellsToAddModList           CellsToAddModListCDMA2000       OPTIONAL,  -- Need ON
    cellForWhichToReportCGI         PhysCellIdCDMA2000          OPTIONAL,  -- Need ON
    ...
}

CellsToAddModListCDMA2000 ::=       SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModCDMA2000

CellsToAddModCDMA2000 ::=   SEQUENCE {
    cellIndex                   INTEGER (1..maxCellMeas),
    physCellId                      PhysCellIdCDMA2000
}

-- ASN1STOP
```

| ***MeasObjectCDMA2000* field descriptions** |
|---|
| ***carrierInfo***<br>Identifies CDMA2000 carrier frequency for which this configuration is valid. |
| ***cdma2000-Type***<br>The type of CDMA2000 network: CDMA2000 1xRTT or CDMA2000 HRPD. |
| ***cellIndex***<br>Entry index in the neighbouring cell list. |
| ***cellsToAddModList***<br>List of cells to add/ modify in the neighbouring cell list. |
| ***cellsToRemoveList***<br>List of cells to remove from the neighbouring cell list. |
| ***physCellId***<br>CDMA2000 Physical cell identity of a cell in neighbouring cell list expressed as PNOffset. |
| ***searchWindowSize***<br>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**

```
-- ASN1START


MeasObjectEUTRA ::=                SEQUENCE {
    carrierFreq                    ARFCN-ValueEUTRA,
    allowedMeasBandwidth           AllowedMeasBandwidth,
    presenceAntennaPort1           PresenceAntennaPort1,
    neighCellConfig                NeighCellConfig,
    offsetFreq                     Q-OffsetRange          DEFAULT dB0,
    -- Cell list
    cellsToRemoveList              CellIndexList          OPTIONAL,    -- Need ON
    cellsToAddModList              CellsToAddModList      OPTIONAL,    -- Need ON
    -- Black list
    blackCellsToRemoveList         CellIndexList          OPTIONAL,    -- Need ON
    blackCellsToAddModList         BlackCellsToAddModList OPTIONAL,    -- Need ON
    cellForWhichToReportCGI        PhysCellId             OPTIONAL,    -- Need ON
    ...,
    [[measCycleSCell-r10           MeasCycleSCell-r10     OPTIONAL,    -- Need ON
      measSubframePatternConfigNeigh-r10  MeasSubframePatternConfigNeigh-r10  OPTIONAL
        -- Need ON
    ]],
    [[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                        CHOICE {
            release                         NULL,
            setup                           ENUMERATED {ms0, ms50, ms100, ms200,
                                             ms300, ms400, ms500, ms1000}
        }                                                   OPTIONAL,       -- Need ON
        reducedMeasPerformance-r12      BOOLEAN                     OPTIONAL,       -- Need ON
        measDS-Config-r12               MeasDS-Config-r12           OPTIONAL        -- Need ON
    ]]
}

MeasObjectEUTRA-v9e0 ::=            SEQUENCE {
    carrierFreq-v9e0                ARFCN-ValueEUTRA-v9e0
}

CellsToAddModList ::=               SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddMod

CellsToAddMod ::= SEQUENCE {
    cellIndex                       INTEGER (1..maxCellMeas),
    physCellId                          PhysCellId,
    cellIndividualOffset            Q-OffsetRange
}

BlackCellsToAddModList ::=          SEQUENCE (SIZE (1..maxCellMeas)) OF BlackCellsToAddMod

BlackCellsToAddMod ::=   SEQUENCE {
    cellIndex                       INTEGER (1..maxCellMeas),
    physCellIdRange                     PhysCellIdRange
}

MeasCycleSCell-r10 ::=              ENUMERATED {sf160, sf256, sf320, sf512,
                                                sf640, sf1024, sf1280, spare1}

MeasSubframePatternConfigNeigh-r10 ::=     CHOICE {
    release                             NULL,
```

```
    setup                                   SEQUENCE {
        measSubframePatternNeigh-r10            MeasSubframePattern-r10,
        measSubframeCellList-r10                MeasSubframeCellList-r10  OPTIONAL   -- Cond 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***<br>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***<br>List of cells to remove from the list of cells for alternative time to trigger. |
| ***blackCellsToAddModList***<br>List of cells to add/ modify in the black list of cells. |
| ***blackCellsToRemoveList***<br>List of cells to remove from the black list of cells. |
| ***carrierFreq***<br>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***<br>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***<br>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***<br>List of cells to add/ modify in the cell list. |
| ***cellsToRemoveList***<br>List of cells to remove from the cell list. |
| ***measCycleSCell***<br>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***<br>Parameters applicable to discovery signals measurement on the carrier frequency indicated by *carrierFreq*. |
| ***measSubframeCellList***<br>List of cells for which *measSubframePatternNeigh* is applied. |
| ***measSubframePatternNeigh***<br>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***<br>Offset value applicable to the carrier frequency. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on. |
| ***physCellId***<br>Physical cell identity of a cell in the cell list. |
| ***physCellIdRange***<br>Physical cell identity or a range of physical cell identities. |
| ***reducedMeasPerformance***<br>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***<br>The value of timer T312. Value *ms0* represents 0 ms, *ms50* represents 50 ms and so on. |
| ***widebandRSRQ-Meas***<br>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 | Explanation |
|---|---|
| *always* | The field is mandatory present. |
| *WB-RSRQ* | 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. |

## – MeasObjectGERAN

The IE *MeasObjectGERAN* specifies information applicable for inter-RAT GERAN neighbouring frequencies.

***MeasObjectGERAN* information element**

```
-- ASN1START

MeasObjectGERAN ::=                 SEQUENCE {
    carrierFreqs                    CarrierFreqsGERAN,
    offsetFreq                      Q-OffsetRangeInterRAT       DEFAULT 0,
    ncc-Permitted                   BIT STRING(SIZE (8))    DEFAULT '11111111'B,
    cellForWhichToReportCGI             PhysCellIdGERAN             OPTIONAL,  -- Need ON
    ...
}

-- ASN1STOP
```

| ***MeasObjectGERAN* field descriptions** |
|---|
| ***ncc-Permitted***<br>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***<br>If E-UTRAN includes *cellForWhichToReportCGI*, it includes only one GERAN ARFCN value in *carrierFreqs*. |

## – MeasObjectId

The IE *MeasObjectId* used to identify a measurement object configuration.

***MeasObjectId* information element**

```
-- ASN1START

MeasObjectId ::=                INTEGER (1..maxObjectId)

-- ASN1STOP
```

## – MeasObjectToAddModList

The IE *MeasObjectToAddModList* concerns a list of measurement objects to add or modify

***MeasObjectToAddModList* information element**

```
-- ASN1START

MeasObjectToAddModList ::=          SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectToAddMod
```

```
MeasObjectToAddModList-v9e0 ::=     SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectToAddMod-v9e0


MeasObjectToAddMod ::= SEQUENCE {
    measObjectId                MeasObjectId,
    measObject                  CHOICE {
        measObjectEUTRA             MeasObjectEUTRA,
        measObjectUTRA              MeasObjectUTRA,
        measObjectGERAN             MeasObjectGERAN,
        measObjectCDMA2000          MeasObjectCDMA2000,
        ...
    }
}


MeasObjectToAddMod-v9e0 ::=  SEQUENCE {
    measObjectEUTRA-v9e0            MeasObjectEUTRA-v9e0    OPTIONAL   -- Cond eutra
}


-- ASN1STOP
```

| 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**

```
-- ASN1START


MeasObjectUTRA ::=              SEQUENCE {
    carrierFreq                 ARFCN-ValueUTRA,
    offsetFreq                  Q-OffsetRangeInterRAT       DEFAULT 0,
    cellsToRemoveList           CellIndexList           OPTIONAL,       -- Need ON
    cellsToAddModList           CHOICE {
        cellsToAddModListUTRA-FDD       CellsToAddModListUTRA-FDD,
        cellsToAddModListUTRA-TDD       CellsToAddModListUTRA-TDD
```

```
    }                                                   OPTIONAL,           -- Need ON
    cellForWhichToReportCGI             CHOICE {
        utra-FDD                        PhysCellIdUTRA-FDD,
        utra-TDD                        PhysCellIdUTRA-TDD
    }                                                   OPTIONAL,  -- Need ON
    ...,
    [[  csg-allowedReportingCells-v930          CSG-AllowedReportingCells-r9    OPTIONAL        -- Need ON
    ]],
    [[  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-FDDList-r9          PhysCellIdRangeUTRA-FDDList-r9  OPTIONAL  -- Need OR
}
-- ASN1STOP
```

| ***MeasObjectUTRA* field descriptions** |
|---|
| ***carrierFreq***<br>Identifies UTRA carrier frequency for which this configuration is valid. E-UTRAN does not configure more than one measurement object for the same physical frequency regardless of the ARFCN used to indicate this. |
| ***cellIndex***<br>Entry index in the neighbouring cell list. |
| ***cellsToAddModListUTRA-FDD***<br>List of UTRA FDD cells to add/ modify in the neighbouring cell list. |
| ***cellsToAddModListUTRA-TDD***<br>List of UTRA TDD cells to add/modify in the neighbouring cell list. |
| ***cellsToRemoveList***<br>List of cells to remove from the neighbouring cell list. |
| ***csg-allowedReportingCells***<br>One or more ranges of physical cell identities for which UTRA-FDD reporting is allowed. |
| ***reducedMeasPerformance***<br>If set to *TRUE* the UTRA carrier frequency is configured for reduced measurement performance, otherwise it is configured for normal measurement performance, see TS 36.133 [16]. |

## – MeasResults

The IE *MeasResults* covers measured results for intra-frequency, inter-frequency and inter- RAT mobility.

***MeasResults* information element**

```
-- ASN1START


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,
        measResultCSI-RS-List-r12   MeasResultCSI-RS-List-r12   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,
            measResult-v1250            RSRQ-Range-v1250        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,
    ...
}

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
    }                                                               OPTIONAL,
    measResult                      SEQUENCE {
        rssi                        INTEGER (0..63),
        ...
    }
}

MeasResultsCDMA2000 ::=             SEQUENCE {
    preRegistrationStatusHRPD       BOOLEAN,
    measResultListCDMA2000          MeasResultListCDMA2000
}

MeasResultListCDMA2000 ::=      SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultCDMA2000

MeasResultCDMA2000 ::= SEQUENCE {
    physCellId                      PhysCellIdCDMA2000,
    cgi-Info                    CellGlobalIdCDMA2000            OPTIONAL,
    measResult                      SEQUENCE {
        pilotPnPhase                INTEGER     (0..32767)          OPTIONAL,
```

```
        pilotStrength                   INTEGER (0..63),
        ...
    }
}

MeasResultForECID-r9 ::=    SEQUENCE {
    ue-RxTxTimeDiffResult-r9            INTEGER (0..4095),
    currentSFN-r9                       BIT STRING (SIZE (10))
}

PLMN-IdentityList2 ::=          SEQUENCE (SIZE (1..5)) OF PLMN-Identity

AdditionalSI-Info-r9 ::=        SEQUENCE {
    csg-MemberStatus-r9             ENUMERATED {member}             OPTIONAL,
    csg-Identity-r9                 CSG-Identity                    OPTIONAL
}

-- ASN1STOP
```

| ***MeasResults* field descriptions** |
|---|
| ***csg-MemberStatus***<br>Indicates whether or not the UE is a member of the CSG of the neighbour cell. |
| ***currentSFN***<br>Indicates the current system frame number when receiving the UE Rx-Tx time difference measurement results from lower layer. |
| ***locationAreaCode***<br>A fixed length code identifying the location area within a PLMN, as defined in TS 23.003 [27]. |
| ***measId***<br>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***<br>Measured result of an E-UTRA cell;<br>Measured result of a UTRA cell;<br>Measured result of a GERAN cell or frequency; or<br>Measured result of a CDMA2000 cell.<br>Measured result of UE Rx–Tx time difference. |
| ***measResultCSI-RS-List***<br>Measured results of the CSI-RS resources in discovery signals measurement. |
| ***measResultListCDMA2000***<br>List of measured results for the maximum number of reported best cells for a CDMA2000 measurement identity. |
| ***measResultListEUTRA***<br>List of measured results for the maximum number of reported best cells for an E-UTRA measurement identity. |
| ***measResultListGERAN***<br>List of measured results for the maximum number of reported best cells or frequencies for a GERAN measurement identity. |
| ***measResultListUTRA***<br>List of measured results for the maximum number of reported best cells for a UTRA measurement identity. |
| ***measResultPCell***<br>Measured result of the PCell. |
| **measResultsCDMA2000**<br>Contains the CDMA2000 HRPD pre-registration status and the list of CDMA2000 measurements. |
| ***MeasResultServFreqList***<br>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***<br>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***<br>CDMA2000 Pilot Strength, the ratio of pilot power to total power in the signal bandwidth of a CDMA2000 Forward Channel. See C.S0005 [25] for CDMA2000 1xRTT and C.S0024 [26] for CDMA2000 HRPD. |
| ***plmn-IdentityList***<br>The list of PLMN Identity read from broadcast information when the multiple PLMN Identities are broadcast. |
| ***preRegistrationStatusHRPD***<br>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. |
| ***routingAreaCode***<br>The RAC identity read from broadcast information, as defined in TS 23.003 [27]. |
| ***rsrpResult***<br>Measured RSRP result of an E-UTRA cell.<br>The rsrpResult is only reported if configured by the eNB. |
| ***rsrqResult***<br>Measured RSRQ result of an E-UTRA cell.<br>The rsrqResult is only reported if configured by the eNB. |
| ***rssi***<br>GERAN Carrier RSSI. RXLEV is mapped to a value between 0 and 63, TS 45.008 [28]. When mapping the RXLEV value to the RSSI bit string, the first/leftmost bit of the bit string contains the most significant bit. |
| ***ue-RxTxTimeDiffResult***<br>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***<br>According to CPICH_Ec/No in TS 25.133 [29] for FDD. Fourteen spare values. The field is not present for TDD. |
| ***utra-RSCP***<br>According to CPICH_RSCP in TS 25.133 [29] for FDD and P-CCPCH_RSCP in TS 25.123 [30] for TDD. Thirty-one spare values. |

### – MeasScaleFactor

The IE *MeasScaleFactor* specifies the factor for scaling the measurement performance requirements in TS 36.133 [16].

**_MeasScaleFactor_ information element**

```
-- ASN1START

MeasScaleFactor-r12 ::=          ENUMERATED {sf-EUTRA-cf1, sf-EUTRA-cf2}

-- ASN1STOP
```

NOTE: If the *reducedMeasPerformance* is not included in any *measObjectEUTRA* or *measObjectUTRA* and the *measScaleFactor* is included in the *measConfig*, E-UTRAN can configure any of the values for the *measScaleFactor* as specified in TS 36.133 [16].

### – QuantityConfig

The IE *QuantityConfig* specifies the measurement quantities and layer 3 filtering coefficients for E-UTRA and inter-RAT measurements.

**_QuantityConfig_ information element**

```
-- ASN1START

QuantityConfig ::=                SEQUENCE {
    quantityConfigEUTRA               QuantityConfigEUTRA               OPTIONAL,  -- Need ON
    quantityConfigUTRA                QuantityConfigUTRA                OPTIONAL,  -- Need ON
    quantityConfigGERAN               QuantityConfigGERAN               OPTIONAL,  -- Need ON
    quantityConfigCDMA2000            QuantityConfigCDMA2000            OPTIONAL,  -- Need ON
    ...,
    [[  quantityConfigUTRA-v1020      QuantityConfigUTRA-v1020          OPTIONAL   -- Need ON
    ]],
    [[  quantityConfigEUTRA-v1250     QuantityConfigEUTRA-v1250         OPTIONAL   -- Need ON
    ]]
}

QuantityConfigEUTRA ::=           SEQUENCE {
    filterCoefficientRSRP             FilterCoefficient             DEFAULT fc4,
    filterCoefficientRSRQ             FilterCoefficient             DEFAULT fc4
```

```
}

QuantityConfigEUTRA-v1250 ::=      SEQUENCE {
                                                                    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}
}

-- ASN1STOP
```

| ***QuantityConfig* field descriptions** |
|---|
| ***filterCoefficient2-FDD***<br>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***<br>Specifies the filtering coefficient used for CSI-RSRP. |
| ***filterCoefficientRSRP***<br>Specifies the filtering coefficient used for RSRP. |
| ***filterCoefficientRSRQ***<br>Specifies the filtering coefficient used for RSRQ. |
| ***measQuantityCDMA2000***<br>Measurement quantity used for CDMA2000 measurements. *pilotPnPhaseAndPilotStrength* is only applicable for *MeasObjectCDMA2000* of *cdma2000-Type* = *type1XRTT*. |
| ***measQuantityGERAN***<br>Measurement quantity used for GERAN measurements. |
| ***measQuantityUTRA***<br>Measurement quantity used for UTRA measurements. |
| ***quantityConfigCDMA2000***<br>Specifies quantity configurations for CDMA2000 measurements. |
| ***quantityConfigEUTRA***<br>Specifies filter configurations for E-UTRA measurements. |
| ***quantityConfigGERAN***<br>Specifies quantity and filter configurations for GERAN measurements. |
| ***quantityConfigUTRA***<br>Specifies quantity and filter configurations for UTRA measurements. Field *quantityConfigUTRA-v1020* is applicable only when reportQuantityUTRA-FDD is configured. |

## – ReportConfigEUTRA

The IE *ReportConfigEUTRA* specifies criteria for triggering of an E-UTRA measurement reporting event. The E-UTRA measurement reporting events concerning CRS are labelled A*N* with *N* equal to 1, 2 and so on.

Event A1: Serving becomes better than absolute threshold;

Event A2: Serving becomes worse than absolute threshold;

Event A3: Neighbour becomes amount of offset better than PCell/ PSCell;

Event A4: Neighbour becomes better than absolute threshold;

Event A5: PCell/ PSCell becomes worse than absolute threshold1 AND Neighbour becomes better than another absolute threshold2.

Event A6: Neighbour becomes amount of offset better than SCell.

The E-UTRA measurement reporting events concerning CSI-RS are labelled C*N* with *N* equal to 1 and 2.

Event C1: CSI-RS resource becomes better than absolute threshold;

Event C2: CSI-RS resource becomes amount of offset better than reference CSI-RS resource.

***ReportConfigEUTRA* information element**

```
-- ASN1START


ReportConfigEUTRA ::=           SEQUENCE {
    triggerType                 CHOICE {
        event                   SEQUENCE {
            eventId                     CHOICE {
                eventA1                     SEQUENCE {
```

```
            a1-Threshold                ThresholdEUTRA
        },
        eventA2                         SEQUENCE {
            a2-Threshold                ThresholdEUTRA
        },
        eventA3                         SEQUENCE {
            a3-Offset                   INTEGER (-30..30),
            reportOnLeave                   BOOLEAN
        },
        eventA4                         SEQUENCE {
            a4-Threshold                ThresholdEUTRA
        },
        eventA5                         SEQUENCE {
            a5-Threshold1                   ThresholdEUTRA,
            a5-Threshold2                   ThresholdEUTRA
        },
        ...,
        eventA6-r10                     SEQUENCE {
            a6-Offset-r10               INTEGER (-30..30),
            a6-ReportOnLeave-r10            BOOLEAN
        },
        eventC1-r12                     SEQUENCE {
            c1-Threshold-r12            ThresholdEUTRA-v1250,
            c1-ReportOnLeave-r12            BOOLEAN
        },
        eventC2-r12                     SEQUENCE {
            c2-RefCSI-RS-r12                MeasCSI-RS-Id-r12,
            c2-Offset-r12               INTEGER (-30..30),
            c2-ReportOnLeave-r12            BOOLEAN
        }
    },
    hysteresis                  Hysteresis,
    timeToTrigger                   TimeToTrigger
},
periodical                      SEQUENCE {
```

```
            purpose                             ENUMERATED {
                                                reportStrongestCells, reportCGI}
        }
    },
    triggerQuantity             ENUMERATED {rsrp, rsrq},
    reportQuantity              ENUMERATED {sameAsTriggerQuantity, both},
    maxReportCells              INTEGER (1..maxCellReport),
    reportInterval              ReportInterval,
    reportAmount                ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    ...,
    [[  si-RequestForHO-r9              ENUMERATED {setup}      OPTIONAL,  -- Cond reportCGI
        ue-RxTxTimeDiffPeriodical-r9    ENUMERATED {setup}      OPTIONAL   -- Need OR
    ]],
    [[  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

-- ASN1STOP
```

| ***ReportConfigEUTRA* field descriptions** |
|---|
| ***a3-Offset/ a6-Offset/ c2-Offset***<br>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***<br>Indicates the time to trigger applicable for cells specified in *altTTT-CellsToAddModList* of the associated measurement object, if configured |
| ***aN-ThresholdM/ cN-ThresholdM***<br>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***<br>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***<br>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***<br>Choice of E-UTRA event triggered reporting criteria. EUTRAN may set this field to *eventC1* or *eventC2* only if *measDS-Config* is configured in the associated *measObject* with one or more CSI-RS resources. |
| ***maxReportCells***<br>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***<br>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***<br>Inidicates that UE shall include rsrp, rsrq together with csi-rsrp in the measurement report, if possible. |
| ***reportOnLeave/ a6-ReportOnLeave***<br>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***<br>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***<br>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***<br>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***<br>For RSRP: RSRP based threshold for event evaluation. The actual value is IE value – 140 dBm.<br>For RSRQ: RSRQ based threshold for event evaluation. The actual value is (IE value – 40)/2 dB.<br>For CSI-RSRP: CSI-RSRP based threshold for event evaluation. The actual value is IE value – 140 dBm.<br>EUTRAN configures the same threshold quantity for all the thresholds of an event. |
| ***timeToTrigger***<br>Time during which specific criteria for the event needs to be met in order to trigger a measurement report. |
| ***triggerQuantity***<br>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***<br>The quantity used to evaluate the triggering condition for the event concerning CSI-RS***.*** The value *csi-RSRP* 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***<br>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***<br>If this field is set to *TRUE* the UE shall use the PSCell instead of the PCell. E-UTRAN configures value *TRUE* only *TRU* events A3 and A5, see 5.5.4.4 and 5.5.4.6. |
| ***useT312***<br>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*. |

| 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. |

## – 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 x 10 log 10 $E_c/I_o$] in units of 0.5dB, see C.S0005 [25] for details.

***ReportConfigInterRAT* information element**

```
-- ASN1START

ReportConfigInterRAT ::=          SEQUENCE {
    triggerType                       CHOICE {
        event                         SEQUENCE {
            eventId                           CHOICE {
                eventB1                       SEQUENCE {
                    b1-Threshold              CHOICE {
                        b1-ThresholdUTRA              ThresholdUTRA,
                        b1-ThresholdGERAN             ThresholdGERAN,
                        b1-ThresholdCDMA2000          ThresholdCDMA2000
                    }
                },
```

```
            eventB2                         SEQUENCE {
                b2-Threshold1                   ThresholdEUTRA,
                b2-Threshold2                   CHOICE {
                    b2-Threshold2UTRA               ThresholdUTRA,
                    b2-Threshold2GERAN              ThresholdGERAN,
                    b2-Threshold2CDMA2000           ThresholdCDMA2000
                }
            },
            ...
        },
        hysteresis                  Hysteresis,
        timeToTrigger               TimeToTrigger
    },
    periodical                      SEQUENCE {
        purpose                         ENUMERATED {
                                        reportStrongestCells,
                                        reportStrongestCellsForSON,
                                        reportCGI}
    }
},
maxReportCells                  INTEGER (1..maxCellReport),
reportInterval                  ReportInterval,
reportAmount                    ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
...,
[[  si-RequestForHO-r9              ENUMERATED {setup}      OPTIONAL   -- Cond reportCGI
]],
[[  reportQuantityUTRA-FDD-r10      ENUMERATED {both}       OPTIONAL   -- Need OR
]],
[[  includeLocationInfo-r11         BOOLEAN                 OPTIONAL   -- Need ON
]],
[[  b2-Threshold1-v1250             CHOICE {
        release                     NULL,
        setup                       RSRQ-Range-v1250
    }                                                       OPTIONAL   -- Need ON
]]
```

```
}

ThresholdUTRA ::=               CHOICE{
    utra-RSCP                       INTEGER (-5..91),
    utra-EcN0                   INTEGER (0..49)
}

ThresholdGERAN ::=              INTEGER (0..63)

ThresholdCDMA2000 ::=           INTEGER (0..63)

-- ASN1STOP
```

| ***ReportConfigInterRAT* field descriptions** |
|---|
| ***bN-ThresholdM***<br>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***<br>Choice of inter-RAT event triggered reporting criteria. |
| ***maxReportCells***<br>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***<br>reportStrongestCellsForSON applies only in case *reportConfig* is linked to a *measObject* set to *measObjectUTRA* or *measObjectCDMA2000*. |
| ***reportAmount***<br>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***<br>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***<br>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***<br>The actual value is IE value – 110 dBm. |
| ***ThresholdUTRA***<br>*utra-RSCP* corresponds to CPICH_RSCP in TS 25.133 [29] for FDD and P-CCPCH_RSCP in TS 25.123 [30] for TDD.<br>*utra-EcN0* corresponds to CPICH_Ec/No in TS 25.133 [29] for FDD, and is not applicable for TDD.<br>For *utra-RSCP*: The actual value is IE value – 115 dBm.<br>For *utra-EcN0*: The actual value is (IE value – 49)/2 dB. |
| ***timeToTrigger***<br>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**

```
-- ASN1START

ReportConfigToAddModList ::=        SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigToAddMod

ReportConfigToAddMod ::=    SEQUENCE {
    reportConfigId                  ReportConfigId,
    reportConfig                CHOICE {
        reportConfigEUTRA               ReportConfigEUTRA,
        reportConfigInterRAT            ReportConfigInterRAT
    }
}


-- ASN1STOP
```

### – ReportInterval

The *ReportInterval* indicates the interval between periodical reports. The *ReportInterval* is applicable if the UE performs periodical reporting (i.e. when *reportAmount* exceeds 1), for *triggerType event* as well as for *triggerType periodical*. Value ms120 corresponds with 120 ms, ms240 corresponds with 240 ms and so on, while value min1 corresponds with 1 min, min6 corresponds with 6 min and so on.

***ReportInterval* information element**

```
-- ASN1START

ReportInterval ::=              ENUMERATED {
                                ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240,
                                min1, min6, min12, min30, min60, spare3, spare2, spare1}


-- ASN1STOP
```

### – RSRP-Range

The IE *RSRP-Range* specifies the value range used in RSRP measurements and thresholds. Integer value for RSRP measurements according to mapping table in TS 36.133 [16].

***RSRP-Range* information element**

```
-- ASN1START
```

```
RSRP-Range ::=                  INTEGER(0..97)

RSRP-RangeSL-r12 ::=            INTEGER(0..13)

RSRP-RangeSL2-r12 ::=               INTEGER(0..7)

RSRP-RangeSL3-r12 ::=               INTEGER(0..11)

-- ASN1STOP
```

| ***RSRP-Range* field descriptions** |
|---|
| ***RSRP-RangeSL***<br>Value 0 corresponds to -infinity, value 1 to -115dBm, value 2 to -110dBm, and so on (i.e. in steps of 5dBm) until value 12, which corresponds to -60dBm, while value 13 corresponds to +infinity. |
| ***RSRP-RangeSL2***<br>Value 0 corresponds to -infinity, value 1 to -110dBm, value 2 to -100dBm, and so on (i.e. in steps of 10dBm) until value 6, which corresponds to -60dBm, while value 7 corresponds to +infinity. |
| ***RSRP-RangeSL3***<br>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. |

## – RSRQ-Range

The IE *RSRQ-Range* specifies the value range used in RSRQ measurements and thresholds. Integer value for RSRQ measurements according to mapping table in TS 36.133 [16]. A given field using *RSRQ-Range-v1250* shall only be signalled if the corresponding original field (using *RSRQ-Range* i.e. without suffix) is set to value 0 or 34. If a field using *RSRQ-Range-v1250* is signalled, the value indicated by the *RSRQ-Range-v1250* shall be used and the value signalled by *RSRQ-Range* (without the suffix) shall be ignored.

### ***RSRQ-Range* information element**

```
-- ASN1START

RSRQ-Range ::=                  INTEGER(0..34)

RSRQ-Range-v1250 ::=            INTEGER(-30..46)



-- ASN1STOP
```

## – RSRQ-Type

The IE *RSRQ-Type* specifies the RSRQ value type used in RSRQ measurements, see TS 36.214 [48].

**_RSRQ-Type_ information element**

```
-- ASN1START

RSRQ-Type-r12 ::=               SEQUENCE {
    allSymbols-r12                      BOOLEAN,
    wideBand-r12                        BOOLEAN
}

-- ASN1STOP
```

| **_RSRQ-Type_ field descriptions** |
|---|
| ***allSymbols*** <br> Value TRUE indicates use of all OFDM symbols when performing RSRQ measurements. |
| ***wideBand*** <br> Value TRUE indicates use of a wider bandwidth when performing RSRQ measurements. |

## – TimeToTrigger

The IE *TimeToTrigger* specifies the value range used for time to trigger parameter, which concerns the time during which specific criteria for the event needs to be met in order to trigger a measurement report. Value ms0 corresponds to 0 ms, ms40 corresponds to 40 ms, and so on.

**_TimeToTrigger_ information element**

```
-- ASN1START

TimeToTrigger ::=               ENUMERATED {
                                ms0, ms40, ms64, ms80, ms100, ms128, ms160, ms256,
                                ms320, ms480, ms512, ms640, ms1024, ms1280, ms2560,
                                ms5120}

-- ASN1STOP
```

## 6.3.6 Other information elements

### – AbsoluteTimeInfo

The IE *AbsoluteTimeInfo* indicates an absolute time in a format YY-MM-DD HH:MM:SS and using BCD encoding. The first/ leftmost bit of the bit string contains the most significant bit of the most significant digit of the year and so on.

***AbsoluteTimeInfo* information element**

```
-- ASN1START

AbsoluteTimeInfo-r10 ::=                BIT STRING (SIZE (48))

-- ASN1STOP
```

### – AreaConfiguration

The *AreaConfiguration* indicates area for which UE is requested to perform measurement logging. If not configured, measurement logging is not restricted to specific cells or tracking areas but applies as long as the RPLMN is contained in *plmn-IdentityList* stored in *VarLogMeasReport*.

***AreaConfiguration* information element**

```
-- ASN1START

AreaConfiguration-r10 ::=   CHOICE {
    cellGlobalIdList-r10            CellGlobalIdList-r10,
    trackingAreaCodeList-r10        TrackingAreaCodeList-r10
}

AreaConfiguration-v1130 ::=         SEQUENCE {
    trackingAreaCodeList-v1130          TrackingAreaCodeList-v1130
}

CellGlobalIdList-r10 ::=                SEQUENCE (SIZE (1..32)) OF CellGlobalIdEUTRA

TrackingAreaCodeList-r10 ::=            SEQUENCE (SIZE (1..8)) OF TrackingAreaCode

TrackingAreaCodeList-v1130 ::=   SEQUENCE {
    plmn-Identity-perTAC-List-r11           SEQUENCE (SIZE (1..8)) OF PLMN-Identity
}
```

```
-- ASN1STOP
```

| ***AreaConfiguration* field descriptions** |
|---|
| ***plmn-Identity-perTAC-List*** |
| Includes the PLMN identity for each of the TA codes included in *trackingAreaCodeList*. The PLMN identity listed first in *plmn-Identity-perTAC-List* corresponds with the TA code listed first in *trackingAreaCodeList* and so on. |

## – C-RNTI

The IE *C-RNTI* identifies a UE having a RRC connection within a cell.

**_C-RNTI_ information element**

```
-- ASN1START

C-RNTI ::=                          BIT STRING (SIZE (16))

-- ASN1STOP
```

## – DedicatedInfoCDMA2000

The *DedicatedInfoCDMA200*0 is used to transfer UE specific CDMA2000 information between the network and the UE. The RRC layer is transparent for this information.

**DedicatedInfoCDMA2000 information element**

```
-- ASN1START

DedicatedInfoCDMA2000 ::=           OCTET STRING

-- ASN1STOP
```

## – DedicatedInfoNAS

The IE *DedicatedInfoNAS* is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for this information.

**_DedicatedInfoNAS_ information element**

```
-- ASN1START

DedicatedInfoNAS ::=        OCTET STRING

-- ASN1STOP
```

### – FilterCoefficient

The IE *FilterCoefficient* specifies the measurement filtering coefficient. Value *fc0* corresponds to k = 0, *fc1* corresponds to k = 1, and so on.

***FilterCoefficient* information element**

```
-- ASN1START

FilterCoefficient ::=           ENUMERATED {
                                    fc0, fc1, fc2, fc3, fc4, fc5,
                                    fc6, fc7, fc8, fc9, fc11, fc13,
                                    fc15, fc17, fc19, spare1, ...}

-- ASN1STOP
```

### – LoggingDuration

The *LoggingDuration* indicates the duration for which UE is requested to perform measurement logging. Value min10 corresponds to 10 minutes, value min20 corresponds to 20 minutes and so on.

***LoggingDuration* information element**

```
-- ASN1START

LoggingDuration-r10 ::=         ENUMERATED {
                                min10, min20, min40, min60, min90, min120, spare2, spare1}

-- ASN1STOP
```

### – LoggingInterval

The *LoggingInterval* indicates the periodicity for logging measurement results. Value ms1280 corresponds to 1.28s, value ms2560 corresponds to 2.56s and so on.

***LoggingInterval* information element**

```
-- ASN1START

LoggingInterval-r10 ::=         ENUMERATED {
                                ms1280, ms2560, ms5120, ms10240, ms20480,
                                ms30720, ms40960, ms61440}

-- ASN1STOP
```

### – 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**

```
-- ASN1START

MeasSubframePattern-r10 ::= CHOICE {
    subframePatternFDD-r10              BIT STRING (SIZE (40)),
    subframePatternTDD-r10              CHOICE {
        subframeConfig1-5-r10               BIT STRING (SIZE (20)),
        subframeConfig0-r10                 BIT STRING (SIZE (70)),
        subframeConfig6-r10                 BIT STRING (SIZE (60)),
        ...
    },
    ...
}

-- ASN1STOP
```

### – MMEC

The IE *MMEC* identifies an MME within the scope of an MME Group within a PLMN, see TS 23.003 [27].

***MMEC* information element**

```
-- ASN1START

MMEC ::=                            BIT STRING (SIZE (8))

-- ASN1STOP
```

### – NeighCellConfig

The IE *NeighCellConfig* is used to provide the information related to MBSFN and TDD UL/DL configuration of neighbour cells.

***NeighCellConfig* information element**

```
-- ASN1START

NeighCellConfig ::=          BIT STRING (SIZE (2))

-- ASN1STOP
```

| ***NeighCellConfig* field descriptions** |
|---|
| ***neighCellConfig*** |
| Provides information related to MBSFN and TDD UL/DL configuration of neighbour cells of this frequency<br>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<br>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<br>01: No MBSFN subframes are present in all neighbour cells<br>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<br>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
    ...
}

ObtainLocationConfig-r11 ::= SEQUENCE {
    obtainLocation-r11              ENUMERATED {setup}              OPTIONAL        -- Need OR
}

PowerPrefIndicationConfig-r11 ::= CHOICE{
    release                 NULL,
    setup                   SEQUENCE{
        powerPrefIndicationTimer-r11        ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20,
                                            s30, s60, s90, s120, s300, s600, spare3,
                                            spare2, spare1}
    }
}

ReportProximityConfig-r9 ::= SEQUENCE {
    proximityIndicationEUTRA-r9     ENUMERATED {enabled}        OPTIONAL,       -- Need OR
    proximityIndicationUTRA-r9      ENUMERATED {enabled}        OPTIONAL        -- Need OR
}

-- ASN1STOP
```

| *OtherConfig* field descriptions |
|---|
| ***autonomousDenialSubframes*** |
| Indicates the maximum number of the UL subframes for which the UE is allowed to deny any UL transmission. Value n2 corresponds to 2 subframes, n5 to 5 subframes and so on. E-UTRAN does not configure autonomous denial for frequencies on which SCG cells are configured. |
| ***autonomousDenialValidity*** |
| Indicates the validity period over which the UL autonomous denial subframes shall be counted. Value sf200 corresponds to 200 subframes, sf500 corresponds to 500 subframes and so on. |
| ***idc-Indication*** |
| The field is used to indicate whether the UE is configured to initiate transmission of the *InDeviceCoexIndication* message to the network. |
| ***obtainLocation*** |
| Requests the UE to attempt to have detailed location information available using GNSS. E-UTRAN configures the field only if *includeLocationInfo* is configured for one or more measurements. |
| ***powerPrefIndicationTimer*** |
| Prohibit timer for Power Preference Indication reporting. Value in seconds. Value s0 means prohibit timer is set to 0 second 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. |
| ***reportProximityConfig*** |
| Indicates, for each of the applicable RATs (EUTRA, UTRA), whether or not proximity indication is enabled for CSG member cell(s) of the concerned RAT. Note. |

NOTE: Enabling/ disabling of proximity indication includes enabling/ disabling of the related functionality e.g. autonomous search in connected mode.

### – RAND-CDMA2000 (1xRTT)

The *RAND-CDMA200*0 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**

```
-- ASN1START

RRC-TransactionIdentifier ::=       INTEGER (0..3)

-- ASN1STOP
```

### – S-TMSI

The IE *S-TMSI* contains an S-Temporary Mobile Subscriber Identity, a temporary UE identity provided by the EPC which uniquely identifies the UE within the tracking area, see TS 23.003 [27].

***S-TMSI* information element**

```
-- ASN1START

S-TMSI ::=                      SEQUENCE {
    mmec                        MMEC,
    m-TMSI                          BIT STRING (SIZE (32))
}

-- ASN1STOP
```

| ***S-TMSI* field descriptions** |
|---|
| ***m-TMSI*** <br> 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**

```
-- ASN1START

TraceReference-r10 ::=          SEQUENCE {
    plmn-Identity-r10               PLMN-Identity,
```

```
    traceId-r10                 OCTET STRING (SIZE (3))

}


-- ASN1STOP
```

## – 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**

```
-- ASN1START


UE-CapabilityRAT-ContainerList ::=SEQUENCE (SIZE (0..maxRAT-Capabilities)) OF UE-CapabilityRAT-Container


UE-CapabilityRAT-Container ::= SEQUENCE {
    rat-Type                    RAT-Type,
    ueCapabilityRAT-Container       OCTET STRING
}


-- ASN1STOP
```

| ***UECapabilityRAT-ContainerList* field descriptions** |
|---|
| ***ueCapabilityRAT-Container*** |
| Container for the UE capabilities of the indicated RAT. The encoding is defined in the specification of each RAT:<br>For E-UTRA: the encoding of UE capabilities is defined in IE *UE-EUTRA-Capability*.<br>For UTRA: the octet string contains the INTER RAT HANDOVER INFO message defined in TS 25.331 [19].<br>For GERAN CS: the octet string contains the concatenated string of the Mobile Station Classmark 2 and Mobile Station Classmark 3. The first 5 octets correspond to Mobile Station Classmark 2 and the following octets correspond to Mobile Station Classmark 3. The Mobile Station Classmark 2 is formatted as 'TLV' and is coded in the same way as the *Mobile Station Classmark 2* information element in TS 24.008 [49]. The first octet is the *Mobile station classmark 2 IEI* and its value shall be set to 33H. The second octet is the *Length of mobile station classmark 2* and its value shall be set to 3. The octet 3 contains the first octet of the value part of the *Mobile Station Classmark 2* information element, the octet 4 contains the second octet of the value part of the *Mobile Station Classmark 2* information element and so on. For each of these octets, the first/ leftmost/ most significant bit of the octet contains b8 of the corresponding octet of the Mobile Station Classmark 2. The Mobile Station Classmark 3 is formatted as 'V' and is coded in the same way as the value part in the *Mobile station classmark 3* information element in TS 24.008 [49]. The sixth octet of this octet string contains octet 1 of the value part of *Mobile station classmark 3*, the seventh of octet of this octet string contains octet 2 of the value part of *Mobile station classmark 3* and so on. Note.<br>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].<br>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**

```
-- ASN1START

UE-EUTRA-Capability ::=          SEQUENCE {
    accessStratumRelease             AccessStratumRelease,
    ue-Category                      INTEGER (1..5),
    pdcp-Parameters                  PDCP-Parameters,
    phyLayerParameters               PhyLayerParameters,
    rf-Parameters                RF-Parameters,
    measParameters                   MeasParameters,
    featureGroupIndicators           BIT STRING (SIZE (32))              OPTIONAL,
    interRAT-Parameters              SEQUENCE {
        utraFDD                          IRAT-ParametersUTRA-FDD             OPTIONAL,
        utraTDD128                       IRAT-ParametersUTRA-TDD128              OPTIONAL,
        utraTDD384                       IRAT-ParametersUTRA-TDD384              OPTIONAL,
        utraTDD768                       IRAT-ParametersUTRA-TDD768              OPTIONAL,
        geran                        IRAT-ParametersGERAN                OPTIONAL,
        cdma2000-HRPD                    IRAT-ParametersCDMA2000-HRPD        OPTIONAL,
        cdma2000-1xRTT                   IRAT-ParametersCDMA2000-1XRTT       OPTIONAL
    },
    nonCriticalExtension         UE-EUTRA-Capability-v920-IEs       OPTIONAL
}

-- Late non critical extensions
UE-EUTRA-Capability-v9a0-IEs ::=   SEQUENCE {
    featureGroupIndRel9Add-r9            BIT STRING (SIZE (32))              OPTIONAL,
    fdd-Add-UE-EUTRA-Capabilities-r9  UE-EUTRA-CapabilityAddXDD-Mode-r9    OPTIONAL,
    tdd-Add-UE-EUTRA-Capabilities-r9  UE-EUTRA-CapabilityAddXDD-Mode-r9    OPTIONAL,
    nonCriticalExtension             UE-EUTRA-Capability-v9c0-IEs       OPTIONAL
}
```

```
UE-EUTRA-Capability-v9c0-IEs ::=        SEQUENCE {
    interRAT-ParametersUTRA-v9c0        IRAT-ParametersUTRA-v9c0        OPTIONAL,
    nonCriticalExtension                UE-EUTRA-Capability-v9d0-IEs    OPTIONAL
}

UE-EUTRA-Capability-v9d0-IEs ::=        SEQUENCE {
    phyLayerParameters-v9d0             PhyLayerParameters-v9d0         OPTIONAL,
    nonCriticalExtension                UE-EUTRA-Capability-v9e0-IEs    OPTIONAL
}

UE-EUTRA-Capability-v9e0-IEs ::=    SEQUENCE {
    rf-Parameters-v9e0                  RF-Parameters-v9e0              OPTIONAL,
    nonCriticalExtension                UE-EUTRA-Capability-v9h0-IEs    OPTIONAL
}

UE-EUTRA-Capability-v9h0-IEs ::=    SEQUENCE {
    interRAT-ParametersUTRA-v9h0        IRAT-ParametersUTRA-v9h0        OPTIONAL,
    -- Following field is only to be used for late REL-9 extensions
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,
    nonCriticalExtension                UE-EUTRA-Capability-v10c0-IEs    OPTIONAL
}

UE-EUTRA-Capability-v10c0-IEs ::= SEQUENCE {
    otdoa-PositioningCapabilities-r10   OTDOA-PositioningCapabilities-r10   OPTIONAL,
    nonCriticalExtension                UE-EUTRA-Capability-v10f0-IEs    OPTIONAL
}

UE-EUTRA-Capability-v10f0-IEs ::= SEQUENCE {
    rf-Parameters-v10f0                 RF-Parameters-v10f0             OPTIONAL,
    -- Following field is only to be used for late REL-10 extensions
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}

-- Regular non critical extensions
UE-EUTRA-Capability-v920-IEs ::=        SEQUENCE {
```

```
    phyLayerParameters-v920             PhyLayerParameters-v920,
    interRAT-ParametersGERAN-v920       IRAT-ParametersGERAN-v920,
    interRAT-ParametersUTRA-v920        IRAT-ParametersUTRA-v920        OPTIONAL,
    interRAT-ParametersCDMA2000-v920    IRAT-ParametersCDMA2000-1XRTT-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,
    nonCriticalExtension            UE-EUTRA-Capability-v1020-IEs   OPTIONAL
}

UE-EUTRA-Capability-v1020-IEs ::= SEQUENCE {
    ue-Category-v1020               INTEGER (6..8)                  OPTIONAL,
    phyLayerParameters-v1020        PhyLayerParameters-v1020        OPTIONAL,
    rf-Parameters-v1020             RF-Parameters-v1020             OPTIONAL,
    measParameters-v1020            MeasParameters-v1020            OPTIONAL,
    featureGroupIndRel10-r10        BIT STRING (SIZE (32))          OPTIONAL,
    interRAT-ParametersCDMA2000-v1020  IRAT-ParametersCDMA2000-1XRTT-v1020  OPTIONAL,
    ue-BasedNetwPerfMeasParameters-r10  UE-BasedNetwPerfMeasParameters-r10  OPTIONAL,
    interRAT-ParametersUTRA-TDD-v1020  IRAT-ParametersUTRA-TDD-v1020    OPTIONAL,
    nonCriticalExtension            UE-EUTRA-Capability-v1060-IEs   OPTIONAL
}

UE-EUTRA-Capability-v1060-IEs ::= SEQUENCE {
    fdd-Add-UE-EUTRA-Capabilities-v1060 UE-EUTRA-CapabilityAddXDD-Mode-v1060  OPTIONAL,
    tdd-Add-UE-EUTRA-Capabilities-v1060 UE-EUTRA-CapabilityAddXDD-Mode-v1060  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,
    measParameters-v1130                MeasParameters-v1130,
    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,
    mbms-Parameters-r11                 MBMS-Parameters-r11                 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-BasedNetwPerfMeasParameters-v1250UE-BasedNetwPerfMeasParameters-v1250  OPTIONAL,
    ue-CategoryDL-r12               INTEGER (0..14)                     OPTIONAL,
    ue-CategoryUL-r12               INTEGER (0..13)                     OPTIONAL,
    wlan-IW-Parameters-r12              WLAN-IW-Parameters-r12              OPTIONAL,
    measParameters-v1250            MeasParameters-v1250                OPTIONAL,
    dc-Parameters-r12               DC-Parameters-r12                   OPTIONAL,
    mbms-Parameters-v1250               MBMS-Parameters-v1250               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            SEQUENCE {}                         OPTIONAL
}

UE-EUTRA-CapabilityAddXDD-Mode-r9 ::=   SEQUENCE {
    phyLayerParameters-r9           PhyLayerParameters              OPTIONAL,
    featureGroupIndicators-r9       BIT STRING (SIZE (32))          OPTIONAL,
    featureGroupIndRel9Add-r9           BIT STRING (SIZE (32))          OPTIONAL,
    interRAT-ParametersGERAN-r9             IRAT-ParametersGERAN            OPTIONAL,
    interRAT-ParametersUTRA-r9          IRAT-ParametersUTRA-v920        OPTIONAL,
    interRAT-ParametersCDMA2000-r9      IRAT-ParametersCDMA2000-1XRTT-v920  OPTIONAL,
    neighCellSI-AcquisitionParameters-r9 NeighCellSI-AcquisitionParameters-r9OPTIONAL,
    ...
}

UE-EUTRA-CapabilityAddXDD-Mode-v1060 ::=    SEQUENCE {
    phyLayerParameters-v1060        PhyLayerParameters-v1020        OPTIONAL,
    featureGroupIndRel10-v1060          BIT STRING (SIZE (32))          OPTIONAL,
```

```
    interRAT-ParametersCDMA2000-v1060  IRAT-ParametersCDMA2000-1XRTT-v1020 OPTIONAL,
    interRAT-ParametersUTRA-TDD-v1060  IRAT-ParametersUTRA-TDD-v1020      OPTIONAL,
    ...,
    [[   otdoa-PositioningCapabilities-r10  OTDOA-PositioningCapabilities-r10  OPTIONAL
    ]]
}

UE-EUTRA-CapabilityAddXDD-Mode-v1130 ::=    SEQUENCE {
    phyLayerParameters-v1130        PhyLayerParameters-v1130        OPTIONAL,
    measParameters-v1130            MeasParameters-v1130            OPTIONAL,
    otherParameters-r11             Other-Parameters-r11            OPTIONAL,
    ...
}

UE-EUTRA-CapabilityAddXDD-Mode-v1180 ::=    SEQUENCE {
    mbms-Parameters-r11                 MBMS-Parameters-r11
}

UE-EUTRA-CapabilityAddXDD-Mode-v1250 ::=    SEQUENCE {
    phyLayerParameters-v1250        PhyLayerParameters-v1250        OPTIONAL,
    measParameters-v1250            MeasParameters-v1250            OPTIONAL
}

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,
        profile0x0101                   BOOLEAN,
        profile0x0102                   BOOLEAN,
        profile0x0103                   BOOLEAN,
        profile0x0104                   BOOLEAN
    },
    maxNumberROHC-ContextSessions       ENUMERATED {
                                        cs2, cs4, cs8, cs12, cs16, cs24, cs32,
                                        cs48, cs64, cs128, cs256, cs512, cs1024,
                                        cs16384, spare2, spare1}            DEFAULT cs16,
    ...
}

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,
    enhancedDualLayerTDD-r9         ENUMERATED {supported}          OPTIONAL
}

PhyLayerParameters-v9d0 ::=         SEQUENCE {
    tm5-FDD-r9                  ENUMERATED {supported}          OPTIONAL,
    tm5-TDD-r9                  ENUMERATED {supported}          OPTIONAL
}

PhyLayerParameters-v1020 ::=        SEQUENCE {
    twoAntennaPortsForPUCCH-r10             ENUMERATED {supported}                  OPTIONAL,
    tm9-With-8Tx-FDD-r10                ENUMERATED {supported}                  OPTIONAL,
    pmi-Disabling-r10                   ENUMERATED {supported}                  OPTIONAL,
    crossCarrierScheduling-r10          ENUMERATED {supported}                  OPTIONAL,
    simultaneousPUCCH-PUSCH-r10             ENUMERATED {supported}                  OPTIONAL,
    multiClusterPUSCH-WithinCC-r10          ENUMERATED {supported}                  OPTIONAL,
    nonContiguousUL-RA-WithinCC-List-r10    NonContiguousUL-RA-WithinCC-List-r10    OPTIONAL
}

PhyLayerParameters-v1130 ::=        SEQUENCE {
    crs-InterfHandl-r11                 ENUMERATED {supported}                  OPTIONAL,
    ePDCCH-r11                          ENUMERATED {supported}                  OPTIONAL,
    multiACK-CSI-Reporting-r11              ENUMERATED {supported}                  OPTIONAL,
    ss-CCH-InterfHandl-r11              ENUMERATED {supported}                  OPTIONAL,
    tdd-SpecialSubframe-r11                 ENUMERATED {supported}                  OPTIONAL,
    txDiv-PUCCH1b-ChSelect-r11              ENUMERATED {supported}                  OPTIONAL,
    ul-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,
    enhanced-4TxCodebook-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
}


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-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-v1250 ::=                 SEQUENCE {
                                            supportedBandListEUTRA-v1250
                                            SupportedBandListEUTRA-v1250    OPTIONAL,
    supportedBandCombination-v1250      SupportedBandCombination-v1250          OPTIONAL,
    supportedBandCombinationAdd-v1250       SupportedBandCombinationAdd-v1250       OPTIONAL,
    freqBandPriorityAdjustment-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-v1130 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1130


SupportedBandCombination-v1250 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1250


SupportedBandCombinationAdd-r11 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-r11


SupportedBandCombinationAdd-v1250 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1250


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-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
    }                                                                   OPTIONAL,
    supportedNAICS-2CRS-AP-r12      BIT STRING (SIZE (1..maxNAICS-Entries-r12))     OPTIONAL,
    commSupportedBandsPerBC-r12             BIT STRING (SIZE (1.. maxBands))    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-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
}

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-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 {
    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 {
    rsrqMeasWideband-r11        ENUMERATED {supported}              OPTIONAL
}

MeasParameters-v11a0 ::=        SEQUENCE {
    benefitsFromInterruption-r11        ENUMERATED {true}           OPTIONAL
}

MeasParameters-v1250 ::=        SEQUENCE {
    timerT312-r12                   ENUMERATED {supported}      OPTIONAL,
    alternativeTimeToTrigger-r12    ENUMERATED {supported}      OPTIONAL,
    incMonEUTRA-r12                 ENUMERATED {supported}      OPTIONAL,
    incMonUTRA-r12                  ENUMERATED {supported}      OPTIONAL,
    extendedMaxMeasId-r12           ENUMERATED {supported}      OPTIONAL,
    extendedRSRQ-LowerRange-r12         ENUMERATED {supported}      OPTIONAL,
    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-v9c0 ::=      SEQUENCE {
    voiceOverPS-HS-UTRA-FDD-r9                ENUMERATED {supported}      OPTIONAL,
```

```
    voiceOverPS-HS-UTRA-TDD128-r9                ENUMERATED {supported}      OPTIONAL,
    srvcc-FromUTRA-FDD-ToUTRA-FDD-r9             ENUMERATED {supported}      OPTIONAL,
    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-v9h0 ::=        SEQUENCE {
    mfbi-UTRA-r9                    ENUMERATED {supported}
}

SupportedBandListUTRA-FDD ::=       SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-FDD

SupportedBandUTRA-FDD ::=           ENUMERATED {
                                    bandI, bandII, bandIII, bandIV, bandV, bandVI,
                                    bandVII, bandVIII, bandIX, bandX, bandXI,
                                    bandXII, bandXIII, bandXIV, bandXV, bandXVI, ...,
                                    bandXVII-8a0, bandXVIII-8a0, bandXIX-8a0, bandXX-8a0,
                                    bandXXI-8a0, bandXXII-8a0, bandXXIII-8a0, bandXXIV-8a0,
                                    bandXXV-8a0, bandXXVI-8a0, bandXXVII-8a0, bandXXVIII-8a0,
                                    bandXXIX-8a0, bandXXX-8a0, bandXXXI-8a0, bandXXXII-8a0}

IRAT-ParametersUTRA-TDD128 ::=      SEQUENCE {
    supportedBandListUTRA-TDD128        SupportedBandListUTRA-TDD128
}

SupportedBandListUTRA-TDD128 ::=    SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD128

SupportedBandUTRA-TDD128 ::=        ENUMERATED {
                                    a, b, c, d, e, f, g, h, i, j, k, l, m, n,
                                    o, p, ...}

IRAT-ParametersUTRA-TDD384 ::=      SEQUENCE {
    supportedBandListUTRA-TDD384        SupportedBandListUTRA-TDD384
}
```

```
SupportedBandListUTRA-TDD384 ::=    SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD384

SupportedBandUTRA-TDD384 ::=        ENUMERATED {
                                    a, b, c, d, e, f, g, h, i, j, k, l, m, n,
                                    o, p, ...}

IRAT-ParametersUTRA-TDD768 ::=      SEQUENCE {
    supportedBandListUTRA-TDD768        SupportedBandListUTRA-TDD768
}

SupportedBandListUTRA-TDD768 ::=    SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD768

SupportedBandUTRA-TDD768 ::=        ENUMERATED {
                                    a, b, c, d, e, f, g, h, i, j, k, l, m, n,
                                    o, p, ...}

IRAT-ParametersUTRA-TDD-v1020 ::=   SEQUENCE {
    e-RedirectionUTRA-TDD-r10           ENUMERATED {supported}
}

IRAT-ParametersGERAN ::=            SEQUENCE {
    supportedBandListGERAN              SupportedBandListGERAN,
    interRAT-PS-HO-ToGERAN              BOOLEAN
}

IRAT-ParametersGERAN-v920 ::=       SEQUENCE {
    dtm-r9                          ENUMERATED {supported}          OPTIONAL,
    e-RedirectionGERAN-r9               ENUMERATED {supported}          OPTIONAL
}

SupportedBandListGERAN ::=          SEQUENCE (SIZE (1..maxBands)) OF SupportedBandGERAN

SupportedBandGERAN ::=              ENUMERATED {
                                    gsm450, gsm480, gsm710, gsm750, gsm810, gsm850,
```

```
                                gsm900P, gsm900E, gsm900R, gsm1800, gsm1900,
                                spare5, spare4, spare3, spare2, spare1, ...}

IRAT-ParametersCDMA2000-HRPD ::=  SEQUENCE {
    supportedBandListHRPD           SupportedBandListHRPD,
    tx-ConfigHRPD                   ENUMERATED {single, dual},
    rx-ConfigHRPD                   ENUMERATED {single, dual}
}

SupportedBandListHRPD ::=           SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandclassCDMA2000

IRAT-ParametersCDMA2000-1XRTT ::= SEQUENCE {
    supportedBandList1XRTT          SupportedBandList1XRTT,
    tx-Config1XRTT                  ENUMERATED {single, dual},
    rx-Config1XRTT                  ENUMERATED {single, dual}
}

IRAT-ParametersCDMA2000-1XRTT-v920 ::=  SEQUENCE {
    e-CSFB-1XRTT-r9                 ENUMERATED {supported},
    e-CSFB-ConcPS-Mob1XRTT-r9       ENUMERATED {supported}      OPTIONAL
}

IRAT-ParametersCDMA2000-1XRTT-v1020 ::= SEQUENCE {
    e-CSFB-dual-1XRTT-r10           ENUMERATED {supported}
}

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
}

NeighCellSI-AcquisitionParameters-r9 ::=SEQUENCE {
    intraFreqSI-AcquisitionForHO-r9  ENUMERATED {supported}          OPTIONAL,
    interFreqSI-AcquisitionForHO-r9  ENUMERATED {supported}          OPTIONAL,
    utran-SI-AcquisitionForHO-r9     ENUMERATED {supported}          OPTIONAL
}

SON-Parameters-r9 ::=               SEQUENCE {
    rach-Report-r9                      ENUMERATED {supported}          OPTIONAL
}

UE-BasedNetwPerfMeasParameters-r10 ::=  SEQUENCE {
    loggedMeasurementsIdle-r10              ENUMERATED {supported}      OPTIONAL,
    standaloneGNSS-Location-r10             ENUMERATED {supported}      OPTIONAL
}

UE-BasedNetwPerfMeasParameters-v1250 ::=    SEQUENCE {
    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
}

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-SLSS-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
```

| *UE-EUTRA-Capability* field descriptions | *FDD/ TDD diff* |
|---|---|
| ***accessStratumRelease***<br>Set to rel12 in this version of the specification. | - |
| ***alternativeTimeToTrigger***<br>Indicates whether the UE supports alternativeTimeToTrigger. | No |
| ***bandCombinationListEUTRA***<br>One entry corresponding to each supported band combination listed in the same order as in *supportedBandCombination.* | - |
| ***BandCombinationParameters-v1090***<br>If included, the UE shall include the same number of entries, and listed in the same order, as in *BandCombinationParameters-r10*. | - |
| ***BandCombinationParameters-v1130***<br>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*. | - |
| ***bandEUTRA***<br>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*. | - |
| ***bandListEUTRA***<br>One entry corresponding to each supported E-UTRA band listed in the same order as in *supportedBandListEUTRA*. | - |
| ***benefitsFromInterruption***<br>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]. | No |
| ***CA-BandwidthClass***<br>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. | - |
| ***cdma2000-NW-Sharing***<br>Indicates whether the UE supports network sharing for CDMA2000. | - |
| ***commSimultaneousTx***<br>Indicates whether the UE supports simultaneous transmission of EUTRA and sidelink direct communication (on different carriers) in all bands for which the UE indicated sidelink support in a band combination (using *commSupportedBandsPerBC*). | - |
| ***commSupportedBands***<br>Indicates the bands on which the UE supports sidelink direct communication, by an independent list of bands i.e. separate from the list of supported E UTRA band, as indicated in *supportedBandListEUTRA*. | - |
| ***commSupportedBandsPerBC***<br>Indicates, for a particular band combination, the bands on which the UE supports simultaneous reception of EUTRA and sidelink direct 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 direct communication. The first bit refers to the first band included in *commSupportedBands*, with value 1 indicating sidelink is supported. | - |
| ***crossCarrierScheduling*** | Yes |
| ***crs-DiscoverySignalsMeas***<br>Indicates whether the UE supports CRS based discovery signals measurement, and PDSCH/EPDCCH RE mapping with zero power CSI-RS configured for discovery signals. | FFS |
| ***crs-InterfHandl***<br>Indicates whether the UE supports CRS interference handling. | No |
| ***csi-RS-DiscoverySignalsMeas***<br>Indicates whether the UE supports CSI-RS based discovery signals measurement. If this field is included, the UE shall also include *crs-DiscoverySignalsMeas*. | FFS |
| ***csi-SubframeSet***<br>Indicates whether the UE supports REL-12 DL CSI subframe set configuration, REL-12 DL CSI subframe set dependent CSI measurement/feedback, configuration of up to 2 CSI-IM resources for a CSI process with no more than 4 CSI-IM resources for all CSI processes of one frequency if the UE supports tm10, configuration of two ZP-CSI-RS for tm1 to tm9, PDSCH RE mapping with two ZP-CSI-RS configurations, and EPDCCH RE mapping with two ZP-CSI-RS configurations if the UE supports EPDCCH. This field is only applicable for UEs supporting TDD. | - |
| ***dc-Support*** | - |

| *UE-EUTRA-Capability* field descriptions | *FDD/ TDD diff* |
|---|---|
| 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***<br>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***<br>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*. | FFS |
| ***disc-SLSS***<br>Indicates whether the UE supports Sidelink Synchronization Signal (SLSS) transmission and reception for sidelink direct discovery. | TBD |
| ***discSupportedBands***<br>Indicates the bands on which the UE supports sidelink direct discovery. One entry corresponding to each supported E UTRA band, listed in the same order as in *supportedBandListEUTRA*. | - |
| ***discSupportedProc***<br>Indicates the number of processes supported by the UE for sidelink direct discovery. | TBD |
| ***dl-256QAM***<br>Indicates whether the UE supports 256QAM in DL on the band. | - |
| ***dtm***<br>Indicates whether the UE supports DTM in GERAN. | - |
| ***e-CSFB-1XRTT***<br>Indicates whether the UE supports enhanced CS fallback to CDMA2000 1xRTT or not. | Yes |
| ***e-CSFB-ConcPS-Mob1XRTT***<br>Indicates whether the UE supports concurrent enhanced CS fallback to CDMA2000 1xRTT and PS handover/ redirection to CDMA2000 HRPD. | Yes |
| ***e-CSFB-dual-1XRTT***<br>Indicates whether the UE supports enhanced CS fallback to CDMA2000 1xRTT for dual Rx/Tx configuration. This bit can only be set to supported if *tx-Config1XRTT* and *rx-Config1XRTT* are both set to dual. | Yes |
| ***e-HARQ-Pattern-FDD***<br>Indicates whether the UE supports enhanced HARQ pattern for TTI bundling operation for FDD. | - |
| ***Enhanced-4TxCodebook***<br>Indicates whether the UE supports enhanced 4Tx codebook. | No |
| ***enhancedDualLayerTDD***<br>Indicates whether the UE supports enhanced dual layer (PDSCH transmission mode 8) for TDD or not. | - |
| ***ePDCCH***<br>Indicates whether the UE can receive DCI on UE specific search space on Enhanced PDCCH. | Yes |
| ***e-RedirectionUTRA*** | Yes |
| ***e-RedirectionUTRA-TDD***<br>Indicates whether the UE supports enhanced redirection to UTRA TDD to multiple carrier frequencies both with and without using related SIB provided by *RRCConnectionRelease* or not. | Yes |
| ***extendedMaxMeasId***<br>Indicates whether the UE supports extended number of measurement identies as defined by *maxMeasId-r12*. | No |
| ***extended-RLC-LI-Field***<br>Indicates whether the UE supports 15 bit RLC length indicator. | - |
| ***extendedRSRQ-LowerRange***<br>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]. | No |
| ***featureGroupIndicators, featureGroupIndRel9Add, featureGroupIndRel10***<br>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 | Yes |

| ***UE-EUTRA-Capability* field descriptions** | ***FDD/ TDD diff*** |
|---|---|
| *featureGroupIndRel10*) | |
| ***freqBandPriorityAdjustment***<br>Indicates whether the UE supports the prioritization of frequency bands in *multiBandInfoList* over the band in *freqBandIndicator* as defined by *freqBandIndicatorPriority-r12*. | - |
| ***freqBandRetrieval***<br>Indicates whether the UE supports reception of *requestedFrequencyBands.* | - |
| ***halfDuplex***<br>If *halfDuplex* is set to true, only half duplex operation is supported for the band, otherwise full duplex operation is supported. | - |
| ***incMonEUTRA***<br>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]. | No |
| ***incMonUTRA***<br>Indicates whether the UE supports increased number of UTRA carrier monitoring in RRC_IDLE and RRC_CONNECTED, as specified in TS 36.133 [16]. | No |
| ***inDeviceCoexInd***<br>Indicates whether the UE supports in-device coexistence indication as well as autonomous denial functionality. | Yes |
| ***interBandTDD-CA-WithDifferentConfig***<br>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. | - |
| ***interFreqBandList***<br>One entry corresponding to each supported E-UTRA band listed in the same order as in *supportedBandListEUTRA*. | - |
| ***interFreqNeedForGaps***<br>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*. | - |
| ***interFreqProximityIndication***<br>Indicates whether the UE supports proximity indication for inter-frequency E-UTRAN CSG member cells. | - |
| ***interFreqRSTD-Measurement***<br>Indicates whether the UE supports inter-frequency RSTD measurements for OTDOA positioning [54]. | Yes |
| ***interFreqSI-AcquisitionForHO***<br>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. | Yes |
| ***interRAT-BandList***<br>One entry corresponding to each supported band of another RAT listed in the same order as in the *interRAT-Parameters*. | - |
| ***interRAT-NeedForGaps***<br>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*. | - |
| ***interRAT-PS-HO-ToGERAN***<br>Indicates whether the UE supports inter-RAT PS handover to GERAN or not. | Yes |
| ***intraFreqProximityIndication***<br>Indicates whether the UE supports proximity indication for intra-frequency E-UTRAN CSG member cells. | - |
| ***intraFreqSI-AcquisitionForHO***<br>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. | Yes |
| ***loggedMBSFNMeasurements***<br>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. | - |

| *UE-EUTRA-Capability* field descriptions | *FDD/ TDD diff* |
|---|---|
| ***loggedMeasurementsIdle***<br>Indicates whether the UE supports logged measurements in Idle mode. | - |
| ***logicalChannelSR-ProhibitTimer***<br>Indicates whether the UE supports the *logicalChannelSR-ProhibitTimer* as defined in TS 36.321 [6]. | - |
| ***longDRX-Command***<br>Indicates whether the UE supports Long DRX Command MAC Control Element. | - |
| ***maxNumberROHC-ContextSessions***<br>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*. | - |
| ***mbms-AsyncDC***<br>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*. | TBD |
| ***mbms-SCell***<br>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). | Yes |
| ***mbms-NonServingCell***<br>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. | Yes |
| ***mfbi-UTRA***<br>It indicates if the UE supports the signalling requirements of multiple radio frequency bands in a UTRA FDD cell, as defined in TS 25.307 [65]. | - |
| ***MIMO-CapabilityDL***<br>The number of supported layers for spatial multiplexing in DL. | - |
| ***MIMO-CapabilityUL***<br>The number of supported layers for spatial multiplexing in UL. Absence of the field means that the number of supported layers is 1. | - |
| ***modifiedMPR-Behavior***<br>Field encoded as a bit map, where at least one bit N is set to "1" if UE supports modified MPR/A-MPR behaviour N, see TS 36.101 [42]. All remaining bits of the field are set to '0'. The leading / leftmost bit (bit 0) corresponds to modified MPR/A-MPR behaviour 0, the next bit corresponds to modified MPR/A-MPR behaviour 1 and so on.<br>Absence of this field means that UE does not support any modified MPR/A-MPR behaviour. | - |
| ***multiACK-CSIreporting***<br>Indicates whether the UE supports multi-cell HARQ ACK and periodic CSI reporting and SR on PUCCH format 3. | Yes |
| ***multiClusterPUSCH-WithinCC*** | Yes |
| ***multipleTimingAdvance***<br>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. | - |

| *UE-EUTRA-Capability* field descriptions | *FDD/ TDD diff* |
|---|---|
| ***naics-Capability-List***<br>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 maximum 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).<br>- For *numberOfNAICS-CapableCC* = 1, UE signals one value for *numberOfAggregatedPRB* from the range {50, 75, 100};<br>- For *numberOfNAICS-CapableCC* = 2, UE signals one value for *numberOfAggregatedPRB* from the range {50, 75, 100, 125, 150, 175, 200};<br>- For *numberOfNAICS-CapableCC* = 3, UE signals one value for *numberOfAggregatedPRB* from the range {50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300};<br>- For *numberOfNAICS-CapableCC* = 4, UE signals one value for *numberOfAggregatedPRB* from the range {50, 100, 150, 200, 250, 300, 350, 400};<br>For *numberOfNAICS-CapableCC* = 5, UE signals one value for *numberOfAggregatedPRB* from the range {50, 100, 150, 200, 250, 300, 350, 400, 450, 500}. | - |
| ***NonContiguousUL-RA-WithinCC-List***<br>One entry corresponding to each supported E-UTRA band listed in the same order as in *supportedBandListEUTRA*. | No |
| ***noResourceRestrictionForTTIBundling***<br>Indicate wheter the UE supports TTI bundling operation without resource allocation restriction. | - |
| ***otdoa-UE-Assisted***<br>Indicates whether the UE supports UE-assisted OTDOA positioning [54]. | Yes |
| ***pdcp-SN-Extension***<br>Indicates whether the UE supports 15 bit length of PDCP sequence number. | - |
| ***phy-TDD-ReConfig-FDD-PCell***<br>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 second bit of *tdd-FDD-CA-PCellDuplex* is set to 1 and *phy-TDD-ReConfig-TDD-PCell* is set to supported. | - |
| ***phy-TDD-ReConfig-TDD-PCell***<br>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. | - |
| ***pmi-Disabling*** | Yes |
| ***powerPrefInd***<br>Indicates whether the UE supports power preference indication. | No |
| ***pusch-FeedbackMode***<br>Indicates whether the UE supports PUSCH feedback mode 3-2. | No |
| ***pusch-SRS-PowerControl-SubframeSet***<br>Indicates whether the UE supports subframe set dependent UL power control for PUSCH and SRS. This field is only applicable for UEs supporting TDD. | - |
| ***rach-Report***<br>Indicates whether the UE supports delivery of rachReport. | - |
| ***requestedBands***<br>Indicates the frequency bands requested by E-UTRAN. | - |
| ***rsrqMeasWideband***<br>Indicates whether the UE can perform RSRQ measurements with wider bandwidth. | Yes |
| ***rsrq-OnAllSymbols***<br>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]. | No |
| ***simultaneousPUCCH-PUSCH*** | Yes |
| ***simultaneousRx-Tx***<br>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. | - |
| ***srvcc-FromUTRA-FDD-ToGERAN***<br>Indicates whether UE supports SRVCC handover from UTRA FDD PS HS to GERAN CS. | - |
| ***srvcc-FromUTRA-FDD-ToUTRA-FDD***<br>Indicates whether UE supports SRVCC handover from UTRA FDD PS HS to UTRA FDD CS. | - |

| *UE-EUTRA-Capability* field descriptions | *FDD/ TDD diff* |
|---|---|
| ***srvcc-FromUTRA-TDD128-ToGERAN***<br>Indicates whether UE supports SRVCC handover from UTRA TDD 1.28Mcps PS HS to GERAN CS. | - |
| ***srvcc-FromUTRA-TDD128-ToUTRA-TDD128***<br>Indicates whether UE supports SRVCC handover from UTRA TDD 1.28Mcps PS HS to UTRA TDD 1.28Mcps CS. | - |
| ***ss-CCH-InterfHandl***<br>Indicates whether the UE supports synchronisation signal and common channel interference handling. | Yes |
| ***standaloneGNSS-Location***<br>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. | - |
| ***supportedBandCombination***<br>Includes the supported CA band combinations, if any, and may include all the supported non-CA bands. | - |
| ***supportedBandCombinationAdd***<br>Includes additional supported CA band combinations in case maximum number of CA band combinations of *supportedBandCombination* is exceeded. | - |
| ***SupportedBandCombinationExt, SupportedBandCombination-v1090, SupportedBandCombination-v1130***<br>If included, the UE shall include the same number of entries, and listed in the same order, as in *supportedBandCombination-r10*. | - |
| ***SupportedBandGERAN***<br>GERAN band as defined in TS 45.005 [20]. | No |
| ***SupportedBandList1XRTT***<br>One entry corresponding to each supported CDMA2000 1xRTT band class. | - |
| ***SupportedBandListEUTRA***<br>Includes the supported E-UTRA bands. This field shall include all bands which are indicated in *BandCombinationParameters*. | - |
| ***SupportedBandListEUTRA-v9e0, SupportedBandListEUTRA-v1250***<br>If included, the UE shall include the same number of entries, and listed in the same order, as in *supportedListEUTRA* (i.e. without suffix). | - |
| ***SupportedBandListGERAN*** | No |
| ***SupportedBandListHRPD***<br>One entry corresponding to each supported CDMA2000 HRPD band class. | - |
| ***SupportedBandUTRA-FDD***<br>UTRA band as defined in TS 25.101 [17]. | - |
| ***SupportedBandUTRA-TDD128***<br>UTRA band as defined in TS 25.102 [18]. | - |
| ***SupportedBandUTRA-TDD384***<br>UTRA band as defined in TS 25.102 [18]. | - |
| ***SupportedBandUTRA-TDD768***<br>UTRA band as defined in TS 25.102 [18]. | - |
| ***supportedBandwidthCombinationSet***<br>The *supportedBandwidthCombinationSet* indicated for a band combination is applicable to all bandwidth classes indicated by the UE in this band combination.<br>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***<br>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.<br>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 | - |

| ***UE-EUTRA-Capability* field descriptions** | ***FDD/ TDD diff*** |
|---|---|
| a second cell group.<br>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***<br>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. | - |
| ***supportedNAICS-2CRS-AP***<br>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.<br>For band combinations with a single component carrier, UE is only allowed to indicate {*numberOfNAICS-CapableCC*, *numberOfAggregatedPRB*} = {1, 100} if NAICS is supported. | - |
| ***supportRohcContextContinue***<br>Indicates whether the UE supports ROHC context continuation operation where the UE does not reset the current ROHC context upon handover. | - |
| ***tdd-SpecialSubframe***<br>Indicates whether the UE supports TDD special subframe defined in TS 36.211 [21]. | No |
| ***tdd-FDD-CA-PCellDuplex***<br>Indicates whether the UE supports TDD PCell and/or FDD PCell in any supported band combination including at least one FDD band and at least one TDD band. The first bit is set to "1" if UE supports the TDD PCell. The second bit is set to '1' if UE supports FDD PCell. This field is included only if the UE supports band combination including at least one FDD band and at least one TDD band. If this field is included, the UE shall set at least one of the bits as '1'. | - |
| ***timerT312***<br>Indicates whether the UE supports T312. | No |
| ***tm5-FDD***<br>Indicates whether the UE supports the PDSCH transmission mode 5 in FDD. | - |
| ***tm5-TDD***<br>Indicates whether the UE supports the PDSCH transmission mode 5 in TDD. | - |
| ***tm9-With-8Tx-FDD*** | No |
| ***twoAntennaPortsForPUCCH*** | No |
| ***txDiv-PUCCH1b-ChSelect***<br>Indicates whether the UE supports transmit diversity for PUCCH format 1b with channel selection. | Yes |
| ***ue-Category***<br>UE category as defined in TS 36.306 [5]. Set to values 1 to 12 in this version of the specification. | - |
| ***ue-CategoryDL***<br>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-r12* is set to values 0, 6, 7, 9, 10, 11, 12, 13 and 14 in this version of the specification. | - |
| ***ue-CategoryUL***<br>UE UL category as defined in TS 36.306 [5]. The field *ue-CategoryUL-r12* is set to values 0, 3, 5, 7, 8 and 13 in this version of the specification. | - |
| ***ue-Rx-TxTimeDiffMeasurements***<br>Indicates whether the UE supports Rx - Tx time difference measurements. | No |
| ***ue-SpecificRefSigsSupported*** | No |
| ***ue-TxAntennaSelectionSupported***<br>TRUE indicates that the UE is capable of supporting UE transmit antenna selection as described in TS 36.213 [23, 8.7]. | Yes |
| ***ul-CoMP***<br>Indicates whether the UE supports UL Coordinated Multi-Point operation. | No |
| ***utran-ProximityIndication***<br>Indicates whether the UE supports proximity indication for UTRAN CSG member cells. | - |
| ***ul-64QAM***<br>Indicates whether the UE supports 64QAM in UL on the band. This field is only present when the field ue-*CategoryUL* is set to 5, 8 or 13. | - |

| *UE-EUTRA-Capability* field descriptions | *FDD/ TDD diff* |
|---|---|
| ***utran-SI-AcquisitionForHO***<br>Indicates whether the UE supports, upon configuration of si-RequestForHO by the network, acquisition and reporting of relevant information using autonomous gaps by reading the SI from a neighbouring UMTS cell. | Yes |
| ***voiceOverPS-HS-UTRA-FDD***<br>Indicates whether UE supports IMS voice according to GSMA IR.58 profile in UTRA FDD. | - |
| ***voiceOverPS-HS-UTRA-TDD128***<br>Indicates whether UE supports IMS voice in UTRA TDD 1.28Mcps. | - |
| ***wlan-IW-RAN-Rules***<br>Indicates whether the UE supports RAN-assisted WLAN interworking based on access network selection and traffic steering rules. | - |
| ***wlan-IW-ANDSF-Policies***<br>Indicates whether the UE supports RAN-assisted WLAN interworking based on ANDSF policies. | - |

NOTE 1: The IE *UE-EUTRA-Capability* does not include AS security capability information, since these are the same as the security capabilities that are signalled by NAS. Consequently AS need not provide "man-in-the-middle" protection for the security capabilities.

NOTE 2: The column FDD/ TDD diff indicates if the UE is allowed to signal, as part of the additional capabilities for an XDD mode i.e. within *UE-EUTRA-CapabilityAddXDD-Mode-xNM*, a different value compared to the value signalled elsewhere within *UE-EUTRA-Capability* (i.e. the common value, supported for both XDD modes). A '-' is used to indicate that it is not possible to signal different values (used for fields for which the field description is provided for other reasons).

NOTE 3: All the combinations of *CA-MIMO-ParametersUL* and *CA-MIMO-ParametersDL* for one band and across all the bands in each *BandCombinationParameters* are supported by the UE and have the same measurement gap requirement (i.e. the same *BandInfoEUTRA* applies). The *BandCombinationParameters* for the same band combination can be included more than once.

NOTE 4: UE CA and measurement capabilities indicate the combinations of frequencies that can be configured as serving frequencies.

NOTE 5: The grouping of the cells to the first and second cell group, as indicated by *supportedCellGrouping*, is shown in the table below.

| Nr of Band Entries: | 5 | 4 | 3 |
|---|---|---|---|
| Length of Bit-String: | 15 | 7 | 3 |
| Bit String Position | Cell grouping option (0= first cell group, 1= second cell group) | | |
| 1 | 00001 | 0001 | 001 |
| 2 | 00010 | 0010 | 010 |
| 3 | 00011 | 0011 | 011 |
| 4 | 00100 | 0100 | |
| 5 | 00101 | 0101 | |
| 6 | 00110 | 0110 | |
| 7 | 00111 | 0111 | |
| 8 | 01000 | | |
| 9 | 01001 | | |
| 10 | 01010 | | |
| 11 | 01011 | | |
| 12 | 01100 | | |
| 13 | 01101 | | |
| 14 | 01110 | | |
| 15 | 01111 | | |

### – UE-RadioPagingInfo

The *UE-RadioPagingInfo* IE contains information needed for paging of category 0 UE.

**_UE-RadioPagingInfo_ information element**

```
-- ASN1START

UE-RadioPagingInfo-r12 ::=              SEQUENCE {
    ue-Category-v1250                   INTEGER (0)         OPTIONAL,
    ...
}

-- ASN1STOP
```

### – 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**

```
-- ASN1START
```

```
UE-TimersAndConstants ::=           SEQUENCE {
    t300                            ENUMERATED {
                                        ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
                                        ms2000},
    t301                            ENUMERATED {
                                        ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
                                        ms2000},
    t310                            ENUMERATED {
                                        ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
    n310                            ENUMERATED {
                                        n1, n2, n3, n4, n6, n8, n10, n20},
    t311                            ENUMERATED {
                                        ms1000, ms3000, ms5000, ms10000, ms15000,
                                        ms20000, ms30000},
    n311                            ENUMERATED {
                                        n1, n2, n3, n4, n5, n6, n8, n10},
    ...
}


-- ASN1STOP
```

| ***UE-TimersAndConstants* field descriptions** |
|---|
| ***n3xy***<br>Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on. |
| ***t3xy***<br>Timers are described in section 7.3. Value ms0 corresponds with 0 ms, ms50 corresponds with 50 ms and so on. |

## – 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),
    ...
}


-- ASN1STOP
```

| ***VisitedCellInfoList* field descriptions** |
|---|
| ***timeSpent*** <br> 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
    }                                               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-backhaulRate-r12 ::=                   ENUMERATED
                                {r0, r4, r8, r16, r32, r64, r128, r256, r512,
                                r1024, r2048, r4096, r8192, r16384, r32768, r65536, r131072,
                                r262144, r524288, r1048576, r2097152, r4194304, r8388608,
```

```
                    r16777216, r33554432, r67108864, r134217728, r268435456,
                    r536870912, r1073741824, r2147483648, r4294967296}

-- ASN1STOP
```

| ***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: $Thresh_{BackhRateDLWLAN, High}$ in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N Kbps. |
| ***thresholdBackhaulDLBandwidth-Low*** |
| Indicates the backhaul available downlink bandwidth threshold used by the UE for traffic steering to E-UTRAN. Parameter: $Thresh_{BackhRateDLWLAN, Low}$ in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N Kbps. |
| ***thresholdBackhaulULBandwidth-High*** |
| Indicates the backhaul available uplink bandwidth threshold used by the UE for traffic steering to WLAN. Parameter: $Thresh_{BackhRateULWLAN, High}$ in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N Kbps. |
| ***thresholdBackhaulULBandwidth-Low*** |
| Indicates the backhaul available uplink bandwidth threshold used by the UE for traffic steering to E-UTRAN. Parameter: $Thresh_{BackhRateULWLAN, Low}$ in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N Kbps. |
| ***thresholdBeaconRSSI-High*** |
| Indicates the Beacon RSSI threshold used by the UE for traffic steering to WLAN. Parameter: $Thresh_{BEACONRSSIWLAN, High}$ in TS 36.304 [4]. |
| ***thresholdBeaconRSSI-Low*** |
| Indicates the Beacon RSSI threshold used by the UE for traffic steering to E-UTRAN. Parameter: $Thresh_{BEACONRSSIWLAN, Low}$ in TS 36.304 [4]. |
| ***thresholdChannelUtilization-High*** |
| Indicates the WLAN channel utilization (BSS load) threshold used by the UE for traffic steering to E-UTRAN. Parameter: $Thresh_{ChUtilWLAN, High}$ 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: $Thresh_{ChUtilWLAN, Low}$ in TS 36.304 [4]. |
| ***thresholdRSRP-High*** |
| Indicates the RSRP threshold (in dBm) used by the UE for traffic steering to E-UTRAN. Parameter: $Thresh_{ServingOffloadWLAN, HighP}$ in TS 36.304 [4]. |
| ***thresholdRSRP-Low*** |
| Indicates the RSRP threshold (in dBm) used by the UE for traffic steering to WLAN. Parameter: $Thresh_{ServingOffloadWLAN, LowP}$ in TS 36.304 [4]. |
| ***thresholdRSRQ-High,thresholdRSRQ-OnAllSymbolsHigh, thresholdRSRQ-WB-High, thresholdRSRQ-OnAllSymbolsWithWB-High*** |
| Indicates the RSRQ threshold (in dB) used by the UE for traffic steering to E-UTRAN. Parameter: $Thresh_{ServingOffloadWLAN, HighQ}$ in TS 36.304 [4]. The UE shall only apply one of threshold values of *thresholdRSRQ-OnAllSymbolsWithWB-High, thresholdRSRQ-OnAllSymbolsHigh, thresholdRSRQ-WB-High* and *thresholdRSRQ-High* as present in *wlan-OffloadConfigCommon* and forward this to upper layer. NOTE 1. |
| ***thresholdRSRQ-Low,thresholdRSRQ-OnAllSymbolsLow, thresholdRSRQ-WB-Low, thresholdRSRQ-OnAllSymbolsWithWB-Low*** |
| Indicates the RSRQ threshold (in dB) used by the UE for traffic steering to WLAN. Parameter: $Thresh_{ServingOffloadWLAN, LowQ}$ in TS 36.304 [4].<br>The UE shall only apply one of threshold values of *thresholdRSRQ-OnAllSymbolsWithWB-Low, thresholdRSRQ-OnAllSymbolsLow, thresholdRSRQ-WB-Low* and *thresholdRSRQ-Low* as present in *wlan-OffloadConfigCommon* and forward this to upper layer. NOTE 1. |
| ***t-SteeringWLAN*** |
| Indicates the timer value during which the rules should be fulfilled before starting traffic steering between E-UTRAN and WLAN. Parameter: $Tsteering_{WLAN}$ 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***

```
-- ASN1START

MBMS-NotificationConfig-r9 ::=              SEQUENCE {
    notificationRepetitionCoeff-r9      ENUMERATED {n2, n4},
    notificationOffset-r9               INTEGER (0..10),
    notificationSF-Index-r9             INTEGER (1..6)
}

-- ASN1STOP
```

| ***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 modificaton 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.<br>FDD: Value 1, 2, 3, 4, 5 and 6 correspond with subframe #1, #2, #3 #6, #7, and #8 respectively.<br>TDD: Value 1, 2, 3, 4, and 5 correspond with subframe #3, #4, #7, #8, and #9 respectively. |

### – MBSFN-AreaId

The IE *MBSFN-AreaId* identifies an MBSFN area by means of a locally unique value at lower layers i.e. it concerns parameter $N_{ID}^{MBSFN}$ in TS 36.211 [21, 6.10.2.1].

***MBSFN-AreaId information element***

```
-- ASN1START
```

```
MBSFN-AreaId-r12 ::=                INTEGER (0..255)

-- ASN1STOP
```

## – 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***

```
-- ASN1START

MBSFN-AreaInfoList-r9 ::=           SEQUENCE (SIZE(1..maxMBSFN-Area)) OF MBSFN-AreaInfo-r9

MBSFN-AreaInfo-r9 ::=               SEQUENCE {
    mbsfn-AreaId-r9                     MBSFN-AreaId-r12,
    non-MBSFNregionLength               ENUMERATED {s1, s2},
    notificationIndicator-r9            INTEGER (0..7),
    mcch-Config-r9                      SEQUENCE {
        mcch-RepetitionPeriod-r9            ENUMERATED {rf32, rf64, rf128, rf256},
        mcch-Offset-r9                      INTEGER (0..10),
        mcch-ModificationPeriod-r9              ENUMERATED {rf512, rf1024},
        sf-AllocInfo-r9                     BIT STRING (SIZE(6)),
        signallingMCS-r9                    ENUMERATED {n2, n7, n13, n19}
    },
    ...
}

-- ASN1STOP
```

| ***MBSFN-AreaInfoList* field descriptions** |
|---|
| ***mcch-ModificationPeriod*** |
| Defines periodically appearing boundaries, i.e. radio frames for which SFN mod *mcch-ModificationPeriod* = 0. The contents of different transmissions of MCCH information can only be different if there is at least one such boundary in-between them. |
| ***mcch-Offset*** |
| Indicates, together with the *mcch-RepetitionPeriod*, the radio frames in which MCCH is scheduled i.e. MCCH is scheduled in radio frames for which: SFN mod *mcch-RepetitionPeriod* = *mcch-Offset*. |
| ***mcch-RepetitionPeriod*** |
| Defines the interval between transmissions of MCCH information, in radio frames, Value rf32 corresponds to 32 radio frames, rf64 corresponds to 64 radio frames and so on. |
| ***non-MBSFNregionLength*** |
| Indicates how many symbols from the beginning of the subframe constitute the non-MBSFN region. This value applies in all subframes of the MBSFN area used for PMCH transmissions as indicated in the MSI. The values s1 and s2 correspond with 1 and 2 symbols, respectively: see TS 36.211 [21, Table 6.7-1]. |
| ***notificationIndicator*** |
| Indicates which PDCCH bit is used to notify the UE about change of the MCCH applicable for this MBSFN area. Value 0 corresponds with the least significant bit as defined in TS 36.212 [22, 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:<br>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.<br>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 $I_{\mathrm{MCS}}$ 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***<br>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:<br>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.<br>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***<br>'1' denotes that the corresponding subframe is allocated for MBSFN. The following mapping applies:<br>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.<br>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***<br>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***<br>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.

***PMCH-InfoList information element***

```
-- ASN1START

PMCH-InfoList-r9 ::=              SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF PMCH-Info-r9

PMCH-InfoListExt-r12 ::=          SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF PMCH-InfoExt-r12

PMCH-Info-r9 ::=                  SEQUENCE {
    pmch-Config-r9                    PMCH-Config-r9,
    mbms-SessionInfoList-r9           MBMS-SessionInfoList-r9,
    ...
}

PMCH-InfoExt-r12 ::=              SEQUENCE {
    pmch-Config-r12                   PMCH-Config-r12,
    mbms-SessionInfoList-r12          MBMS-SessionInfoList-r9,
    ...
}
```

```
MBMS-SessionInfoList-r9 ::=     SEQUENCE (SIZE (0..maxSessionPerPMCH)) OF MBMS-SessionInfo-r9

MBMS-SessionInfo-r9 ::=         SEQUENCE {
    tmgi-r9                         TMGI-r9,
    sessionId-r9                OCTET STRING (SIZE (1))         OPTIONAL,  -- Need OR
    logicalChannelIdentity-r9       INTEGER (0..maxSessionPerPMCH-1),
    ...
}

PMCH-Config-r9 ::=              SEQUENCE {
    sf-AllocEnd-r9                  INTEGER (0..1535),
    dataMCS-r9                      INTEGER (0..28),
    mch-SchedulingPeriod-r9         ENUMERATED {
                                rf8, rf16, rf32, rf64, rf128, rf256, rf512, rf1024},
    ...
}

PMCH-Config-r12 ::=             SEQUENCE {
    sf-AllocEnd-r12                 INTEGER (0..1535),
    dataMCS-r12                     CHOICE {
        normal-r12                      INTEGER (0..28),
        higerOrder-r12                  INTEGER (0..27)
    },
    mch-SchedulingPeriod-r12    ENUMERATED {
                                rf4, rf8, rf16, rf32, rf64, rf128, rf256, rf512, rf1024},
    ...
}

TMGI-r9 ::=                 SEQUENCE {
    plmn-Id-r9                      CHOICE {
        plmn-Index-r9                   INTEGER (1..maxPLMN-r11),
        explicitValue-r9                PLMN-Identity
    },
    serviceId-r9                OCTET STRING (SIZE (3))
```

```
}


-- ASN1STOP
```

| ***PMCH-InfoList* field descriptions** |
|---|
| ***dataMCS*** |
| Indicates the value for parameter $I_{MCS}$ in TS 36.213 [23], which defines the Modulation and Coding Scheme (MCS) applicable for the subframes of this (P)MCH as indicated by the field *commonSF-Alloc*. Value *normal* corresponds to Table 7.1.7.1-1 and value *higherOrder* corresponds to Table 7.1.7.1-1A. The MCS does however neither apply to the subframes that may carry MCCH i.e. the subframes indicated by the field *sf-AllocInfo* within *SystemInformationBlockType13* nor for the first subframe allocated to this (P)MCH within each MCH scheduling period (which may contain the MCH scheduling information provided by MAC). |
| ***mch-SchedulingPeriod*** |
| Indicates the MCH scheduling period i.e. the periodicity used for providing MCH scheduling information at lower layers (MAC) applicable for an MCH. Value rf8 corresponds to 8 radio frames, rf16 corresponds to 16 radio frames and so on. The *mch-SchedulingPeriod* starts in the radio frames for which: SFN mod *mch-SchedulingPeriod* = 0. E-UTRAN configures *mch-SchedulingPeriod* of the (P)MCH listed first in *PMCH-InfoList* to be smaller than or equal to *mcch-RepetitionPeriod.* |
| ***plmn-Index*** |
| Index of the entry in field *plmn-IdentityList* within *SystemInformationBlockType1*. |
| ***sessionId*** |
| Indicates the optional MBMS Session Identity, which together with TMGI identifies a transmission or a possible retransmission of a specific MBMS session: see TS 29.061 [51, Sections 20.5, 17.7.11, 17.7.15]. The field is included whenever upper layers have assigned a session identity i.e. one is available for the MBMS session in E-UTRAN. |
| ***serviceId*** |
| Uniquely identifies the identity of an MBMS service within a PLMN. The field contains octet 3- 5 of the IE Temporary Mobile Group Identity (TMGI) as defined in TS 24.008 [49]. The first octet contains the third octet of the TMGI, the second octet contains the fourth octet of the TMGI and so on. |
| ***sf-AllocEnd*** |
| Indicates the last subframe allocated to this (P)MCH within a period identified by field *commonSF-AllocPeriod*. The subframes allocated to (P)MCH corresponding with the $n^{th}$ entry in *pmch-InfoList* are the subsequent subframes starting from either the next subframe after the subframe identified by *sf-AllocEnd* of the $(n-1)^{th}$ listed (P)MCH or, for n=1, the first subframe defined by field *commonSF-Alloc*, through the subframe identified by *sf-AllocEnd* of the $n^{th}$ listed (P)MCH. Value 0 corresponds with the first subframe defined by field *commonSF-Alloc*. |

## 6.3.8 Sidelink information elements

### – SL-CommConfig

The IE *SL-CommConfig* specifies the dedicated configuration information for sidelink direct communication. In particular it concerns the transmission resource configuration for direct communication on the primary frequency.

***SL-CommConfig* information element**

```
-- ASN1START


SL-CommConfig-r12 ::=               SEQUENCE  {
    commTxResources-r12                 CHOICE {
        release                         NULL,
        setup                           CHOICE {
            scheduled-r12               SEQUENCE {
```

```
                sl-RNTI-r12                 C-RNTI,
                mac-MainConfig-r12              MAC-MainConfigSL-r12,
                commTxConfig-r12            SL-CommResourcePool-r12,
                mcs-r12                     INTEGER (0..28)             OPTIONAL   -- Need OP
            },
            ue-Selected-r12                 SEQUENCE {
                -- Pool for normal usage
                commTxPoolNormalDedicated-r12   SEQUENCE {
                    poolToReleaseList-r12       SL-TxPoolToReleaseList-r12 OPTIONAL,    -- Need ON
                    poolToAddModList-r12        SL-CommTxPoolToAddModList-r12 OPTIONAL    -- Need ON
                }
            }
        }
    }                                                               OPTIONAL,  -- Need ON
    ...
}

SL-CommTxPoolToAddModList-r12 ::=       SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-
CommTxPoolToAddMod-r12

SL-CommTxPoolToAddMod-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
```

| *SL-CommConfig* field descriptions |
|---|
| ***commTxPoolNormalDedicated***<br>Indicates a pool of transmission resources the UE is allowed to use while in RRC_CONNECTED. |
| ***commTxConfig***<br>Indicates a pool of resources for SC when E-UTRAN schedules Tx resources (i.e. when indices included in DCI format 5 indicate the actual data resources to be used as specified in TS 36.212 [22, 5.3.3.1.9]). |
| ***mcs***<br>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 UE implementation. |
| ***scheduled***<br>Indicates the configuration for the case E-UTRAN schedules the transmission resources based on sidelink specific BSR from the UE. |
| ***ue-Selected***<br>Indicates the configuration for the case the UE selects the transmission resources from a pool of resources configured by E-UTRAN. |

## – SL-CommResourcePool

The IE *SL-CommResourcePool* specifies the configuration information for an individual pool of resources for sidelink direct communication. The IE covers the configuration of both the sidelink control information and the data.

***SL-CommResourcePool* information element**

```
-- ASN1START

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 {
        data-TF-ResourceConfig-r12              SL-TF-ResourceConfig-r12,
        trpt-Subset-r12                     SL-TRPT-Subset-r12    OPTIONAL   -- Need OP
    }                                                             OPTIONAL,  -- Need OR
    rxParametersNCell-r12           SEQUENCE {
        tdd-Config-r12              TDD-Config                    OPTIONAL,  -- Need OP
        syncConfigIndex-r12         INTEGER (0..15)
    }                                                             OPTIONAL,  -- Need OR
    txParameters-r12              SEQUENCE {
        sc-TxParameters-r12         SL-TxParameters-r12,
```

```
        dataTxParameters-r12            SL-TxParameters-r12

    }                                                   OPTIONAL,  -- Cond Tx

    ...
}


SL-TRPT-Subset-r12 ::=              BIT STRING (SIZE (3..5))


-- ASN1STOP
```

| ***SL-CommResourcePool* field descriptions** |
|---|
| ***sc-Period*** |
| Indicates the period over which resources allocated in a cell for SC, scheduled and UE selected data transmissions occur, see 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 direct 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. |

| Conditional presence | Explanation |
|---|---|
| *Tx* | The field is mandatory present when included in *commTxPoolNormalDedicated*, *commTxPoolNormalCommon* or *commTxPoolExceptional*. Otherwise the field is not present. |

## – 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 direct discovery.

***SL-DiscConfig* information element**

```
-- ASN1START

SL-DiscConfig-r12 ::=                SEQUENCE {
    discTxResources-r12                  CHOICE {
        release                          NULL,
        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
            }
        }
    }                                                    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
}

-- ASN1STOP
```

| ***SL-DiscConfig* field descriptions** |
|---|
| ***discTxResources*** <br> 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. |
| ***discTxConfig*** <br> 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). |
| ***SL-TF-IndexPair*** <br> A pair of indices, one for the time domain and one for the frequency domain, indicating resources within the pool covered by *discTxConfig*, see TS 36.211 [21, 9.5.6]. |

## – SL-DiscResourcePool

The IE *SL-DiscResourcePool* specifies the configuration information for an individual pool of resources for sidelink direct discovery.

### ***SL-DiscResourcePool* information element**

```
-- ASN1START

SL-DiscTxPoolList-r12 ::=       SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-DiscResourcePool-r12

SL-DiscRxPoolList-r12 ::=       SEQUENCE (SIZE (1..maxSL-RxPool-r12)) OF SL-DiscResourcePool-r12

SL-DiscResourcePool-r12 ::=         SEQUENCE  {
    cp-Len-r12                      SL-CP-Len-r12,
    discPeriod-r12                  ENUMERATED {rf32, rf64, rf128,
                                        rf256, rf512, rf1024, spare2, spare},
    numRetx-r12                     INTEGER (0..3),
    numRepetition-r12                   INTEGER (1..50),
    tf-ResourceConfig-r12               SL-TF-ResourceConfig-r12,
    txParameters-r12                SEQUENCE {
        txParametersGeneral-r12         SL-TxParameters-r12,
        ue-SelectedResourceConfig-r12   SEQUENCE {
            poolSelection-r12               CHOICE {
```

```
                rsrpBased-r12               SL-PoolSelectionConfig-r12,
                random-r12                  NULL
            },
            txProbability-r12       ENUMERATED {p25, p50, p75, p100}
        }                                               OPTIONAL   -- Need OR
    }                                                   OPTIONAL,  -- Cond Tx
    rxParameters-r12            SEQUENCE {
        tdd-Config-r12              TDD-Config              OPTIONAL,  -- Need OR
        syncConfigIndex-r12         INTEGER (0..15)
    }                                                   OPTIONAL,  -- Need OR
    ...
}

SL-PoolSelectionConfig-r12 ::=      SEQUENCE {
    threshLow-r12                   RSRP-RangeSL2-r12,
    threshHigh-r12                  RSRP-RangeSL2-r12
}

-- ASN1STOP
```

| ***SL-DiscResourcePool* field descriptions** |
|---|
| ***numRepetition***<br>Indicates the number of times *subframeBitmap* occurs within a *discPeriod*. The highest value E-UTRAN may use depends on the configuration i.e. 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 length of *subframeBitmap* times the *numRepetition* is less than or equal to *discPeriod*. |
| ***poolSelection***<br>Indicates the mechanism for selecting a (transmission) pool when multiple candidates are provided. E-UTRAN configures the same value for all candidate pools i.e. all pools included in *discTxPoolCommon* or all pools configured by *discTxPoolDedicated*. |
| ***syncConfigIndex***<br>Indicate 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***<br>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***<br>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**

```
-- ASN1START

SL-DiscTxPowerInfoList-r12 ::=   SEQUENCE (SIZE (maxSL-DiscPowerClass-r12)) OF SL-DiscTxPowerInfo-r12

SL-DiscTxPowerInfo-r12 ::=              SEQUENCE  {
    discMaxTxPower-r12                      P-Max,
    ...
}

-- ASN1STOP
```

| ***SL-DiscTxPowerInfo* field descriptions** |
|---|
| ***discMaxTxPower*** |
| Indicates the P-Max parameter used to calculate the maximum transmit power a UE configured with the concerned range class, see TS 24.333 [70, 4.2.11]. The first entry in *SL-DiscTxPowerInfoList* corresponds to UE range class "short", the second entry corresponds to "medium" and the third entry corresponds to "long". |

### – SL-HoppingConfig

The IE *SL-HoppingConfig* indicates the hopping configuration used for sidelink.

***SL-HoppingConfig* information element**

```
-- ASN1START

SL-HoppingConfigComm-r12 ::=      SEQUENCE  {
    hoppingParameter-r12              INTEGER (0..504),
    numSubbands-r12                       ENUMERATED {ns1, ns2, ns4},
    rb-Offset-r12                   INTEGER (0..110)
}

SL-HoppingConfigDisc-r12 ::= SEQUENCE  {
    a-r12                             INTEGER (1..200),
    b-r12                             INTEGER (1..10),
    c-r12                             ENUMERATED {n1, n5}
}
```

```
-- ASN1STOP
```

| ***SL-HoppingConfig* field descriptions** |
|---|
| ***a***<br>Parameter: $N_{PSDCH}^{(1)}$ see TS 36.213 [23, 14.3.1]. |
| ***b***<br>Parameter: $N_{PSDCH}^{(2)}$ see TS 36.213 [23, 14.3.1]. |
| ***c***<br>Parameter: $N_{PSDCH}^{(3)}$ see TS36.213 [23, 14.3.1] |
| ***hoppingParameter***<br>Affects the hopping performed as specificed in TS 36.213 [23, 14.1.1.2 and 14.1.1.3. In case value 504 is received, the value used by the UE is 510. |
| ***numSubbands***<br>Parameter: $N_{sb}$ see TS 36.211 [21, 9.3.6]. |
| ***rb-Offset***<br>Parameter: $N_{RB}^{HO}$ , see TS 36.211 [21, 9.3.6]. |

## – SL-OffsetIndicator

The IE *SL-OffsetIndicator* indicates the offset of the pool of resources relative to SFN 0 of the cell from which it was obtained or, when out of coverage, relative to DFN 0.

### *SL-OffsetIndicator* information element

```
-- ASN1START

SL-OffsetIndicator-r12 ::=          CHOICE {
    small-r12                           INTEGER (0..319),
    large-r12                           INTEGER (0..10239)
}

SL-OffsetIndicatorSync-r12 ::=      INTEGER (0..39)

-- ASN1STOP
```

| ***SL-OffsetIndicator* field descriptions** |
|---|
| ***SL-OffsetIndicator***<br>Indicates the offset of the first period of pool of resources within a SFN cycle. |
| ***SL-OffsetIndicatorSync***<br>Synch 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 direct communication.

***SL-PeriodComm* information element**

```
-- ASN1START

SL-PeriodComm-r12 ::=           ENUMERATED {sf40, sf60, sf70, sf80, sf120, sf140,
                                    sf160, sf240, sf280, sf320, spare6, spare5,
                                    spare4, spare3, spare2, spare}

-- ASN1STOP
```

### – SLSSID

The IE *SLSSID* identifies a cell and is used by the receiving UE to detect asynchronous neighbouring cells, and by transmitting UEs to extend the synchronisation signals beyond the cell"s coverage area.

***SLSSID* information element**

```
-- ASN1START

SLSSID-r12 ::=              INTEGER (0..167)

-- ASN1STOP
```

### – SL-SyncConfig

The IE *SL-SyncConfig* specifies the configuration information concerning reception of synchronisation signals from neighbouring cells as well as concerning the transmission of synchronisation signals for sidelink direct communication and sidelink direct discovery.

***SL-SyncConfig* information element**

```
-- ASN1START

SL-SyncConfigList-r12 ::=   SEQUENCE (SIZE (1..maxSL-SyncConfig-r12)) OF SL-SyncConfig-r12

SL-SyncConfig-r12 ::=           SEQUENCE {
    syncCP-Len-r12                  SL-CP-Len-r12,
    syncOffsetIndicator-r12         SL-OffsetIndicatorSync-r12,
    slssid-r12                      SLSSID-r12,
    txParameters-r12                SEQUENCE {
```

```
        syncTxParameters-r12            SL-TxParameters-r12,
        syncTxThreshIC-r12              RSRP-RangeSL-r12,
                                        syncInfoReserved-r12            BIT STRING (SIZE (19))
                                        OPTIONAL    -- Need OR
    }                                                   OPTIONAL,  -- Need OR
    rxParamsNCell-r12               SEQUENCE {
        physCellId-r12                  PhysCellId,
        discSyncWindow-r12              ENUMERATED {w1, w2}
    }                                                   OPTIONAL,  -- Need OR
    ...
}


-- ASN1STOP
```

| ***SL-SyncConfig* field descriptions** |
|---|
| ***discSyncWindow***<br>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***<br>Reserved for future use. |
| ***syncOffsetIndicator***<br>E-UTRAN should ensure *syncOffsetIndicator* is set to the same value as *syncOffsetIndicator1* or *syncOffsetIndicator2* in *preconfigSync* within *SL-Preconfiguration*, if configured. |
| ***syncTxThreshIC***<br>Indicates the threshold used while in coverage. In case the RSRP measurement of the cell chosen for transmission of sidelink direct 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 direct transmission.. |
| ***txParameters***<br>Includes parameters relevant only for transmission. E-UTRAN includes the field in one entry per list, as included in *commSyncConfig* or *discSyncConfig*. |

## – SL-TF-ResourceConfig

The IE *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 *prb-Start* and less than *prb-Start* + *prb-Num*, and on PRB with index greater than *prb-End* - *prb-Num* and less than or equal to *prb-End*. Even for neighbouring cells, *prb-Start* and prb-End , are relative to PRB #0 of the cell from which it was obtained. See TS36.213 [23, 14.1.3, 14.2.3, 14.3.3]. |

## – SL-TxParameters

The IE *SL-TxParameters* identifies a set of parameters configured for sidelink transmission, used for communication, discovery and synchronisation.

***SL-TxParameters* information element**

```
-- 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): $\alpha_{PSSCH,1}$, $\alpha_{PSSCH,2}$, $\alpha_{PSCCH,1}$, $\alpha_{PSCCH,2}$, $\alpha_{PSDCH,1}$, $\alpha_{PSSS}$ See TS 36.213 [23, 14.1.1.5, 14.2.1.2, 14.3.1, 14.4] where al0 corresponds to 0, al04 corresponds to value 0.4, al05 to 0.5, al06 to 0.6, al07 to 0.7, al08 to 0.8, al09 to 0.9 and al1 corresponds to 1. This field applies for sidelink power control. |
| ***p0*** |
| Parameter: $P_{O\_PSSCH,1}$, $P_{O\_PSSCH,2}$, $P_{O\_PSCCH,1}$, $P_{O\_PSCCH,2}$, $P_{O\_PSDCH,1}$, $P_{O\_PSSS}$ 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 ::= 16 -- Maximum number of visited EUTRA cells reported
maxCellInfoGERAN-r9      INTEGER ::=32  -- Maximum number of GERAN cells for which system in-
                                    -- formation can be provided as redirection assistance
maxCellInfoUTRA-r9           INTEGER ::=16  -- Maximum number of UTRA cells for which system
                                    -- information can be provided as redirection
                                    -- assistance
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 RS 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)
maxFreqUTRA-TDD-r10         INTEGER ::=6    -- Maximum number of UTRA TDD carrier frequencies for
                                            -- which system information can be provided as
                                            -- redirection assistance
maxCellInter                INTEGER ::= 16 -- Maximum number of neighbouring inter-frequency
                                            -- cells listed in SIB type 5
maxCellIntra                INTEGER ::= 16 -- Maximum number of neighbouring intra-frequency
                                            -- cells listed in SIB type 4
maxCellListGERAN            INTEGER ::= 3   -- Maximum number of lists of GERAN cells
maxCellMeas                 INTEGER ::= 32 -- Maximum number of entries in each of the
                                            -- cell lists in a measurement object
maxCellReport               INTEGER ::= 8   -- Maximum number of reported cells/CSI-RS resources
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-CSI-RS-r12            INTEGER ::= 5   -- Maximum number of zero transmission power CSI-RS for
                                            -- a serving cell concerning discovery signals
maxEARFCN                   INTEGER ::= 65535-- Maximum value of EUTRA carrier frequency
maxEARFCN-Plus1             INTEGER ::= 65536-- Lowest value extended EARFCN range
maxEARFCN2                  INTEGER ::= 262143    -- Highest value extended EARFCN range
maxEPDCCH-Set-r11           INTEGER ::= 2   -- Maximum number of EPDCCH sets
maxFBI                      INTEGER ::= 64 -- Maximum value of fequency band indicator
```

```
maxFBI-Plus1            INTEGER ::= 65 -- Lowest value extended FBI range
maxFBI2                 INTEGER ::= 256    -- Highest value extended FBI range
maxFreq                 INTEGER ::= 8  -- Maximum number of carrier frequencies
maxFreqIDC-r11          INTEGER ::= 32 -- Maximum number of carrier frequencies that are
                                       -- affected by the IDC problems
maxFreqMBMS-r11         INTEGER ::= 5  -- Maximum number of carrier frequencies for which an
                                       -- MBMS capable UE may indicate an interest
maxGERAN-SI             INTEGER ::= 10 -- Maximum number of GERAN SI blocks that can be
                                       -- provided as part of NACC information
maxGNFG                 INTEGER ::= 16 -- Maximum number of GERAN neighbour freq groups
maxLogMeasReport-r10    INTEGER ::= 520    -- Maximum number of logged measurement entries
                                       --  that can be reported by the UE in one message
maxMBSFN-Allocations    INTEGER ::= 8  -- Maximum number of MBSFN frame allocations with
                                       -- different offset
maxMBSFN-Area           INTEGER ::= 8
maxMBSFN-Area-1         INTEGER ::= 7
maxMeasId               INTEGER ::= 32
maxMeasId-Plus1         INTEGER ::= 33
maxMeasId-r12           INTEGER ::= 64
maxMultiBands           INTEGER ::= 8  -- Maximum number of additional frequency bands
                                       -- that a cell belongs to
maxNAICS-Entries-r12    INTEGER ::= 8  -- Maximum number of supported NAICS combination(s)
maxNeighCell-r12        INTEGER ::= 8  -- Maximum number of neighbouring cells in NAICS
                        -- configuration (per carrier frequency)
maxObjectId             INTEGER ::= 32
maxP-a-PerNeighCell-r12 INTEGER ::= 3  -- Maximum number of power offsets for a neighbour cell
                        -- in NAICS configuration
maxPageRec              INTEGER ::= 16 --
maxPhysCellIdRange-r9                  INTEGER ::= 4  -- Maximum number of physical
                                       cell identity ranges
maxPLMN-r11             INTEGER ::=6   -- Maximum number of PLMNs
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
maxSL-Dest-r12              INTEGER ::= 16 -- Maximum number of sidelink destinations
maxSL-DiscPowerClass-r12    INTEGER ::= 3   -- Maximum number of sidelink power classes
maxSL-RxPool-r12            INTEGER ::= 16 -- Maximum number of individual sidelink Rx resource pools
maxSL-SyncConfig-r12        INTEGER ::= 16 -- Maximum number of sidelink Sync configurations
maxSL-TF-IndexPair-r12      INTEGER ::= 64 -- Maximum number of sidelink Time Freq resource index
                                    --  pairs
maxSL-TxPool-r12            INTEGER ::= 4   -- Maximum number of individual sidelink Tx resource pools
maxSTAG-r11                     INTEGER ::= 3   -- Maximum number of STAGs
maxServCell-r10             INTEGER ::= 5   -- Maximum number of Serving cells
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-r10INTEGER ::= 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
```

– SBCCH-SL-BCH-Message

The *SBCCH-SL-BCH-Message* class is the set of RRC messages that may be sent from the UE to the UE via SL-BCH on the SBCCH logical channel.

```
-- ASN1START


SBCCH-SL-BCH-Message ::= SEQUENCE {
    message                 SBCCH-SL-BCH-MessageType
}
```

```
SBCCH-SL-BCH-MessageType ::=                MasterInformationBlock-SL


-- ASN1STOP
```

## 6.5.2 Message definitions

### – MasterInformationBlock-SL

The *MasterInformationBlock-SL* includes the information transmitted by a UE transmitting SLSS, i.e. acting as synchronisation reference, via SL-BCH.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: SBCCH

Direction: UE to UE

***MasterInformationBlock-SL***

```
-- ASN1START


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))
}



-- ASN1STOP
```

| ***MasterInformationBlock-SL* field descriptions** |
|---|
| ***directFrameNumber***<br>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***<br>Value *TRUE* indicates that the UE transmitting the *MasterInformationBlock-SL* is in E-UTRAN coverage. |
| ***sl-Bandwidth***<br>Parameter: transmission bandwidth configuration. n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on. |

– End of PC5-RRC-Definitions

```
-- ASN1START


END


-- ASN1STOP
```

# 7 Variables and constants

## 7.1 UE variables

NOTE: To facilitate the specification of the UE behavioural requirements, UE variables are represented using ASN.1. Unless explicitly specified otherwise, it is however up to UE implementation how to store the variables. The optionality of the IEs in ASN.1 is used only to indicate that the values may not always be available.

– EUTRA-UE-Variables

This ASN.1 segment is the start of the E-UTRA UE variable definitions.

```
-- ASN1START


EUTRA-UE-Variables DEFINITIONS AUTOMATIC TAGS ::=


BEGIN


IMPORTS
    AbsoluteTimeInfo-r10,
    AreaConfiguration-r10,
    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;

-- ASN1STOP
```

### – VarConnEstFailReport

The UE variable *VarConnEstFailReport* includes the connection establishment failure information.

***VarConnEstFailReport* UE variable**

```
-- ASN1START

VarConnEstFailReport-r11 ::=    SEQUENCE {
    connEstFailReport-r11           ConnEstFailReport-r11,
    plmn-Identity-r11               PLMN-Identity
}

-- ASN1STOP
```

### – VarLogMeasConfig

The UE variable *VarLogMeasConfig* includes the configuration of the logging of measurements to be performed by the UE while in RRC_IDLE, covering intra-frequency, inter-frequency, inter-RAT mobility and MBSFN related measurements. If MBSFN logging is configured, the UE performs logging of measurements while in both RRC_IDLE and RRC_CONNECTED. Otherwise, the UE performs logging of measurements only while in RRC_IDLE.

***VarLogMeasConfig* UE variable**

```
-- ASN1START

VarLogMeasConfig-r10 ::=            SEQUENCE {
    areaConfiguration-r10           AreaConfiguration-r10       OPTIONAL,
    loggingDuration-r10             LoggingDuration-r10,
    loggingInterval-r10             LoggingInterval-r10
}

VarLogMeasConfig-r11 ::=    SEQUENCE {
    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
}

-- ASN1STOP
```

– VarLogMeasReport

The UE variable *VarLogMeasReport* includes the logged measurements information.

***VarLogMeasReport* UE variable**

```
-- ASN1START

VarLogMeasReport-r10 ::=            SEQUENCE {
    traceReference-r10              TraceReference-r10,
    traceRecordingSessionRef-r10            OCTET STRING (SIZE (2)),
    tce-Id-r10                      OCTET STRING (SIZE (1)),
    plmn-Identity-r10               PLMN-Identity,
    absoluteTimeInfo-r10            AbsoluteTimeInfo-r10,
    logMeasInfoList-r10             LogMeasInfoList2-r10
}

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
}

LogMeasInfoList2-r10 ::=            SEQUENCE (SIZE (1..maxLogMeas-r10)) OF LogMeasInfo-r10
```

```
-- ASN1STOP
```

## – VarMeasConfig

The UE variable *VarMeasConfig* includes the accumulated configuration of the measurements to be performed by the UE, covering intra-frequency, inter-frequency and inter-RAT mobility related measurements.

NOTE: The amount of measurement configuration information, which a UE is required to store, is specified in subclause 11.1. If the number of frequencies configured for a particular RAT exceeds the minimum performance requirements specified in [16], it is up to UE implementation which frequencies of that RAT are measured. If the total number of frequencies for all RATs provided to the UE in the measurement configuration exceeds the minimum performance requirements specified in [16], it is up to UE implementation which frequencies/RATs are measured.

**VarMeasConfig UE variable**

```
-- ASN1START


VarMeasConfig ::=               SEQUENCE {
    -- Measurement identities
    measIdList                      MeasIdToAddModList              OPTIONAL,
    measIdListExt-r12               MeasIdToAddModListExt-r12       OPTIONAL,
    -- Measurement objects
    measObjectList                  MeasObjectToAddModList          OPTIONAL,
    measObjectList-v9i0             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
}
```

```
-- ASN1STOP
```

## – VarMeasReportList

The UE variable *VarMeasReportList* includes information about the measurements for which the triggering conditions have been met.

***VarMeasReportList* UE variable**

```
-- ASN1START

VarMeasReportList ::=           SEQUENCE (SIZE (1..maxMeasId)) OF VarMeasReport
VarMeasReportList-r12 ::=       SEQUENCE (SIZE (1..maxMeasId-r12)) OF VarMeasReport

VarMeasReport ::=               SEQUENCE {
    -- List of measurement that have been triggered
    measId                          MeasId,
    measId-v1250                    MeasId-v1250                OPTIONAL,
    cellsTriggeredList              CellsTriggeredList          OPTIONAL,
    csi-RS-TriggeredList-r12        CSI-RS-TriggeredList-r12    OPTIONAL,
    numberOfReportsSent                 INTEGER
}

CellsTriggeredList ::=          SEQUENCE (SIZE (1..maxCellMeas)) OF CHOICE {
    physCellIdEUTRA                     PhysCellId,
    physCellIdUTRA                      CHOICE {
        fdd                             PhysCellIdUTRA-FDD,
        tdd                             PhysCellIdUTRA-TDD
    },
    physCellIdGERAN                     SEQUENCE {
        carrierFreq                     CarrierFreqGERAN,
        physCellId                      PhysCellIdGERAN
    },
    physCellIdCDMA2000                  PhysCellIdCDMA2000
}

CSI-RS-TriggeredList-r12 ::=    SEQUENCE (SIZE (1..maxCSI-RS-Meas-r12)) OF MeasCSI-RS-Id-r12
```

```
-- ASN1STOP
```

### – VarMobilityHistoryReport

The UE variable *VarMobilityHistoryReport* includes the mobility history information.

```
-- ASN1START

VarMobilityHistoryReport-r12 ::=  VisitedCellInfoList-r12


-- ASN1STOP
```

### – VarRLF-Report

The UE variable *VarRLF-Report* includes the radio link failure information or handover failure information.

***VarRLF-Report* UE variable**

```
-- 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** |
|---|
| ***cellIdentity***<br>Set to CellIdentity of the current cell. |
| ***c-RNTI***<br>Set to C-RNTI that the UE had in the PCell it was connected to prior to the failure. |
| ***physCellId***<br>Set to the physical cell identity of the PCell the UE was connected to prior to the failure. |

### – Multiplicity and type constraint definitions

This section includes multiplicity and type constraints applicable (only) for UE variables.

```
-- ASN1START

maxLogMeas-r10              INTEGER ::= 4060-- Maximum number of logged measurement entries
                                    -- that can be stored by the UE

-- ASN1STOP
```

### – End of EUTRA-UE-Variables

```
-- ASN1START

END

-- ASN1STOP
```

## 7.2 Counters

| Counter | Reset | Incremented | When reaching max value |
|---|---|---|---|
| | | | |

# 7.3 Timers (Informative)

| Timer | Start | Stop | At expiry |
|---|---|---|---|
| T300 | Transmission of *RRCConnectionRequest* | Reception of *RRCConnectionSetup* or *RRCConnectionReject* message, cell re-selection and upon abortion of connection establishment by upper layers | Perform the actions as specified in 5.3.3.6 |
| T301 | Transmission of *RRCConnectionReestablishmentRequest* | Reception of *RRCConnectionReestablishment* or *RRCConnectionReestablishmentReject* message as well as when the selected cell becomes unsuitable | Go to RRC_IDLE |
| T302 | Reception of *RRCConnectionReject* while performing RRC connection establishment | Upon entering RRC_CONNECTED and upon cell re-selection | Inform upper layers about barring alleviation as specified in 5.3.3.7 |
| T303 | Access barred while performing RRC connection establishment for mobile originating calls | Upon entering RRC_CONNECTED and upon cell re-selection | Inform upper layers about barring alleviation as specified in 5.3.3.7 |
| T304 | Reception of *RRCConnectionReconfiguration* message including the *MobilityControl Info* or reception of *MobilityFromEUTRACommand* message including *CellChangeOrder* | 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) | 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. |
| T305 | Access barred while performing RRC connection establishment for mobile originating signalling | Upon entering RRC_CONNECTED and upon cell re-selection | Inform upper layers about barring alleviation as specified in 5.3.3.7 |
| T306 | Access barred while performing RRC connection establishment for mobile originating CS fallback. | Upon entering RRC_CONNECTED and upon cell re-selection | Inform upper layers about barring alleviation as specified in 5.3.3.7 |
| T307 | Reception of *RRCConnectionReconfiguration* message including *MobilityControlInfoSCG* | Successful completion of random access on the PSCell, upon initiating re-establishment and upon SCG release | Inform E-UTRAN about the SCG change failure by initiating the SCG failure information procedure as specified in 5.6.13. |
| T310 | Upon detecting physical layer problems for the PCell i.e. upon receiving N310 consecutive out-of-sync indications from lower layers | Upon receiving N311 consecutive in-sync indications from lower layers for the PCell, upon triggering the handover procedure and upon initiating the connection re-establishment procedure | If security is not activated: go to RRC_IDLE else: initiate the connection re-establishment procedure |
| T311 | Upon initiating the RRC connection re-establishment procedure | Selection of a suitable E-UTRA cell or a cell using another RAT. | Enter RRC_IDLE |
| T312 | Upon triggering a measurement report for a measurement identity for which T312 has been configured, while T310 is running | 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 | If security is not activated: go to RRC_IDLE else: initiate the connection re-establishment procedure |

| Timer | Start | Stop | At expiry |
|---|---|---|---|
| T313 | Upon detecting physical layer problems for the PSCell i.e. upon receiving N313 consecutive out-of-sync indications from lower layers | Upon receiving N314 consecutive in-sync indications from lower layers for the PSCell, upon initiating the connection re-establishment procedure, upon SCG release and upon receiving *RRCConnectionReconfiguration* including *MobilityControlInfoSCG* | Inform E-UTRAN about the SCG radio link failure by initiating the SCG failure information procedure as specified in 5.6.13. |
| T320 | Upon receiving *t320* or upon cell (re)selection to E-UTRA from another RAT with validity time configured for dedicated priorities (in which case the remaining validity time is applied). | Upon entering RRC_CONNECTED, when PLMN selection is performed on request by NAS, or upon cell (re)selection to another RAT (in which case the timer is carried on to the other RAT). | Discard the cell reselection priority information provided by dedicated signalling. |
| T321 | Upon receiving *measConfig* including a *reportConfig* with the *purpose* set to *reportCGI* | Upon acquiring the information needed to set all fields of *cellGlobalId* for the requested cell, upon receiving *measConfig* that includes removal of the *reportConfig* with the *purpose* set to *reportCGI* | Initiate the measurement reporting procedure, stop performing the related measurements and remove the corresponding *measId* |
| T325 | Timer (re)started upon receiving *RRCConnectionReject* message with *deprioritisationTimer*. | | Stop deprioritisation of all frequencies or E-UTRA signalled by *RRCConnectionReject.* |
| T330 | Upon receiving *LoggedMeasurementConfiguration* message | Upon log volume exceeding the suitable UE memory, upon initiating the release of *LoggedMeasurementConfiguration* procedure | Perform the actions specified in 5.6.6.4 |
| T340 | Upon transmitting *UEAssistanceInformation* message with *powerPrefIndication* set to *normal* | Upon initiating the connection re-establishment procedure | No action. |
| T350 | Upon entering RRC_IDLE if *t350* has been received in wlan-OffloadInfo. | Upon entering RRC_CONNECTED, or upon cell reselection. | Perform the actions specified in 5.6.12.4. |

# 7.4 Constants

| Constant | Usage |
|---|---|
| N310 | Maximum number of consecutive "out-of-sync" indications for the PCell received from lower layers |
| N311 | Maximum number of consecutive "in-sync" indications for the PCell received from lower layers |
| N313 | Maximum number of consecutive "out-of-sync" indications for the PSCell received from lower layers |
| N314 | Maximum number of consecutive "in-sync" indications for the PSCell received from lower layers |

# 8 Protocol data unit abstract syntax

## 8.1 General

The RRC PDU contents in clause 6 and clause 10 are described using abstract syntax notation one (ASN.1) as specified in ITU-T Rec. X.680 [13] and X.681 [14]. Transfer syntax for RRC PDUs is derived from their ASN.1 definitions by use of Packed Encoding Rules, unaligned as specified in ITU-T Rec. X.691 [15].

The following encoding rules apply in addition to what has been specified in X.691:

- When a bit string value is placed in a bit-field as specified in 15.6 to 15.11 in X.691, the leading bit of the bit string value shall be placed in the leading bit of the bit-field, and the trailing bit of the bit string value shall be placed in the trailing bit of the bit-field.

NOTE: The terms 'leading bit' and 'trailing bit' are defined in ITU-T Rec. X.680. When using the 'bstring' notation, the leading bit of the bit string value is on the left, and the trailing bit of the bit string value is on the right.

- When decoding types constrained with the ASN.1 Contents Constraint ("CONTAINING"), automatic decoding of the contained type should not be performed because errors in the decoding of the contained type should not cause the decoding of the entire RRC message PDU to fail. It is recommended that the decoder first decodes the outer PDU type that contains the OCTET STRING or BIT STRING with the Contents Constraint, and then decodes the contained type that is nested within the OCTET STRING or BIT STRING as a separate step.

- When decoding a) RRC message PDUs, b) BIT STRING constrained with a Contents Constraint, or c) OCTET STRING constrained with a Contents Constraint, PER decoders are required to never report an error if there are extraneous zero or non-zero bits at the end of the encoded RRC message PDU, BIT STRING or OCTET STRING.

## 8.2 Structure of encoded RRC messages

An RRC PDU, which is the bit string that is exchanged between peer entities/ across the radio interface contains the basic production as defined in X.691.

RRC PDUs shall be mapped to and from PDCP SDUs (in case of DCCH) or RLC SDUs (in case of PCCH, BCCH, CCCH or MCCH) upon transmission and reception as follows:

- when delivering an RRC PDU as an PDCP SDU to the PDCP layer for transmission, the first bit of the RRC PDU shall be represented as the first bit in the PDCP SDU and onwards; and

- when delivering an RRC PDU as an RLC SDU to the RLC layer for transmission, the first bit of the RRC PDU shall be represented as the first bit in the RLC SDU and onwards; and

- upon reception of an PDCP SDU from the PDCP layer, the first bit of the PDCP SDU shall represent the first bit of the RRC PDU and onwards; and

- upon reception of an RLC SDU from the RLC layer, the first bit of the RLC SDU shall represent the first bit of the RRC PDU and onwards.

## 8.3 Basic production

The 'basic production' is obtained by applying UNALIGNED PER to the abstract syntax value (the ASN.1 description) as specified in X.691. It always contains a multiple of 8 bits.

## 8.4 Extension

The following rules apply with respect to the use of protocol extensions:

- A transmitter compliant with this version of the specification shall, unless explicitly indicated otherwise on a PDU type basis, set the extension part empty. Transmitters compliant with a later version may send non-empty extensions;

- A transmitter compliant with this version of the specification shall set spare bits to zero;

## 8.5 Padding

If the encoded RRC message does not fill a transport block, the RRC layer shall add padding bits. This applies to PCCH and BCCH.

Padding bits shall be set to 0 and the number of padding bits is a multiple of 8.

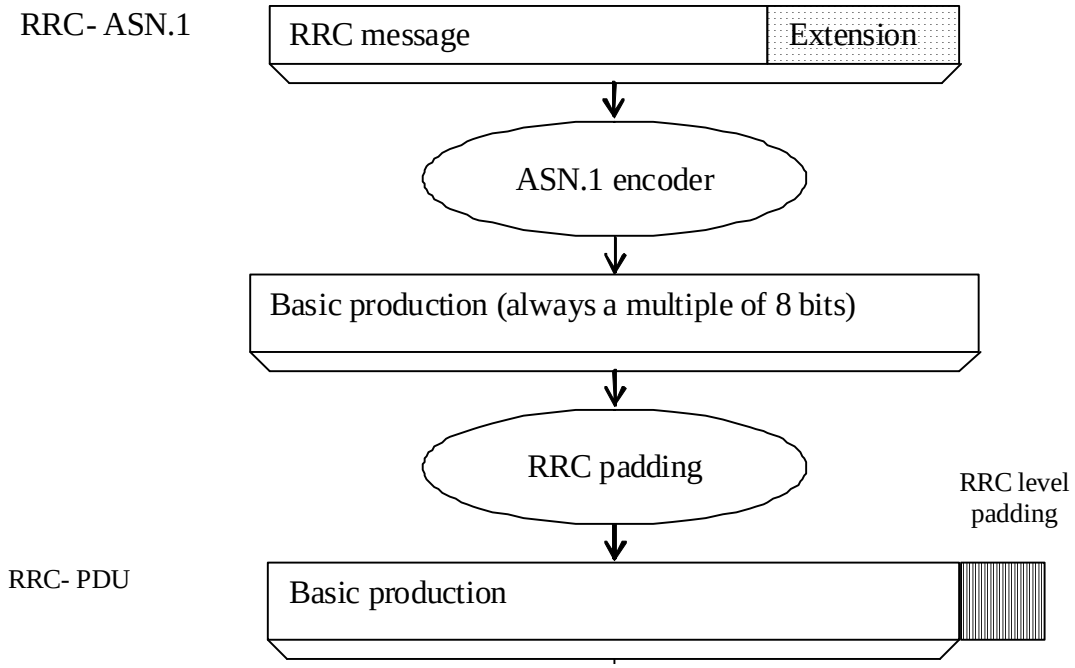


**Figure 8.5-1: RRC level padding**

# 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

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| PDCP configuration | N/A | | |
| RLC configuration | TM | | |
| MAC configuration | TM | | |

NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

### 9.1.1.2 CCCH configuration

Parameters

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| PDCP configuration | N/A | | |
| RLC configuration | TM | | |
| MAC configuration | | Normal MAC headers are used | |
| Logical channel configuration | | | |
| *priority* | 1 | Highest priority | |
| *prioritisedBitRate* | infinity | | |
| *bucketSizeDuration* | N/A | | |
| *logicalChannelGroup* | 0 | | |
| *logicalChannelSR-Mask-r9* | release | | v920 |

### 9.1.1.3 PCCH configuration

Parameters

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| PDCP configuration | N/A | | |
| RLC configuration | TM | | |
| MAC configuration | TM | | |

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

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| PDCP configuration | N/A | | |
| RLC configuration | UM | | |
| *Sn-FieldLength* | size5 | | |
| *t-Reordering* | 0 | | |

### 9.1.1.5 SBCCH configuration

Parameters

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| PDCP configuration | N/A | | |
| RLC configuration | TM | | |
| MAC configuration | TM | | |

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

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| PDCP configuration | | | |
| discardTimer | Undefined | Up to UE implementation | |
| pdcp-SN-Size | 16 | | |
| maxCID | 15 | | |
| profiles | | | |
| RLC configuration | | Uni-directional UM RLC<br>UM window size is set to 0 | |

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| *sn-FieldLength* | 5 | | |
| logicalChannelIdentity | Undefined | Selected by the transmitting UE, up to UE implementation | |
| Logical channel configuration | | | |
| priority | Undefined | Selected by the transmitting UE, up to UE implementation | |
| prioritisedBitRate | Undefined | Selected by the transmitting UE, up to UE implementation | |
| bucketSizeDuration | Undefined | Selected by the transmitting UE, up to UE implementation | |
| logicalChannelGroup | 3 | | |
| MAC configuration | | | |
| maxHARQ-Tx | 4 | | |

## 9.1.2 SRB configurations

### 9.1.2.1 SRB1

Parameters

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| RLC configuration | | | |
| *logicalChannelIdentity* | 1 | | |

### 9.1.2.2 SRB2

Parameters

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| RLC configuration | | | |
| *logicalChannelIdentity* | 2 | | |

# 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

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| RLC configuration CHOICE | am | | |
| *ul-RLC-Config*<br>*>t-PollRetransmit*<br>*>pollPDU*<br>*>pollByte*<br>*>maxRetxThreshold* | <br>ms45<br>infinity<br>infinity<br>t4 | | |
| *dl-RLC-Config*<br>*>t-Reordering*<br>*>t-StatusProhibit* | <br>ms35<br>ms0 | | |
| Logical channel configuration | | | |
| *priority* | 1 | Highest priority | |
| *prioritisedBitRate* | infinity | | |
| *bucketSizeDuration* | N/A | | |
| *logicalChannelGroup* | 0 | | |

#### 9.2.1.2 SRB2

Parameters

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| RLC configuration CHOICE | am | | |
| *ul-RLC-Config*<br>*>t-PollRetransmit*<br>*>pollPDU*<br>*>pollByte*<br>*>maxRetxThreshold* | <br>ms45<br>infinity<br>infinity<br>t4 | | |
| *dl-RLC-Config*<br>*>t-Reordering*<br>*>t-StatusProhibit* | <br>ms35<br>ms0 | | |
| Logical channel configuration | | | |
| *priority* | 3 | | |
| *prioritisedBitRate* | infinity | | |
| *bucketSizeDuration* | N/A | | |
| *logicalChannelGroup* | 0 | | |

### 9.2.2 Default MAC main configuration

Parameters

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| MAC main configuration | | | |
| *maxHARQ-tx* | n5 | | |
| *periodicBSR-Timer* | infinity | | |
| *retxBSR-Timer* | sf2560 | | |
| *ttiBundling* | FALSE | | |
| *drx-Config* | release | | |
| *phr-Config* | release | | |

### 9.2.3 Default semi-persistent scheduling configuration

| | | | |
|---|---|---|---|
| SPS-Config<br>*>sps-ConfigDL*<br>*>sps-ConfigUL* | <br>release<br>release | | |

### 9.2.4 Default physical channel configuration

Parameters

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| *PDSCH-ConfigDedicated*<br>*>p-a* | <br>dB0 | | |
| *PUCCH-ConfigDedicated*<br>*> tdd-AckNackFeedbackMode*<br>*>ackNackRepetition* | <br>bundling<br>release | <br>Only valid for TDD mode | |
| *PUSCH-ConfigDedicated*<br>*>betaOffset-ACK-Index*<br>*>betaOffset-RI-Index*<br>*>betaOffset-CQI-Index* | <br>10<br>12<br>15 | | |
| *UplinkPowerControlDedicated*<br>*>p0-UE-PUSCH*<br>*>deltaMCS-Enabled*<br>*>accumulationEnabled*<br>*>p0-UE-PUCCH*<br>*>pSRS-Offset*<br>*> filterCoefficient* | <br>0<br>en0 (disabled)<br>TRUE<br>0<br>7<br>fc4 | | |
| *tpc-pdcch-ConfigPUCCH* | release | | |
| *tpc-pdcch-ConfigPUSCH* | release | | |
| *CQI-ReportConfig*<br>*> CQI-ReportPeriodic*<br>*> cqi-ReportModeAperiodic*<br>*> nomPDSCH-RS-EPRE-Offset* | <br>release<br>N/A<br>N/A | | |
| *SoundingRS-UL-ConfigDedicated* | release | | |
| *AntennaInfoDedicated*<br>*>transmissionMode*<br><br><br><br>*>codebookSubsetRestriction*<br>*>ue-TransmitAntennaSelection* | <br>tm1, tm2<br><br><br><br>N/A<br>release | <br>If the number of PBCH antenna ports is one, tm1 is used as default; otherwise tm2 is used as default | |
| *SchedulingRequestConfig* | release | | |

### 9.2.5 Default values timers and constants

Parameters

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| t310 | ms1000 | | |
| n310 | n1 | | |
| t311 | ms1000 | | |
| n311 | n1 | | |

## 9.3 Sidelink pre-configured parameters

### 9.3.1 Specified parameters

This section only list parameters which value is specified in the standard.

Parameters

| Name | Value | Semantics description | Ver |
|---|---|---|---|
| *preconfigSync*<br>*>syncTxParameters*<br>*>>alpha* | | <br><br>0 | |
| *preconfigComm*<br>*>sc-TxParameters*<br>*>>alpha*<br>*>dataTxParameters*<br>*>>alpha* | | <br><br>0<br><br>0 | |

## 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].

```
-- ASN1START

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-OffsetIndicatorSync-r12,
    SL-PeriodComm-r12,
    RSRP-RangeSL3-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**

```
-- ASN1START
```

```
SL-Preconfiguration-r12 ::=     SEQUENCE {
    preconfigGeneral-r12            SL-PreconfigGeneral-r12,
    preconfigSync-r12               SL-PreconfigSync-r12,
    preconfigComm-r12               SL-PreconfigCommPoolList4-r12,
    ...
}

SL-PreconfigGeneral-r12 ::=         SEQUENCE {
    -- PDCP configuration
    rohc-Profiles-r12               SEQUENCE {
        profile0x0001-r12                   BOOLEAN,
        profile0x0002-r12                   BOOLEAN,
        profile0x0004-r12                   BOOLEAN,
        profile0x0006-r12                   BOOLEAN,
        profile0x0101-r12                   BOOLEAN,
        profile0x0102-r12                   BOOLEAN,
        profile0x0104-r12                   BOOLEAN
    },
    -- Physical configuration
    carrierFreq-r12                 ARFCN-ValueEUTRA-r9,
    maxTxPower-r12                  P-Max,
    additionalSpectrumEmission-r12      AdditionalSpectrumEmission,
    sl-bandwidth-r12                ENUMERATED {n6, n15, n25, n50, n75, n100},
    tdd-ConfigSL-r12                TDD-ConfigSL-r12,
    reserved-r12                    BIT STRING (SIZE (19)),
    ...
}

SL-PreconfigSync-r12 ::=    SEQUENCE {
    syncCP-Len-r12                  SL-CP-Len-r12,
    syncOffsetIndicator1-r12        SL-OffsetIndicatorSync-r12,
    syncOffsetIndicator2-r12        SL-OffsetIndicatorSync-r12,
    syncTxParameters-r12            P0-SL-r12,
    syncTxThreshOoC-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***<br>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***<br>Indicates a list of a number of individual resource pools. The same set of pools is used for for reception and transmission of sidelink direct communication. |
| ***syncRefDiffHyst***<br>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***<br>Hysteresis when evaluating a SyncRef UE using absolute comparison. Value *dB0* corresponds to 0 dB, *dB3* to 3 dB and so on. |

# 10 Radio information related interactions between network nodes

## 10.1 General

This section specifies RRC messages that are transferred between network nodes. These RRC messages may be transferred to or from the UE via another Radio Access Technology. Consequently, these messages have similar characteristics as the RRC messages that are transferred across the E-UTRA radio interface, i.e. the same transfer syntax and protocol extension mechanisms apply.

## 10.2 Inter-node RRC messages

### 10.2.1 General

This section specifies RRC messages that are sent either across the X2- or the S1-interface, either to or from the eNB, i.e. a single 'logical channel' is used for all RRC messages transferred across network nodes. The information could originate from or be destined for another RAT.

#### – EUTRA-InterNodeDefinitions

This ASN.1 segment is the start of the E-UTRA inter-node PDU definitions.

```
-- ASN1START

EUTRA-InterNodeDefinitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    AntennaInfoCommon,
    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,
    SystemInformationBlockType1-v890-IEs,
    SystemInformationBlockType2,
    UEAssistanceInformation-r11,
    UECapabilityInformation,
    UE-CapabilityRAT-ContainerList,
    UE-RadioPagingInfo-r12,
  WLAN-OffloadConfig-r12
FROM EUTRA-RRC-Definitions;

-- ASN1STOP
```

## 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**

```
-- ASN1START

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
}

-- ASN1STOP
```

| ***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**

```
-- ASN1START

HandoverPreparationInformation ::=   SEQUENCE {
    criticalExtensions                CHOICE {
        c1                            CHOICE{
            handoverPreparationInformation-r8     HandoverPreparationInformation-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture      SEQUENCE {}
    }
}

HandoverPreparationInformation-r8-IEs ::= SEQUENCE {
    ue-RadioAccessCapabilityInfo      UE-CapabilityRAT-ContainerList,
    as-Config                     AS-Config                 OPTIONAL,      -- Cond HO
    rrm-Config                        RRM-Config                OPTIONAL,
    as-Context                        AS-Context                OPTIONAL,      -- Cond HO
    nonCriticalExtension          HandoverPreparationInformation-v920-IEs       OPTIONAL
}

HandoverPreparationInformation-v920-IEs    ::= SEQUENCE {
    ue-ConfigRelease-r9               ENUMERATED {
                                  rel9, rel10, rel11, rel12, spare4, spare3,
                                  spare2, spare1, ...}          OPTIONAL,  -- Cond HO2
    nonCriticalExtension          HandoverPreparationInformation-v9d0-IEs       OPTIONAL
}

HandoverPreparationInformation-v9d0-IEs    ::= SEQUENCE {
```

```
    lateNonCriticalExtension            OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                HandoverPreparationInformation-v9e0-IEs         OPTIONAL
}

HandoverPreparationInformation-v9e0-IEs    ::= SEQUENCE {
    as-Config-v9e0                      AS-Config-v9e0                  OPTIONAL,  -- Cond HO2
    nonCriticalExtension                HandoverPreparationInformation-v1130-IEs    OPTIONAL
}

HandoverPreparationInformation-v1130-IEs  ::= SEQUENCE {
    as-Context-v1130                    AS-Context-v1130                OPTIONAL,  -- Cond HO2
    nonCriticalExtension                HandoverPreparationInformation-v1250-IEs                OPTIONAL
}

HandoverPreparationInformation-v1250-IEs ::= SEQUENCE {
    ue-SupportedEARFCN-r12              ARFCN-ValueEUTRA-r9             OPTIONAL,  -- Cond HO3
    as-Config-v1250                     AS-Config-v1250                 OPTIONAL,  -- Cond HO2
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

| ***HandoverPreparationInformation* field descriptions** |
|---|
| ***as-Config***<br>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***<br>Local E-UTRAN context required by the target eNB. |
| ***rrm-Config***<br>Local E-UTRAN context used depending on the target node"s implementation, which is mainly used for the RRM purpose. |
| ***ue-ConfigRelease***<br>Indicates the RRC protocol release 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***<br>NOTE 2 |
| ***ue-SupportedEARFCN***<br>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.

| Source RAT | E-UTRA capabilites | UTRA capabilities | GERAN capabilities |
|---|---|---|---|
| UTRAN | Included | May be included, ignored by eNB if received | May be included |
| GERAN CS | Excluded | May be included, ignored by eNB if received | Included |
| GERAN PS | Excluded | May be included, ignored by eNB if received | Included |
| E-UTRAN | Included | May be included | May be included |

| Conditional presence | Explanation |
|---|---|
| *HO* | The field is mandatory present in case of handover within E-UTRA; otherwise the field is not present. |
| *HO2* | The field is optional present in case of handover within E-UTRA; otherwise the field is not present. |
| *HO3* | The field is optional present in case of handover from GERAN to E-UTRA, otherwise the field is not present. |

## – SCG-Config

This message is used to transfer the SCG radio configuration generated by the SeNB.

Direction: Secondary eNB to master eNB

***SCG-Config* message**

```
-- 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*** <br> Includes the change of the dedicated SCG configuration and, upon addition of an SCG cell, the common SCG configuration. <br> 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**

```
-- 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-r12RadioResourceConfigDedicated       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,
    mbmsInterestIndication-r12      OCTET STRING (CONTAINING
                                    MBMSInterestIndication-r11)     OPTIONAL,
    measResultServCellListSCG-r12   MeasResultServCellListSCG-r12       OPTIONAL,
    drb-ToAddModListSCG-r12             DRB-InfoListSCG-r12                 OPTIONAL,
    drb-ToReleaseListSCG-r12        DRB-ToReleaseList                   OPTIONAL,
    sCellToAddModListSCG-r12        SCellToAddModListSCG-r12            OPTIONAL,
    sCellToReleaseListSCG-r12       SCellToReleaseList-r10              OPTIONAL,
    p-Max-r12                       P-Max                               OPTIONAL,
    nonCriticalExtension        SEQUENCE {}                             OPTIONAL
}

DRB-InfoListSCG-r12 ::=             SEQUENCE (SIZE (1..maxDRB)) OF DRB-InfoSCG-r12

DRB-InfoSCG-r12 ::=             SEQUENCE {
    eps-BearerIdentity-r12          INTEGER (0..15)             OPTIONAL,  -- Cond DRB-Setup
    drb-Identity-r12            DRB-Identity,
    drb-Type-r12                ENUMERATED {split, scg}     OPTIONAL,  -- Cond DRB-Setup
    ...
}

SCellToAddModListSCG-r12 ::=    SEQUENCE (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 (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
    },
    ...
}

SCG-ConfigRestrictInfo-r12 ::=          SEQUENCE {
    maxSCH-TB-BitsDL-r12                INTEGER (1..100),
    maxSCH-TB-BitsUL-r12                INTEGER (1..100)
}

-- ASN1STOP
```

| ***SCG-ConfigInfo* field descriptions** |
|---|
| ***drb-ToAddModListSCG***<br>Includes DRBs the SeNB is requested to establish or modify (DRB type change). |
| ***drb-ToReleaseListSCG***<br>Includes DRBs the SeNB is requested to release. |
| ***maxSCH-TB-BitsXL***<br>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***<br>Includes the current measurement gap configuration. |
| ***measResultServCellListSCG***<br>Includes measurement results of SCG (serving) cells. |
| ***radioResourceConfigDedMCG***<br>Includes the current dedicated MCG radio resource configuration. |
| ***sCellToAddModListMCG***<br>Includes the current MCG SCell configuration. |
| ***sCellToAddModListSCG***<br>Includes SCG cells the SeNB is requested to establish. Measurement results may be provided for these cells. |
| ***sCellToReleaseListSCG***<br>Includes SCG cells the SeNB is requested to release. |
| ***scg-RadioConfig***<br>Includes the current dedicated SCG configuration. |
| ***scg-ConfigRestrictInfo***<br>Includes fields for which MeNB explictly indicates the restriction to be observed by SeNB. |
| ***p-Max***<br>Cell specific value i.e. as broadcast by PCell. |

| Conditional presence | Explanation |
|---|---|
| *DRB-Setup* | The field is mandatory present in case DRB establishment is requested; otherwise the field is not present. |
| *SCellAdd* | The field is mandatory present in case SCG cell establishment is requested; otherwise the field is not present. |
| *SCellAdd2* | The field is optional present in case SCG cell establishment is requested; otherwise the field is not present. |

## – 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**

```
-- ASN1START


UERadioAccessCapabilityInformation ::= SEQUENCE {
    criticalExtensions                  CHOICE {
        c1                              CHOICE{
            ueRadioAccessCapabilityInformation-r8
                                            UERadioAccessCapabilityInformation-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
    }
}


UERadioAccessCapabilityInformation-r8-IEs ::= SEQUENCE {
    ue-RadioAccessCapabilityInfo    OCTET STRING (CONTAINING UECapabilityInformation),
    nonCriticalExtension            SEQUENCE {}                         OPTIONAL
}


-- ASN1STOP
```

| ***UERadioAccessCapabilityInformation* field descriptions** |
|---|
| ***ue-RadioAccessCapabilityInfo***<br>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

UERadioPagingInformation ::= SEQUENCE {
    criticalExtensions                  CHOICE {
        c1                              CHOICE{
            ueRadioPagingInformation-r12        UERadioPagingInformation-r12-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
    }
}

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
                                        {..., nonCriticalExtension ABSENT}),
    sourceSystemInformationBlockType2   SystemInformationBlockType2,
    antennaInfoCommon                   AntennaInfoCommon,
    sourceDl-CarrierFreq                ARFCN-ValueEUTRA,
    ...,
    [[  sourceSystemInformationBlockType1Ext  OCTET STRING (CONTAINING
                                        SystemInformationBlockType1-v890-IEs)OPTIONAL,
        sourceOtherConfig-r9            OtherConfig-r9
    -- sourceOtherConfig-r9 should have been optional. A target eNB compliant with this transfer
    -- syntax should support receiving an AS-Config not including this extension addition group
    -- e.g. from a legacy source eNB
    ]],
    [[  sourceSCellConfigList-r10       SCellToAddModList-r10       OPTIONAL
    ]],
    [[  sourceConfigSCG-r12             SCG-Config-r12      OPTIONAL
    ]]
}

AS-Config-v9e0 ::=              SEQUENCE {
    sourceDl-CarrierFreq-v9e0       ARFCN-ValueEUTRA-v9e0
}

AS-Config-v1250 ::=             SEQUENCE {
    sourceWlan-OffloadConfig-r12    WLAN-OffloadConfig-r12          OPTIONAL,
    sourceSL-CommConfig-r12         SL-CommConfig-r12               OPTIONAL,
    sourceSL-DiscConfig-r12         SL-DiscConfig-r12               OPTIONAL
}
```

```
-- ASN1STOP
```

NOTE: The *AS-Config* re-uses information elements primarily created to cover the radio interface signalling requirements. Consequently, the information elements may include some parameters that are not relevant for the target eNB e.g. the SFN as included in the *MasterInformationBlock*.

| ***AS-Config* field descriptions** |
|---|
| ***antennaInfoCommon***<br>This field provides information about the number of antenna ports in the source PCell. |
| ***sourceDL-CarrierFreq***<br>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***<br>Provides other configuration in the source PCell. |
| ***sourceMasterInformationBlock***<br>*MasterInformationBlock* transmitted in the source PCell. |
| ***sourceMeasConfig***<br>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***<br>This field covers the sidelink direct communication configuration. |
| ***sourceSL-DiscConfig***<br>This field covers the sidelink direct discovery configuration. |
| ***sourceRadioResourceConfig***<br>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***<br>Radio resource configuration (common and dedicated) of the SCells configured in the source eNB. |
| ***sourceSecurityAlgorithmConfig***<br>This field provides the AS integrity protection (SRBs) and AS ciphering (SRBs and DRBs) algorithm configuration used in the source PCell. |
| ***sourceSystemInformationBlockType1***<br>*SystemInformationBlockType1* transmitted in the source PCell. |
| ***sourceSystemInformationBlockType2***<br>*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**

```
-- ASN1START


AS-Context ::=                  SEQUENCE {
    reestablishmentInfo             ReestablishmentInfo         OPTIONAL   -- Cond HO
}


AS-Context-v1130 ::=            SEQUENCE {
    idc-Indication-r11              OCTET STRING (CONTAINING
                                InDeviceCoexIndication-r11)    OPTIONAL,  -- Cond HO2
    mbmsInterestIndication-r11      OCTET STRING (CONTAINING
```

```
                                    MBMSInterestIndication-r11)   OPTIONAL,  -- Cond HO2
    powerPrefIndication-r11             OCTET STRING (CONTAINING
                                    UEAssistanceInformation-r11)  OPTIONAL,  -- Cond HO2
    ...,
    [[  sidelinkUEInformation-r12           OCTET STRING (CONTAINING
                                        SidelinkUEInformation-r12)     OPTIONAL   -- Cond HO2
    ]]
}

-- ASN1STOP
```

| ***AS-Context* field descriptions** |
|---|
| ***idc-Indication***<br>Including information used for handling the IDC problems. |
| ***reestablishmentInfo***<br>Including information needed for the RRC connection re-establishment. |

| Conditional presence | Explanation |
|---|---|
| *HO* | The field is mandatory present in case of handover within E-UTRA; otherwise the field is not present. |
| *HO2* | The field is optional present in case of handover within E-UTRA; otherwise the field is not present. |

## – ReestablishmentInfo

The *ReestablishmentInfo* IE contains information needed for the RRC connection re-establishment.

***ReestablishmentInfo* information element**

```
-- ASN1START

ReestablishmentInfo ::=             SEQUENCE {
    sourcePhysCellId                PhysCellId,
    targetCellShortMAC-I                ShortMAC-I,
    additionalReestabInfoList           AdditionalReestabInfoList               OPTIONAL,
    ...
}

AdditionalReestabInfoList ::=       SEQUENCE ( SIZE (1..maxReestabInfo) ) OF AdditionalReestabInfo

AdditionalReestabInfo ::=   SEQUENCE{
    cellIdentity                    CellIdentity,
```

```
    key-eNodeB-Star             Key-eNodeB-Star,
    shortMAC-I                  ShortMAC-I
}

Key-eNodeB-Star ::=             BIT STRING (SIZE (256))

-- ASN1STOP
```

| ***ReestablishmentInfo field descriptions*** |
|---|
| ***additionalReestabInfoList*** <br> 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*** <br> 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*** <br> The physical cell identity of the source PCell, used to determine the UE context in the target eNB at re-establishment. |
| ***targetCellShortMAC-I*** <br> 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**

```
-- 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** |
|---|
| ***candidateCellInfoList***<br>A list of the best cells on each frequency for which measurement information was available, in order of decreasing RSRP. |
| ***dl-CarrierFreq***<br>The source includes *dl-CarrierFreq-v1090* if and only if *dl-CarrierFreq-r10* is set to *maxEARFCN*. |
| ***ue-InactiveTime***<br>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. |

## 10.4 Inter-node RRC multiplicity and type constraint values

### – Multiplicity and type constraints definitions

```
-- ASN1START

maxReestabInfo              INTEGER ::= 32 -- Maximum number of KeNB* and shortMAC-I forwarded
```

```
                                    -- at handover for re-establishment preparation


-- ASN1STOP
```

## – End of EUTRA-InterNodeDefinitions

```
-- ASN1START


END


-- ASN1STOP
```

# 10.5 Mandatory information in *AS-Config*

The *AS-Config* transferred between source eNB and target-eNB shall include all IEs necessary to describe the AS context. The conditional presence in section 6 is only applicable for eNB to UE communication.

The "need" or "cond" statements are not applied in case of sending the IEs from source eNB to target eNB. Some 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.

| Parameter | Description | Value |
|---|---|---|
| #DRBs | The number of DRBs that a UE shall support | 8 |
| #RLC-AM | The number of RLC AM entities that a UE shall support | 10 |
| #minCellperMeasObjectEUTRA | The minimum number of neighbour cells (excluding black list cells) that a UE shall be able to store within a MeasObjectEUTRA. NOTE. | 32 |
| #minBlackCellRangesperMeasObjectEUTRA | The minimum number of blacklist cell PCI ranges that a UE shall be able to store within a MeasObjectEUTRA | 32 |
| #minCellperMeasObjectUTRA | The minimum number of neighbour cells that a UE shall be able to store within a MeasObjectUTRA. NOTE. | 32 |
| #minCellperMeasObjectGERAN | The minimum number of neighbour cells that a UE shall be able to store within a measObjectGERAN. NOTE. | 32 |
| #minCellperMeasObjectCDMA2000 | The minimum number of neighbour cells that a UE shall be able to store within a measObjectCDMA2000. NOTE. | 32 |
| #minCellTotal | The minimum number of neighbour cells (excluding black list cells) that UE shall be able to store in total in all measurement objects configured | 256 |
| 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.

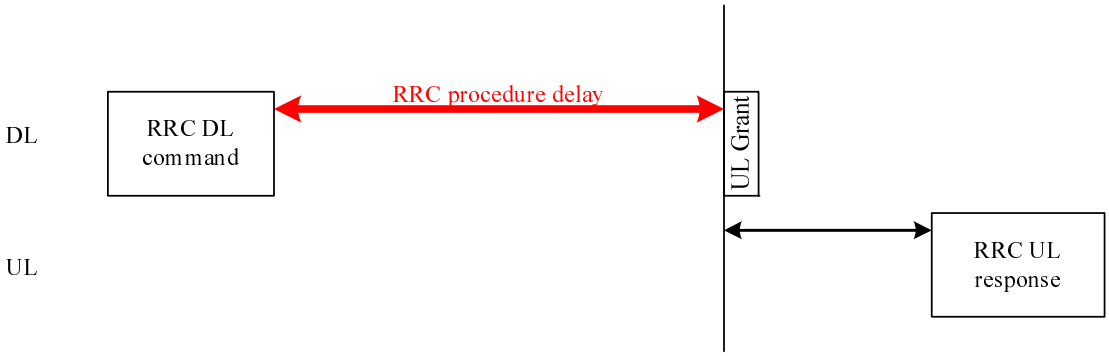


**Figure 11.2-1: Illustration of RRC procedure delay**

| Procedure title: | E-UTRAN -> UE | UE -> E-UTRAN | N | Notes |
|---|---|---|---|---|

| Procedure title: | E-UTRAN -> UE | UE -> E-UTRAN | N | Notes |
|---|---|---|---|---|
| **RRC Connection Control Procedures** | | | | |
| RRC connection establishment | *RRCConnectionSetup* | *RRCConnectionSetupComplete* | 15 | |
| RRC connection release | *RRCConnectionRelease* | | NA | |
| RRC connection re-configuration (radio resource configuration) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 15 | |
| RRC connection re-configuration (measurement configuration) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 15 | |
| RRC connection re-configuration (intra-LTE mobility) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 15 | |
| RRC connection reconfiguration (SCell addition/release) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 20 | |
| RRC connection reconfiguration (SCG establishment/ release, SCG cell addition/ release) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 20 | |
| RRC connection re-establishment | *RRCConnectionReestablishment* | *RRCConnectionReestablishmentComplete* | 15 | |
| Initial security activation | *SecurityModeCommand* | *SecurityModeCommandComplete/SecurityModeCommandFailure* | 10 | |
| Initial security activation + RRC connection re-configuration (RB establishment) | *SecurityModeCommand, RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 20 | The two DL messages are transmitted in the same TTI |
| Paging | *Paging* | | NA | |
| **Inter RAT mobility** | | | | |
| Handover to E-UTRA | *RRCConnectionReconfiguration (sent by other RAT)* | *RRCConnectionReconfigurationComplete* | NA | The performance of this procedure is specified in [50] in case of handover from GSM and [29], [30] in case of handover from UTRA. |
| Handover from E-UTRA | *MobilityFromEUTRACommand* | | NA | The performance of this procedure is specified in [16] |
| Handover from E-UTRA to CDMA2000 | *HandoverFromEUTRAPreparationRequest (CDMA2000)* | | NA | Used to trigger the handover preparation procedure with a CDMA2000 RAT. The performance of this procedure is specified in [16] |
| **Measurement procedures** | | | | |
| Measurement Reporting | | *MeasurementReport* | NA | |
| **Other procedures** | | | | |
| UE capability transfer | *UECapabilityEnquiry* | *UECapabilityInformation* | 10 | |
| Counter check | *CounterCheck* | *CounterCheckResponse* | 10 | |
| Proximity indication | | *ProximityIndication* | NA | |

| Procedure title: | E-UTRAN -> UE | UE -> E-UTRAN | N | Notes |
|---|---|---|---|---|
| UE information | *UEInformationRequest* | *UEInformationResponse* | 15 | |
| MBMS counting | *MBMSCountingRequest* | *MBMSCountingResponse* | NA | |
| MBMS interest indication | | *MBMSInterestIndication* | NA | |
| In-device coexistence indication | | *InDeviceCoexIndication* | NA | |
| UE assistance information | | *UEAssistanceInformation* | NA | |
| SCG failure information | | *SCGFailureInformation* | NA | |
| SidelinkUE information | | *SidelinkUEInformation* | NA | |

## 11.3 Void

# Annex A (informative): Guidelines, mainly on use of ASN.1

Editor's note No agreements have been reached concerning the extension of RRC PDUs so far. Any statements in this section about the protocol extension mechanism should be considered as FFS.

## A.1 Introduction

The following clauses contain guidelines for the specification of RRC protocol data units (PDUs) with ASN.1.

## A.2 Procedural specification

### A.2.1 General principles

The procedural specification provides an overall high level description regarding the UE behaviour in a particular scenario.

It should be noted that most of the UE behaviour associated with the reception of a particular field is covered by the applicable parts of the PDU specification. The procedural specification may also include specific details of the UE behaviour upon reception of a field, but typically this should be done only for cases that are not easy to capture in the PDU section e.g. general actions, more complicated actions depending on the value of multiple fields.

Likewise, the procedural specification need not specify the UE requirements regarding the setting of fields within the messages that are send to E-UTRAN i.e. this may also be covered by the PDU specification.

### A.2.2 More detailed aspects

The following more detailed conventions should be used:

- Bullets:
  - Capitals should be used in the same manner as in other parts of the procedural text i.e. in most cases no capital applies since the bullets are part of the sentence starting with 'The UE shall:'
  - All bullets, including the last one in a sub-clause, should end with a semi-colon i.e. an ';'
- Conditions
  - Whenever multiple conditions apply, a semi-colon should be used at the end of each conditions with the exception of the last one, i.e. as in 'if cond1; or cond2:

## A.3 PDU specification

### A.3.1 General principles

#### A.3.1.1 ASN.1 sections

The RRC PDU contents are formally and completely described using abstract syntax notation (ASN.1), see X.680 [13], X.681 (02/2002) [14].

The complete ASN.1 code is divided into a number of ASN.1 sections in the specifications. In order to facilitate the extraction of the complete ASN.1 code from the specification, each ASN.1 section begins with a text paragraph consisting entirely of an *ASN.1 start tag*, which consists of a double hyphen followed by a single space and the text string "ASN1START" (in all upper case letters). Each ASN.1 section ends with a text paragraph consisting entirely of an *ASN.1 stop tag*, which consists of a double hyphen followed by a single space and the text "ASN1STOP" (in all upper case letters):

```
-- 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 "-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 suffices are not used, unless there is a clear need to distinguish the extension from the original field.

- More generally, in case there is a need to distinguish different variants of an ASN.1 field or IE, a suffix should be added at the end of the identifiers e.g. *MeasObjectUTRA*, *ConfigCommon*. When there is no particular need to distinguish the fields (e.g. because the field is included in different IEs), a common field identifier name may be used. This may be attractive e.g. in case the procedural specification is the same for the different variants.

**Table A.3.1.2-1: Examples of typical abbreviations used in ASN.1 identifiers**

| Abbreviation | Abbreviated word |
|---|---|
| Comm | Communication |
| Conf | Confirmation |
| Config | Configuration |
| Disc | Discovery |
| DL | Downlink |
| Ext | Extension |
| Freq | Frequency |
| Id | Identity |
| Ind | Indication |
| Info | Information |
| Meas | Measurement |
| Neigh | Neighbour(ing) |
| Param(s) | Parameter(s) |
| Persist | Persistent |
| Phys | Physical |
| Proc | Process |
| Reestab | Reestablishment |
| Req | Request |
| Rx | Reception |
| Sched | Scheduling |
| Sync | Synchronisation |
| Thresh | Threshold |
| Tx/ Transm | Transmission |
| UL | Uplink |

NOTE: The table A.3.1.2.1-1 is not exhaustive. Additional abbreviations may be used in ASN.1 identifiers when needed.

### A.3.1.3 Text references using ASN.1 identifiers

A text reference into the RRC PDU contents description from other parts of the specification is made using the ASN.1 field 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.

```
-- /example/ ASN1START


LogicalChannelConfig ::=          SEQUENCE {
    ul-SpecificParameters             SEQUENCE {
        priority                      Priority,
        prioritisedBitRate                PrioritisedBitRate,
        bucketSizeDuration                BucketSizeDuration,
        logicalChannelGroup                   INTEGER (0..3)
    }       OPTIONAL
}
```

```
-- ASN1STOP
```

NOTE: All the ASN.1 start tags in the ASN.1 sections, used as examples in this annex to the specification, are deliberately distorted, in order not to include them when the ASN.1 description of the RRC PDU contents is extracted from the specification.

A reference to a specific type of information element should be made using the corresponding ASN.1 type identifier preceded by the acronym "IE", e.g., a reference to the IE *LogicalChannelConfig* in the example above.

References to a specific type of information element should only be used when those are generic, i.e., without regard to the particular context wherein the specific type of information element is used. If the reference is related to a particular context, e.g., an RRC PDU type (message) wherein the information element is used, the corresponding field identifier in that context should be used in the text reference.

A reference to a specific value of an ASN.1 field should be made using the corresponding ASN.1 value without using quotation marks around the ASN.1 value, e.g., 'if the *status* field is set to value *true*'.

## A.3.2 High-level message structure

Within each logical channel type, the associated RRC PDU (message) types are alternatives within a CHOICE, as shown in the example below.

```
-- /example/ ASN1START


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


DL-DCCH-MessageType ::= CHOICE {
    c1                      CHOICE {
        dlInformationTransfer                   DLInformationTransfer,
        handoverFromEUTRAPreparationRequest     HandoverFromEUTRAPreparationRequest,
        mobilityFromEUTRACommand                MobilityFromEUTRACommand,
        rrcConnectionReconfiguration            RRCConnectionReconfiguration,
        rrcConnectionRelease                    RRCConnectionRelease,
        securityModeCommand                     SecurityModeCommand,
        ueCapabilityEnquiry                     UECapabilityEnquiry,
        spare1 NULL
    },
    messageClassExtension  SEQUENCE {}
}


-- ASN1STOP
```

A nested two-level CHOICE structure is used, where the alternative PDU types are alternatives within the inner level *c1* CHOICE.

Spare alternatives (i.e., *spare1* in this case) may be included within the *c1* CHOICE to facilitate future extension. The number of such spare alternatives should not extend the total number of alternatives beyond an integer-power-of-two number of alternatives (i.e., eight in this case).

Further extension of the number of alternative PDU types is facilitated using the *messageClassExtension* alternative in the outer level CHOICE.

## A.3.3 Message definition

Each PDU (message) type is specified in an ASN.1 section similar to the one shown in the example below.

```
-- /example/ ASN1START


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


RRCConnectionReconfiguration-r8-IEs ::= SEQUENCE {
    -- Enter the IEs here.
    ...
}


-- ASN1STOP
```

Hooks for *critical* and *non-critical* extension should normally be included in the PDU type specification. How these hooks are used is further described in sub-clause A.4.

Critical extensions are characterised by a redefinition of the PDU contents and need to be governed by a mechanism for protocol version agreement between the encoder and the decoder of the PDU, such that the encoder is prevented from sending a critically extended version of the PDU type, which is not comprehended by the decoder.

Critical extension of a PDU type is facilitated by a two-level CHOICE structure, where the alternative PDU contents are alternatives within the inner level *c1* CHOICE. Spare alternatives (i.e., *spare3* down to *spare1* in this case) may be included within the *c1* CHOICE. The number of spare alternatives to be included in the original PDU specification should be decided case by case, based on the expected rate of critical extension in the future releases of the protocol.

Further critical extension, when the spare alternatives from the original specifications are used up, is facilitated using the *criticalExtensionsFuture* in the outer level CHOICE.

In PDU types where critical extension is not expected in the future releases of the protocol, the inner level *c1* CHOICE and the spare alternatives may be excluded, as shown in the example below.

```
-- /example/ ASN1START


RRCConnectionReconfigurationComplete ::= SEQUENCE {
    rrc-TransactionIdentifier          RRC-TransactionIdentifier,
    criticalExtensions                      CHOICE {
        rrcConnectionReconfigurationComplete-r8
                                            RRCConnectionReconfigurationComplete-r8-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}


RRCConnectionReconfigurationComplete-r8-IEs ::= SEQUENCE {
    -- Enter the IEs here. --                                                    -- Cond condTag
    ...
}


-- ASN1STOP
```

Non-critical extensions are characterised by the addition of new information to the original specification of the PDU type. If not comprehended, a non-critical extension may be skipped by the decoder, whilst the decoder is still able to complete the decoding of the comprehended parts of the PDU contents.

Non-critical extensions at locations other than the end of the message or other than at the end of a field contained in a BIT or OCTET STRING are facilitated by use of the ASN.1 extension marker "...". The original specification of a PDU type should normally include the extension marker at the end of the sequence of information elements contained.

Non-critical extensions at the end of the message or at the end of a field that is contained in a BIT or OCTET STRING are facilitated by use of an empty sequence that is marked OPTIONAL e.g. as shown in the following example:

```
-- /example/ ASN1START


RRCMessage-r8-IEs ::=                   SEQUENCE {
    field1                              InformationElement1,
    field2                              InformationElement2,
    nonCriticalExtension                SEQUENCE {}                 OPTIONAL
}
```

```
-- ASN1STOP
```

The ASN.1 section specifying the contents of a PDU type may be followed by a *field description* table where a further description of, e.g., the semantic properties of the fields may be included. The general format of this table is shown in the example below. The field description table is absent in case there are no fields for which further description needs to be provided e.g. because the PDU does not include any fields, or because an IE is defined for each field while there is nothing specific regarding the use of this IE that needs to be specified.

| ***%PDU-TypeIdentifier%* field descriptions** |
|---|
| ***%field identifier%***<br>Field description. |
| ***%field identifier%***<br>Field description. |

The field description table has one column. The header row shall contain the ASN.1 type identifier of the PDU type.

The following rows are used to provide field descriptions. Each row shall include a first paragraph with a *field identifier* (in ***bold and italic*** font style) referring to the part of the PDU to which it applies. The following paragraphs at the same row may include (in regular font style), e.g., semantic description, references to other specifications and/ or specification of value units, which are relevant for the particular part of the PDU.

The parts of the PDU contents that do not require a field description shall be omitted from the field description table.

## A.3.4 Information elements

Each IE (information element) type is specified in an ASN.1 section similar to the one shown in the example below.

```
-- /example/ ASN1START


PRACH-ConfigSIB ::=             SEQUENCE {
    rootSequenceIndex               INTEGER (0..1023),
    prach-ConfigInfo            PRACH-ConfigInfo
}


PRACH-Config ::=                SEQUENCE {
    rootSequenceIndex               INTEGER (0..1023),
    prach-ConfigInfo            PRACH-ConfigInfo            OPTIONAL   -- Need ON
}


PRACH-ConfigInfo ::=            SEQUENCE {
    prach-ConfigIndex               ENUMERATED {ffs},
    highSpeedFlag                   ENUMERATED {ffs},
    zeroCorrelationZoneConfig       ENUMERATED {ffs}
}


-- ASN1STOP
```

IEs should be introduced whenever there are multiple fields for which the same set of values apply. IEs may also be defined for other reasons e.g. to break down a ASN.1 definition in to smaller pieces.

A group of closely related IE type definitions, like the IEs *PRACH-ConfigSIB* and *PRACH-Config* in this example, are preferably placed together in a common ASN.1 section. The IE type identifiers should in this case have a common base, defined as the *generic type identifier*. It may be complemented by a suffix to distinguish the different variants. The "*PRACH-Config*" is the generic type identifier in this example, and the "*SIB*" suffix is added to distinguish the variant. The sub-clause heading and generic references to a group of closely related IEs defined in this way should use the generic type identifier.

The same principle should apply if a new version, or an extension version, of an existing IE is created for *critical* or *non-critical* extension of the protocol (see sub-clause A.4). The new version, or the extension version, of the IE is included in the same ASN.1 section defining the original. A suffix is added to the type identifier, using the naming conventions defined in sub-clause A.3.1.2, indicating the release or version of the where the new version, or extension version, was introduced.

Local IE type definitions, like the IE *PRACH-ConfigInfo* in the example above, may be included in the ASN.1 section and be referenced in the other IE types defined in the same ASN.1 section. The use of locally defined IE types should be encouraged, as a tool to break up large and complex IE type definitions. It can improve the readability of the code. There may also be a benefit for the software implementation of the protocol end-points, as these IE types are typically provided by the ASN.1 compiler as independent data elements, to be used in the software implementation.

An IE type defined in a local context, like the IE *PRACH-ConfigInfo*, should not be referenced directly from other ASN.1 sections in the RRC specification. An IE type which is referenced in more than one ASN.1 section should be defined in a separate sub-clause, with a separate heading and a separate ASN.1 section (possibly as one in a set of closely related IE types, like the IEs *PRACH-ConfigSIB* and *PRACH-Config* in the example above). Such IE types are also referred to as 'global IEs'.

NOTE: Referring to an IE type, that is defined as a local IE type in the context of another ASN.1 section, does not generate an ASN.1 compilation error. Nevertheless, using a locally defined IE type in that way makes the IE type definition difficult to find, as it would not be visible at an outline level of the specification. It should be avoided.

The ASN.1 section specifying the contents of one or more IE types, like in the example above, may be followed by a *field description* table, where a further description of, e.g., the semantic properties of the fields of the information elements may be included. This table may be absent, similar as indicated in sub-clause A.3.3 for the specification of the PDU type. The general format of the *field description* table is the same as shown in sub-clause A.3.3 for the specification of the PDU type.

## A.3.5 Fields with optional presence

A field with optional presence may be declared with the keyword DEFAULT. It identifies a default value to be assumed, if the sender does not include a value for that field in the encoding:

```
-- /example/ ASN1START


PreambleInfo ::=                SEQUENCE {
    numberOfRA-Preambles                INTEGER (1..64)                 DEFAULT 1,
    ...
}


-- ASN1STOP
```

Alternatively, a field with optional presence may be declared with the keyword OPTIONAL. It identifies a field for which a value can be omitted. The omission carries semantics, which is different from any normal value of the field:

```
-- /example/ ASN1START


PRACH-Config ::=                SEQUENCE {
    rootSequenceIndex                   INTEGER (0..1023),
    prach-ConfigInfo                PRACH-ConfigInfo                OPTIONAL   -- Need ON
}


-- ASN1STOP
```

The semantics of an optionally present field, in the case it is omitted, should be indicated at the end of the paragraph including the keyword OPTIONAL, using a short comment text with a need statement. The need statement includes the keyword "Need", followed by one of the predefined semantics tags (OP, ON or OR) defined in sub-clause 6.1. If the semantics tag OP is used, the semantics of the absent field are further specified either in the field description table following the ASN.1 section, or in procedure text.

## A.3.6 Fields with conditional presence

A field with conditional presence is declared with the keyword OPTIONAL. In addition, a short comment text shall be included at the end of the paragraph including the keyword OPTIONAL. The comment text includes the keyword "Cond", followed by a condition tag associated with the field ("UL" in this example):

```
-- /example/ ASN1START


LogicalChannelConfig ::=            SEQUENCE {
    ul-SpecificParameters               SEQUENCE {
        priority                        INTEGER (0),
        ...
    }       OPTIONAL                                                    -- Cond UL
}


-- ASN1STOP
```

When conditionally present fields are included in an ASN.1 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.

| Conditional presence | Explanation |
|---|---|
| UL | **Specification of the conditions for including the field associated with the condition tag = "UL". Semantics in case of optional presence under certain conditions may also be specified.** |

The conditional presence table has two columns. The first column (heading: "Conditional presence") contains the condition tag (in *italic* font style), which links the fields with a condition tag in the ASN.1 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 indepedently e.g. by another message and/ or at another point in time, the relation is best reflected by means of a statement in the field description table.

If the ASN.1 section does not include any fields with conditional presence, the conditional presence table shall not be included.

Whenever a field is only applicable in specific cases e.g. TDD, use of conditional presence should be considered.

## A.3.7 Guidelines on use of lists with elements of SEQUENCE type

Where an information element has the form of a list (the SEQUENCE OF construct in ASN.1) with the type of the list elements being a SEQUENCE data type, an information element shall be defined for the list elements even if it would not otherwise be needed.

For example, a list of PLMN identities with reservation flags is defined as in the following example:

```
-- /example/ ASN1START


PLMN-IdentityInfoList ::=           SEQUENCE (SIZE (1..6)) OF PLMN-IdentityInfo


PLMN-IdentityInfo ::=           SEQUENCE {
    plmn-Identity               PLMN-Identity,
    cellReservedForOperatorUse          ENUMERATED {reserved, notReserved}
}


-- ASN1STOP
```

rather than as in the following (bad) example, which may cause generated code to contain types with unpredictable names:

```
-- /bad example/ ASN1START


PLMN-IdentityList ::=           SEQUENCE (SIZE (1..6)) OF SEQUENCE {
    plmn-Identity               PLMN-Identity,
    cellReservedForOperatorUse          ENUMERATED {reserved, notReserved}
}


-- ASN1STOP
```

# A.4 Extension of the PDU specifications

## A.4.1 General principles to ensure compatibility

It is essential that extension of the protocol does not affect interoperability i.e. it is essential that implementations based on different versions of the RRC protocol are able to interoperate. In particular, this requirement applies for the following kind of protocol extensions:

- Introduction of new PDU types (i.e. these should not cause unexpected behaviour or damage).
- Introduction of additional fields in an extensible PDUs (i.e. it should be possible to ignore uncomprehended extensions without affecting the handling of the other parts of the message).
- Introduction of additional values of an extensible field of PDUs. If used, the behaviour upon reception of an uncomprehended value should be defined.

It should be noted that the PDU extension mechanism may depend on the logical channel used to transfer the message e.g. for some PDUs an implementation may be aware of the protocol version of the peer in which case selective ignoring of extensions may not be required.

The non-critical extension mechanism is the primary mechanism for introducing protocol extensions i.e. the critical extension mechanism is used merely when there is a need to introduce a 'clean' message version. Such a need appears when the last message version includes a large number of non-critical extensions, which results in issues like readability, overhead associated with the extension markers. The critical extension mechanism may also be considered when it is complicated to accommodate the extensions by means of non-critical extension mechanisms.

## A.4.2 Critical extension of messages

The mechanisms to critically extend a message are defined in A.3.3. There are both "outer branch" and "inner branch" mechanisms available. The "outer branch" consists of a CHOICE having the name *criticalExtensions*, with two values, *c1* and *criticalExtensionsFuture*. The *criticalExtensionsFuture* branch consists of an empty SEQUENCE, while the c1 branch contains the "inner branch" mechanism.

The "inner branch" structure is a CHOICE with values of the form "*MessageName-rX-IEs*" (e.g., "*RRCConnectionReconfiguration-r8-IEs*") or "*spareX*", with the spare values having type NULL. The "-rX-IEs" structures contain the *complete* structure of the message IEs for the appropriate release; i.e., the critical extension branch for the Rel-10 version of a message includes all Rel-8 and Rel-9 fields (that are not obviated in the later version), rather than containing only the additional Rel-10 fields.

The following guidelines may be used when deciding which mechanism to introduce for a particular message, i.e. only an 'outer branch', or an 'outer branch' in combination with an 'inner branch' including a certain number of spares:

- For certain messages, e.g. initial uplink messages, messages transmitted on a broadcast channel, critical extension may not be applicable.
- An outer branch may be sufficient for messages not including any fields.
- The number of spares within inner branch should reflect the likelihood that the message will be critically extended in future releases (since each release with a critical extension for the message consumes one of the spare values). The estimation of the critical extension likelyhood may be based on the number, size and changeability of the fields included in the message.
- In messages where an inner branch extension mechanism is available, all spare values of the inner branch should be used before any critical extensions are added using the outer branch.

The following example illustrates the use of the critical extension mechanism by showing the ASN.1 of the original and of a later release

```
-- /example/ ASN1START                    -- Original release


RRCMessage ::=                            SEQUENCE {
```

```
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions              CHOICE {
        c1                          CHOICE{
            rrcMessage-r8                   RRCMessage-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture    SEQUENCE {}
    }
}

-- ASN1STOP
```

```
-- /example/ ASN1START              -- Later release

RRCMessage ::=                      SEQUENCE {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions              CHOICE {
        c1                          CHOICE{
            rrcMessage-r8                   RRCMessage-r8-IEs,
            rrcMessage-r10                  RRCMessage-r10-IEs,
            rrcMessage-r11                  RRCMessage-r11-IEs,
            rrcMessage-r14                  RRCMessage-r14-IEs
        },
        later                       CHOICE {
            c2                              CHOICE{
                rrcMessage-r16                  RRCMessage-r16-IEs,
                spare7 NULL, spare6 NULL, spare5 NULL, spare4 NULL,
                spare3 NULL, spare2 NULL, spare1 NULL
            },
            criticalExtensionsFuture        SEQUENCE {}
        }
    }
}

-- ASN1STOP
```

## A.4.3 Non-critical extension of messages

### A.4.3.1 General principles

The mechanisms to extend a message in a non-critical manner are defined in A.3.3. W.r.t. the use of extension markers, the following additional guidelines apply:

- When further non-critical extensions are added to a message that has been critically extended, the inclusion of these non-critical extensions in earlier critical branches of the message should be avoided when possible.
- The extension marker ("…") is the primary non-critical extension mechanism that is used unless a length determinant is not required. Examples of cases where a length determinant is not required:
  - at the end of a message,
  - at the end of a structure contained in a BIT STRING or OCTET STRING
- When an extension marker is available, non-critical extensions are preferably placed at the location (e.g. the IE) where the concerned parameter belongs from a logical/ functional perspective (referred to as the '*default extension location*')
- It is desirable to aggregate extensions of the same release or version of the specification into a group, which should be placed at the lowest possible level.
- In specific cases it may be preferrable 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 seperate 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 allways 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 seperate 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
        field4-r9                   InformationElement4       OPTIONAL      -- Need OR
    ]]
}

InformationElement1-r10 ::=         SEQUENCE {
    field1                      ENUMERATED {
                                    value1, value2, value3, value4-v880,
                                    value5-v960, value6-v1170, spare2, spare1, ... },
    field2                      CHOICE {
        field2a                     BOOLEAN,
        field2b                     InformationElement2b,
        field2c-v960                InformationElement2c-r9,
        ...,
        field2d-v12b0               INTEGER (0..63)
    },
    field3-r9                   InformationElement3-r10       OPTIONAL,  -- Need OR
    field4-r9                   InformationElement4           OPTIONAL,  -- Need OR
    field5-r10                  BOOLEAN,
    field6-r10                  InformationElement6-r10       OPTIONAL,  -- Need OR
    ...,
    [[  field3-v1170                InformationElement3-v1170     OPTIONAL   -- Need OR
    ]]
}

-- ASN1STOP
```

Some remarks regarding the extensions of *InformationElement1* as shown in the above example:

- The *InformationElement1* is initially extended with a number of non-critical extensions. In release 10 however, a critical extension is introduced for the message using this IE. Consequently, a new version of the IE *InformationElement1* (i.e. *InformationElement1-r10*) is defined in which the earlier non-critical extensions are incorporated by means of a revision of the original field.
- The *value4-v880* is replacing a spare value defined in the original protocol version for *field1*. Likewise *value6-v1170* replaces *spare3* that was originally defined in the r10 version of *field1*
- Within the critically extended release 10 version of *InformationElement1*, the names of the original fields/ IEs are not changed, unless there is a real need to distinguish them from other fields/ IEs. E.g. the *field1* and *InformationElement4* were defined in the original protocol version (release 8) and hence not tagged. Moreover,

the *field3-r9* is introduced in release 9 and not re-tagged; although, the *InformationElement3* is also critically extended and therefore tagged *InformationElement3-r10* in the release 10 version of InformationElement1.

### A.4.3.4 Typical examples of non critical extension at the end of a message

The following example illustrates the use of non-critical extensions at the end of the message or at the end of a field that is contained in a BIT or OCTET STRING i.e. when an empty sequence is used.

```
-- /example/ ASN1START


RRCMessage-r8-IEs ::=          SEQUENCE {
    field1                     InformationElement1,
    field2                     InformationElement2,
    field3                     InformationElement3              OPTIONAL,  -- Need ON
    nonCriticalExtension       RRCMessage-v860-IEs              OPTIONAL
}


RRCMessage-v860-IEs ::=        SEQUENCE {
    field4-v860                InformationElement4                 OPTIONAL,  -- Need OP
    field5-v860                BOOLEAN                             OPTIONAL,  -- Cond C54
    nonCriticalExtension       RRCMessage-v940-IEs              OPTIONAL
}


RRCMessage-v940-IEs ::=        SEQUENCE {
    field6-v940                InformationElement6-r9              OPTIONAL,  -- Need OR
    nonCriticalExtensions      SEQUENCE {}                            OPTIONAL
}


-- ASN1STOP
```

Some remarks regarding the extensions shown in the above example:

– The *InformationElement4* is introduced in the original version of the protocol (release 8) and hence no suffix is used.

### A.4.3.5 Examples of non-critical extensions not placed at the default extension location

The following example illustrates the use of non-critical extensions in case an extension is not placed at the default extension location.

### – ParentIE-WithEM

The IE *ParentIE-WithEM* is an example of a high level IE including the extension marker (EM). The root encoding of this IE includes two lower level IEs *ChildIE1-WithoutEM* and *ChildIE2-WithoutEM* which not include the extension marker. Consequently, non-critical extensions of the Child-IEs have to be included at the level of the Parent-IE.

The example illustrates how the two extension IEs *ChildIE1-WithoutEM-vNx0* and *ChildIE2-WithoutEM-vNx0* (both in release N) are used to connect non-critical extensions with a default extension location in the lower level IEs to the actual extension location in this IE.

***ParentIE-WithEM* information element**

```
-- /example/ ASN1START


ParentIE-WithEM ::=                 SEQUENCE {
    -- Root encoding, including:
    childIE1-WithoutEM                  ChildIE1-WithoutEM              OPTIONAL,   -- Need ON
    childIE2-WithoutEM                  ChildIE2-WithoutEM              OPTIONAL,   -- Need ON
    ...,
    [[  childIE1-WithoutEM-vNx0             ChildIE1-WithoutEM-vNx0     OPTIONAL,   -- Need ON
        childIE2-WithoutEM-vNx0             ChildIE2-WithoutEM-vNx0     OPTIONAL    -- Need ON
    ]]
}


-- ASN1STOP
```

Some remarks regarding the extensions shown in the above example:

- The fields *childIEx-WithoutEM-vNx0* may not really need to be optional (depends on what is defined at the next lower level).
- In general, especially when there are several nesting levels, fields should be marked as optional only when there is a clear reason.

### – ChildIE1-WithoutEM

The IE *ChildIE1-WithoutEM* is an example of a lower level IE, used to control certain radio configurations including a configurable feature which can be setup or released using the local IE *ChIE1-ConfigurableFeature*. The example illustrates how the new field *chIE1-NewField* is added in release N to the configuration of the configurable feature. The example is based on the following assumptions:

- when initially configuring as well as when modifying the new field, the original fields of the configurable feature have to be provided also i.e. as if the extended ones were present within the setup branch of this feature.
- when the configurable feature is released, the new field should be released also.
- when omitting the original fields of the configurable feature the UE continues using the existing values (which is used to optimise the signalling for features that typically continue unchanged upon handover).

– when omitting the new field of the configurable feature the UE releases the existing values and discontinues the associated functionality (which may be used to support release of unsupported functionality upon handover to an eNB supporting an earlier protocol version).

The above assumptions, which affect the use of conditions and need codes, may not always apply. Hence, the example should not be re-used blindly.

### *ChildIE1-WithoutEM* information elements

```
-- /example/ ASN1START

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
```

| Conditional presence | Explanation |
|---|---|
| *ConfigF* | The field is optional present, need OR, in case of *chIE1-ConfigurableFeature* is included and set to "setup"; otherwise the field is not present and the UE shall delete any existing value for this field. |

– ChildIE2-WithoutEM

The IE *ChildIE2-WithoutEM* is an example of a lower level IE, typically used to control certain radio configurations. The example illustrates how the new field *chIE1-NewField* is added in release N to the configuration of the configurable feature.

***ChildIE2-WithoutEM* information element**

```
-- /example/ ASN1START


ChildIE2-WithoutEM ::=              CHOICE {
    release                         NULL,
    setup                           SEQUENCE {
        -- Root encoding
    }
}


ChildIE2-WithoutEM-vNx0 ::=         SEQUENCE {
    chIE2-NewField-rN               INTEGER (0..31)             OPTIONAL   -- Cond ConfigF
}


-- ASN1STOP
```

| Conditional presence | Explanation |
|---|---|
| *ConfigF* | The field is optional present, need OR, in case of *chIE2-ConfigurableFeature* is included and set to "setup"; otherwise the field is not present and the UE shall delete any existing value for this field. |

# 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.

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

| Message | P | A-I | A-C | Comment |
|---|---|---|---|---|
| CSFBParametersRequestCDMA2000 | + | - | - | |
| CSFBParametersResponseCDMA2000 | + | - | - | |
| CounterCheck | - | - | - | |
| CounterCheckResponse | - | - | - | |
| DLInformationTransfer | + | - | - | |
| HandoverFromEUTRAPreparationRequest (CDMA2000) | - | - | - | |
| InDeviceCoexIndication | - | - | - | |
| InterFreqRSTDMeasurementIndication | - | - | - | |
| LoggedMeasurementsConfiguration | - | - | - | |
| MasterInformationBlock | + | + | + | |
| MBMSCountingRequest | + | + | + | |
| MBMSCountingResponse | - | - | - | |
| MBMSInterestIndication | + | - | - | |
| MBSFNAreaConfiguration | + | + | + | |
| MeasurementReport | + | - | - | Justification for case 'P': RAN2 agreed that measurement configuration may be sent prior to security activation |
| MobilityFromEUTRACommand | - | - | - | |
| Paging | + | + | + | |
| SidelinkUEInformation | + | - | - | |
| ProximityIndication | - | - | - | |
| RNReconfiguration | - | - | - | |
| RNReconfigurationComplete | - | - | - | |
| RRCConnectionReconfiguration | + | - | - | The message shall not be sent unprotected before security activation if it is used to perform handover or to establish SRB2 and DRBs |
| RRCConnectionReconfigurationComplete | + | - | - | Unprotected, if sent as response to RRCConnectionReconfiguration which was sent before security activation |
| RRCConnectionReestablishment | - | + | + | This message is not protected by PDCP operation. |
| RRCConnectionReestablishmentComplete | - | - | - | |
| RRCConnectionReestablishmentReject | - | + | + | One reason to send this may be that the security context has been lost, therefore sent as unprotected. |
| RRCConnectionReestablishmentRequest | - | - | + | This message is not protected by PDCP operation. However a short MAC-I is included. |
| RRCConnectionReject | + | NA | NA | |
| RRCConnectionRelease | + | - | - | 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. |
| RRCConnectionRequest | + | NA | NA | |
| RRCConnectionSetup | + | NA | NA | |
| RRCConnectionSetupComplete | + | NA | NA | |
| SecurityModeCommand | + | NA | NA | Integrity protection applied, but no ciphering (integrity verification done after the message received by RRC) |
| SecurityModeComplete | - | NA | NA | Integrity protection applied, but no ciphering. Ciphering is applied after completing the procedure. |
| SecurityModeFailure | + | NA | NA | Neither integrity protection nor ciphering applied. |
| SystemInformation | + | + | + | |
| SystemInformationBlockType1 | + | + | + | |
| UEAssistanceInformation | - | - | - | |
| UECapabilityEnquiry | + | - | - | |

| Message | P | A-I | A-C | Comment |
|---|---|---|---|---|
| UECapabilityInformation | + | - | - | |
| SCGFailureInformation | - | - | - | |
| UEInformationRequest | - | - | - | |
| UEInformationResponse | - | - | - | |
| ULHandoverPreparationTransfer (CDMA2000) | - | - | - | This message should follow HandoverFromEUTRAPreparationRequest |
| ULInformationTransfer | + | - | - | |

# A.7 Miscellaneous

The following miscellaneous conventions should be used:

- References: Whenever another specification is referenced, the specification number and optionally the relevant subclause, table or figure, should be indicated in addition to the pointer to the References section e.g. as follows: 'see TS 36.212 [22, 5.3.3.1.6]'.

# Annex B (normative): Release 8 and 9 AS feature handling

## B.1 Feature group indicators

This annex contains the definitions of the bits in fields *featureGroupIndicators* (in Table B.1-1) and *featureGroupIndRel9Add* (in Table B.1-1a).

In this release of the protocol, the UE shall include the fields *featureGroupIndicators* in the IE *UE-EUTRA-Capability* and *featureGroupIndRel9Add* in the IE *UE-EUTRA-Capability-v9a0*. All the functionalities defined within the field *featureGroupIndicators* defined in Table B.1-1 or Table B.1-1a are mandatory for the UE, if the related capability (frequency band, RAT, SR-VCC or Inter-RAT ANR) is also supported. For a specific indicator, if all functionalities for a feature group listed in Table B.1-1 have been implemented and tested, the UE shall set the indicator as one (1), else (i.e. if any one of the functionalities in a feature group listed in Table B.1-1 or Table B.1-1a, which have not been implemented or tested), the UE shall set the indicator as zero (0).

The UE shall set all indicators that correspond to RATs not supported by the UE as zero (0).

The UE shall set all indicators, which do not have a definition in Table B.1-1 or Table B.1-1a, as zero (0).

If the optional fields *featureGroupIndicators* or *featureGroupIndRel9Add* are not included by a UE of a future release, the network may assume that all features pertaining to the RATs supported by the UE, respectively listed in Table B.1-1 or Table B.1-1a and deployed in the network, have been implemented and tested by the UE.

In Table B.1-1, a 'VoLTE capable UE' corresponds to a UE which is IMS voice capable.

The indexing in Table B.1-1a starts from index 33, which is the leftmost bit in the field *featureGroupIndRel9Add*.

**Table B.1-1: Definitions of feature group indicators**

| **Index of indicator** (bit number) | **Definition** (description of the supported functionality, if indicator set to one) | **Notes** | **If indicated "Yes" the feature shall be implemented and successfully tested for this version of the specification** | ***FDD/ TDD diff*** |
|---|---|---|---|---|
| 1 (leftmost bit) | - Intra-subframe frequency hopping for PUSCH scheduled by UL grant<br>- DCI format 3a (TPC commands for PUCCH and PUSCH with single bit power adjustments)<br>- Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected subband CQI without PMI<br>- 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<br>- Absolute TPC command for PUSCH<br>- Resource allocation type 1 for PDSCH<br>- Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-0 – UE selected subband CQI without PMI<br>- Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-1 – UE selected subband CQI with single PMI | | | Yes |
| 3 | - 5bit RLC UM SN<br>- 7bit PDCP SN | - can only be set to 1 if the UE has set bit number 7 to 1. | Yes, if UE supports VoLTE.<br>Yes, if UE supports SRVCC to EUTRAN from GERAN. | No |
| 4 | - Short DRX cycle | - can only be set to 1 if | | Yes |

| | | | | |
|---|---|---|---|---|
| | | the UE has set bit number 5 to 1. | | |

| | | | | |
|---|---|---|---|---|
| 5 | - Long DRX cycle<br>- DRX command MAC control element | | Yes | No |
| 6 | - Prioritised bit rate | | Yes | No |
| 7 | - RLC UM | - can only be set to 0 if the UE does not support VoLTE | Yes, if UE supports VoLTE.<br>Yes, if UE supports SRVCC to EUTRAN from GERAN. | No |
| 8 | - EUTRA RRC_CONNECTED to UTRA FDD or UTRA TDD CELL_DCH PS handover, if the UE supports either only UTRAN FDD or only UTRAN TDD<br><br>- EUTRA RRC_CONNECTED to UTRA FDD CELL_DCH PS handover, if the UE supports both UTRAN FDD and UTRAN TDD | - can only be set to 1 if the UE has set bit number 22 to 1 | Yes for FDD, if UE supports UTRA FDD | Yes |
| 9 | - EUTRA RRC_CONNECTED to GERAN GSM_Dedicated handover | - related to SR-VCC<br>- can only be set to 1 if the UE has set bit number 23 to 1 | Yes, if UE supports SRVCC to EUTRAN from GERAN. | Yes |
| 10 | - EUTRA RRC_CONNECTED to GERAN (Packet_) Idle by Cell Change Order<br>- EUTRA RRC_CONNECTED to GERAN (Packet_) Idle by Cell Change Order with NACC (Network Assisted Cell Change) | | | Yes |
| 11 | - EUTRA RRC_CONNECTED to CDMA2000 1xRTT CS Active handover | - related to SR-VCC<br>- can only be set to 1 if the UE has sets bit number 24 to 1 | | Yes |
| 12 | - EUTRA RRC_CONNECTED to CDMA2000 HRPD Active handover | - can only be set to 1 if the UE has set bit number 26 to 1 | | Yes |
| 13 | - Inter-frequency handover (within FDD or TDD) | - can only be set to 1 if the UE has set bit number 25 to 1 | Yes, unless UE only supports band 13 | No |
| 14 | - Measurement reporting event: Event A4 – Neighbour > threshold<br>- Measurement reporting event: Event A5 – Serving < threshold1 & Neighbour > threshold2 | | Yes | No |
| 15 | - Measurement reporting event: Event B1 – Neighbour > 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<br><br>- Measurement reporting event: Event B1 – Neighbour > 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<br><br>- Measurement reporting event: Event B1 – Neighbour > threshold for GERAN, 1xRTT or HRPD, if the UE has set bit number 23, 24 or 26 to 1, respectively | - can only be set to 1 if the UE has set at least one of the bit number 22, 23, 24, 26 or 39 to 1.<br>- 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 | Yes for FDD, if UE supports only UTRAN FDD and does not support UTRAN TDD or GERAN or 1xRTT or HRPD | Yes |
| 16 | - Intra-frequency periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportStrongestCells*<br><br>- 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 | | Yes | No |

| | | | | |
|---|---|---|---|---|
| | - 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<br><br>- 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<br><br>- 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.<br><br>NOTE: Event triggered periodical reporting (i.e., with *triggerType* set to *event* and with *reportAmount* > 1) is a mandatory functionality of event triggered reporting and therefore not the subject of this bit. | | | |
| 17 | Intra-frequency ANR features including:<br>- Intra-frequency periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportStrongestCells*<br>- Intra-frequency periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportCGI* | - can only be set to 1 if the UE has set bit number 5 to 1. | Yes | No |
| 18 | Inter-frequency ANR features including:<br>- Inter-frequency periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportStrongestCells*<br>- Inter-frequency periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportCGI* | - can only be set to 1 if the UE has set bit number 5 and bit number 25 to 1. | Yes, unless UE only supports band 13 | No |
| 19 | Inter-RAT ANR features including:<br>- 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<br>- 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<br>- 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 | - 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.<br>- 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 | | Yes |

| | | | | |
|---|---|---|---|---|
| | - 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<br>- Inter-RAT periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportCGI* for UTRAN FDD or UTRAN TDD, if the UE supports either only UTRAN FDD or only UTRANTDD and has set bit number 22 to 1<br>- Inter-RAT periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportCGI* for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively<br>- 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 | | | |
| 20 | If bit number 7 is set to 0:<br>- SRB1 and SRB2 for DCCH + 8x AM DRB<br><br>If bit number 7 is set to 1:<br>- SRB1 and SRB2 for DCCH + 8x AM DRB<br>- SRB1 and SRB2 for DCCH + 5x AM DRB + 3x UM DRB<br><br>NOTE: UE which indicate support for a DRB combination also support all subsets of the DRB combination. Therefore, release of DRB(s) never results in an unsupported DRB combination. | - Regardless of what bit number 7 and bit number 20 is set to, UE shall support at least SRB1 and SRB2 for DCCH + 4x AM DRB<br>- 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 | Yes | No |
| 21 | - Predefined intra- and inter-subframe frequency hopping for PUSCH with N_sb > 1<br>- 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<br><br>- 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 for FDD, if UE supports UTRA FDD | 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 for FDD, if UE supports enhanced 1xRTT CSFB for FDD<br>Yes for TDD, if UE supports enhanced | Yes |

| | | | | |
|---|---|---|---|---|
| | | | 1xRTT CSFB for TDD | |
| 25 | - Inter-frequency measurements and reporting in E-UTRA connected mode<br><br>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 | No |
| 26 | - HRPD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode | | Yes for FDD, if UE supports HRPD | Yes |
| 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<br><br>- EUTRA RRC_CONNECTED to UTRA FDD CELL_DCH CS handover, if the UE supports both UTRAN FDD and UTRAN TDD | - related to SR-VCC<br>- can only be set to 1 if the UE has set bit number 8 to 1 and supports SR-VCC from EUTRA defined in TS 24.008 [49] | Yes for FDD, if UE supports VoLTE and UTRA FDD | Yes |
| 28 | - TTI bundling | | Yes for FDD | Yes |
| 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 | No |
| 32 | Undefined | | | |

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**

| **Index of indicator** (bit number) | **Definition** (description of the supported functionality, if indicator set to one) | **Notes** | **If indicated "Yes" the feature shall be implemented and successfully tested for this version of the specification** | ***FDD/ TDD diff*** |
|---|---|---|---|---|
| 33 (leftmost bit) | Inter-RAT ANR features for UTRAN FDD including:<br>- Inter-RAT periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportStrongestCellsForSON*<br>- Inter-RAT periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportCGI* | - can only be set to 1 if the UE has set bit number 5 and bit number 22 to 1. | | Yes |
| 34 | Inter-RAT ANR features for GERAN including:<br>- Inter-RAT periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportStrongestCells*<br>- Inter-RAT periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportCGI* | - can only be set to 1 if the UE has set bit number 5 and bit number 23 to 1. | | Yes |
| 35 | Inter-RAT ANR features for 1xRTT including:<br>- Inter-RAT periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportStrongestCellsForSON*<br>- Inter-RAT periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportCGI* | - can only be set to 1 if the UE has set bit number 5 and bit number 24 to 1. | | Yes |
| 36 | Inter-RAT ANR features for HRPD including:<br>- Inter-RAT periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportStrongestCellsForSON*<br>- Inter-RAT periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportCGI* | - can only be set to 1 if the UE has set bit number 5 and bit number 26 to 1. | | Yes |
| 37 | Inter-RAT ANR features for UTRAN TDD including:<br>- Inter-RAT periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportStrongestCellsForSON*<br>- Inter-RAT periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportCGI* | - 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. | | Yes |
| 38 | - EUTRA RRC_CONNECTED to UTRA TDD CELL_DCH PS handover, if the UE supports both UTRAN FDD and UTRAN TDD | - can only be set to 1 if the UE has set bit number 39 to 1 | | Yes |
| 39 | - UTRAN TDD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode, if the UE supports both UTRAN FDD and UTRAN TDD | | | Yes |
| 40 | - EUTRA RRC_CONNECTED to UTRA | - related to SR-VCC | | Yes |

| | | | | |
|---|---|---|---|---|
| | TDD CELL_DCH CS handover, if the UE supports both UTRAN FDD and UTRAN TDD | - can only be set to 1 if the UE has set bit number 38 to 1 | | |
| 41 | Measurement reporting event: Event B1 – Neighbour > threshold for UTRAN FDD, if the UE supports UTRAN FDD and has set bit number 22 to 1 | | Yes for FDD, unless UE has set bit number 15 to 1 | Yes |
| 42 | Undefined | | | |
| 43 | Undefined | | | |
| 44 | Undefined | | | |
| 45 | Undefined | | | |
| 46 | Undefined | | | |
| 47 | Undefined | | | |
| 48 | Undefined | | | |
| 49 | Undefined | | | |
| 50 | Undefined | | | |
| 51 | Undefined | | | |
| 52 | Undefined | | | |
| 53 | Undefined | | | |
| 54 | Undefined | | | |
| 55 | Undefined | | | |
| 56 | Undefined | | | |
| 57 | Undefined | | | |
| 58 | Undefined | | | |
| 59 | Undefined | | | |
| 60 | Undefined | | | |
| 61 | Undefined | | | |
| 62 | Undefined | | | |
| 63 | Undefined | | | |
| 64 | Undefined | | | |

NOTE: The column FDD/ TDD diff indicates if the UE is allowed to signal different values for FDD and TDD.

**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**

| Feature | GERAN | UTRAN | HRPD | 1xRTT | EUTRAN |
|---|---|---|---|---|---|
| A. Measurements and cell reselection procedure in E-UTRA idle mode | Supported if GERAN band support is indicated | Supported if UTRAN band support is indicated | Supported if CDMA2000 HRPD band support is indicated | Supported if CDMA2000 1xRTT band support is indicated | Supported for supported bands |
| B. RRC release with blind redirection procedure in E-UTRA connected mode | Supported if GERAN band support is indicated | Supported if UTRAN band support is indicated | Supported if CDMA2000 HRPD band support is indicated | Supported if CDMA2000 1xRTT band support is indicated | Supported for supported bands |
| C. Cell Change Order (with or without) Network Assisted Cell Change) in E-UTRA connected mode | Group 10 | N.A. | N.A | N.A | N.A. |
| D. Inter-frequency/RAT measurements, reporting and measurement reporting event B2 (for inter-RAT) in E-UTRA connected mode | Group 23 | Group 22/39 | Group 26 | Group 24 | Group 25 |
| E. Inter-frequency/RAT handover procedure in E-UTRA connected mode | Group 9 (GSM_connected handover) Separate UE capability bit defined in TS 36.306 for PS handover | Group 8/38 (PS handover) or Group 27/40 (SRVCC handover) | Group 12 | Group 11 | Group 13 (within FDD o TDD) Group 30 (between FDD and TDD) |

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**

| Index of indicator | Definition (description of the supported functionality, if indicator set to one) | Notes | If indicated "Yes" the feature shall be implemented and successfully tested for this version of the specification | FDD/ TDD diff |
|---|---|---|---|---|
| 101 (leftmost bit) | - DMRS with OCC (orthogonal cover code) and SGH (sequence group hopping) disabling | - if the UE supports two or more layers for spatial multiplexing in UL, this bit shall be set to 1.<br>- If a category 0 UE does not support this feature, this bit shall be set to 0. | | No |
| 102 | - Trigger type 1 SRS (aperiodic SRS) transmission (Up to X ports)<br><br>NOTE: X = number of supported layers on given band | | | Yes |
| 103 | - PDSCH transmission mode 9 when up to 4 CSI reference signal ports are configured | - for Category 8 UEs, this bit shall be set to 1. | | Yes |
| 104 | - PDSCH transmission mode 9 for TDD when 8 CSI reference signal ports are configured | - 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.<br>- for Category 8 UEs, this bit shall be set to 1. | | No |
| 105 | - Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-0 – UE selected subband CQI without PMI, when PDSCH transmission mode 9 is configured<br>- 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. | | Yes |

| | | | | |
|---|---|---|---|---|
| 106 | - 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 | - this bit can be set to 1 only if the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports (i.e., for TDD, if index 104 is set to 1, and for FDD, if *tm9-With-8Tx-FDD-r10* is set to "supported") and if index 2 (Table B.1-1) is set to 1. | | Yes |
| 107 | - Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected subband CQI without PMI, when PDSCH transmission mode 9 is configured<br>- Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected subband CQI with multiple PMI, when PDSCH transmission mode 9 and up to 4 CSI reference signal ports are configured | - this bit can be set to 1 only if indices 1 (Table B.1-1) and 103 are set to 1. | | Yes |
| 108 | - Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected subband CQI with multiple PMI, when PDSCH transmission mode 9 and 8 CSI reference signal ports are configured | - this bit can be set to 1 only if the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports (i.e., for TDD, if index 104 is set to 1, and for FDD, if *tm9-With-8Tx-FDD-r10* is set to "supported") and if index 1 (Table B.1-1) is set to 1. | | Yes |
| 109 | - Periodic CQI/PMI/RI reporting on PUCCH Mode 1-1, submode 1 | - this bit can be set to 1 only if the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports (i.e., for TDD, if index 104 is set to 1, and for FDD, if *tm9-With-8Tx-FDD-r10* is set to "supported"). | | Yes |
| 110 | - Periodic CQI/PMI/RI reporting on PUCCH Mode 1-1, submode 2 | - this bit can be set to 1 only if the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports (i.e., for TDD, if index 104 is set to 1, and for FDD, if *tm9-With-8Tx-FDD-r10* is set to "supported"). | | Yes |
| 111 | - Measurement reporting trigger Event A6 | - this bit can be set to 1 only if the UE supports carrier aggregation. | | Yes |
| 112 | - SCell addition within the Handover to EUTRA procedure | - this bit can be set to 1 only if the UE supports carrier aggregation and the Handover to EUTRA procedure. | | Yes |
| 113 | - Trigger type 0 SRS (periodic SRS) transmission on X Serving Cells<br><br>NOTE: X = number of supported component carriers in a given band combination | - this bit can be set to 1 only if the UE supports carrier aggregation in UL. | | Yes |
| 114 | - Reporting of both UTRA CPICH RSCP and Ec/N0 in a Measurement Report | - this bit can be set to 1 only if index 22 (Table B.1-1) is set to 1. | | No |
| 115 | - time domain ICIC RLM/RRM measurement subframe restriction for the serving cell<br>- time domain ICIC RRM measurement subframe restriction for neighbour cells<br>- time domain ICIC CSI measurement | | | Yes |

| | | | | |
|---|---|---|---|---|
| | subframe restriction | | | |
| 116 | - Relative transmit phase continuity for spatial multiplexing in UL | - this bit can be set to 1 only if the UE supports two or more layers for spatial multiplexing in UL. | | Yes |
| 117 | Undefined | | | |
| 118 | Undefined | | | |
| 119 | Undefined | | | |
| 120 | Undefined | | | |
| 121 | Undefined | | | |
| 122 | Undefined | | | |
| 123 | Undefined | | | |
| 124 | Undefined | | | |
| 125 | Undefined | | | |
| 126 | Undefined | | | |
| 127 | Undefined | | | |
| 128 | Undefined | | | |
| 129 | Undefined | | | |
| 130 | Undefined | | | |
| 131 | Undefined | | | |
| 132 | Undefined | | | |

NOTE: The column FDD/ TDD diff indicates if the UE is allowed to signal different values for FDD and TDD.

# Annex D (informative): Descriptive background information

## D.1 Signalling of Multiple Frequency Band Indicators (Multiple FBI)

### D.1.1 Mapping between frequency band indicator and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the E-UTRA frequency bands in *SystemInformationBlockType1* by means of an example as shown in Figure D.1.1-1. In this example:

- E-UTRAN cell belongs to band B90 and also bands B6, B7, B91, and B92.
- E-UTRAN uses B64 to indicate the presence of B90 in *freqBandIndciator-v9e0*.
- For the MFBI list of this cell, E-UTRAN uses B64 in *MultiBAndInfoList* to indicate the position and priority of the bands in *MultiBandInfoList-v9e0*.
- The UE, after reading *SystemInformationBlockType1*, generates an MFBI list with priority of B91, B6, B92, and B7. The UE applies the first listed band which it supports.

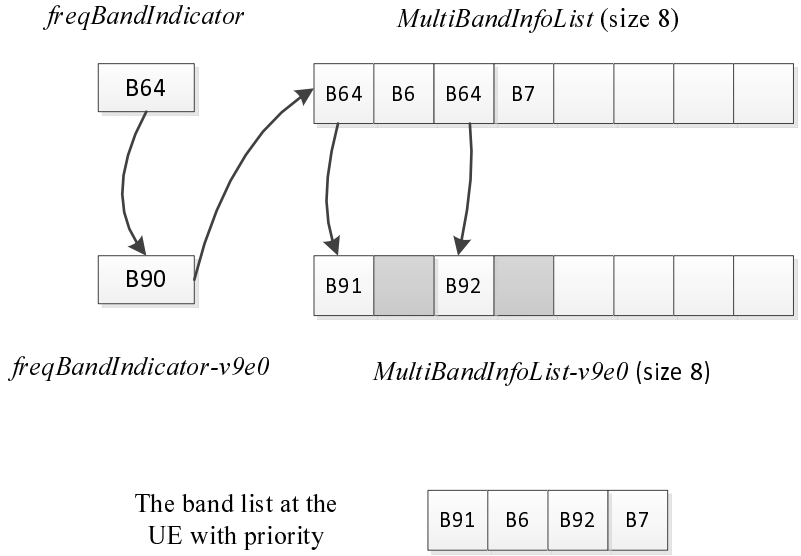


**Figure D.1.1-1: Mapping of frequency bands to *MultiBandInfoList/MultiBandInfoList-v9e0***

### D.1.2 Mapping between inter-frequency neighbour list and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the E-UTRA frequencies signalled in *SystemInformationBlockType5* by means of an example as shown in Figure D.1.2-1. In this example:

- E-UTRAN includes 4 frequencies: the bands associated with f1 and f4 belong to bands lower than 64; the bands associated with f2 and f3 belong to bands larger than 64. The reserved EARFCN value of 65535 is used to indicate the presence of *ARFCN-ValueEUTRA-v9e0*.
- The band associated with f1 has two overlapping bands, B1 and B2 (lower than 64); the band associated with f2 has one overlapping band, B91; the bands associated with f3 has four overlapping bands B3, B4, B92, and B93; the band associated with f4 does not have overlapping bands.

- 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*.

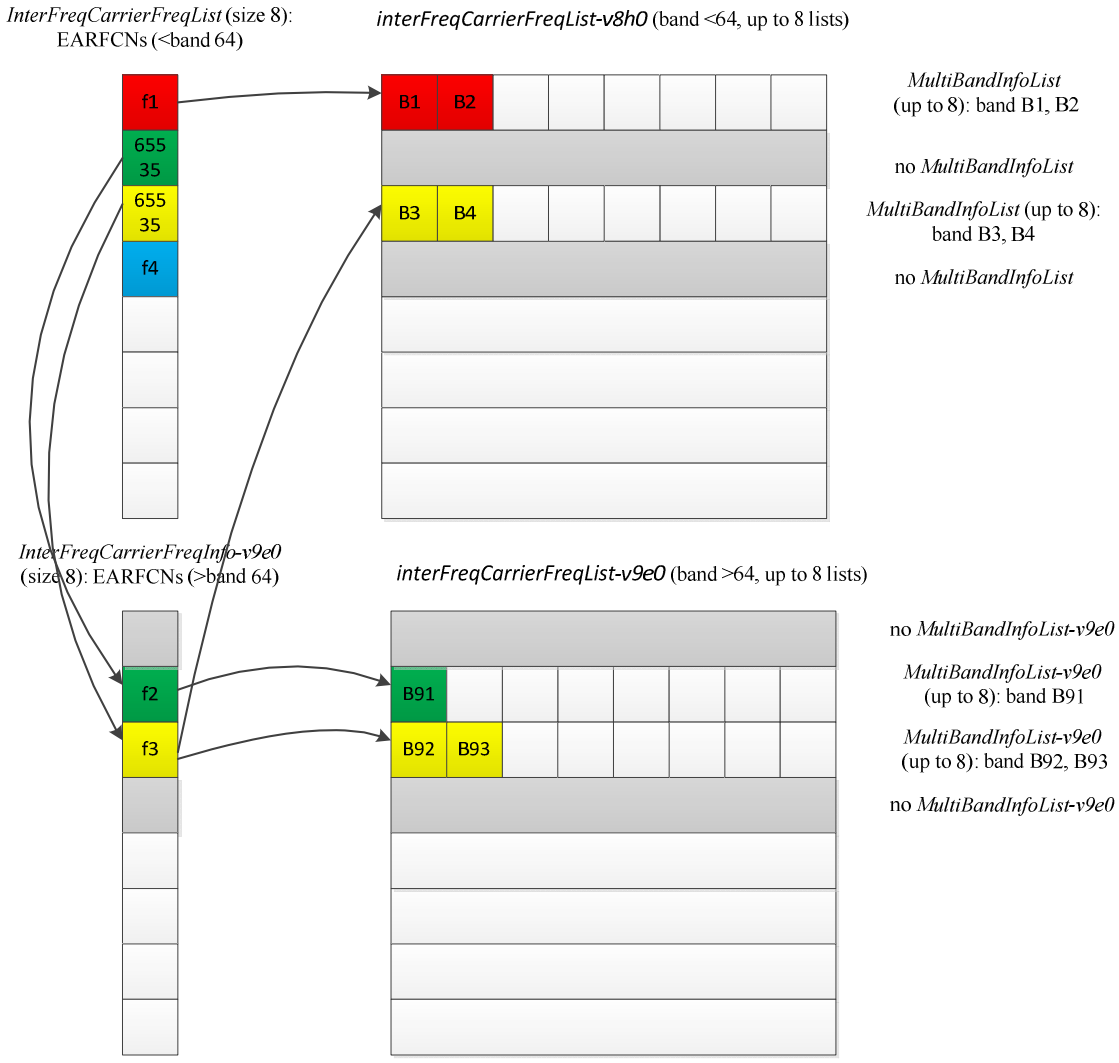


**Figure D.1.2-1: Mapping of EARFCNs to *MultiBandInfoList/MultiBandInfoList-v9e0***

## 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-UTRA includes 4 UTRAN FDD frequencies.
- The bands associated with f1 and f4 have no overlapping bands. The band associated f2 has two overlapping bands, B1 and B2. The band associated with f3 has one overlapping band, B3.
- E-UTRA include 4 lists in *carrierFreqListUTRA-FDD-v8h0* with the first and fourth entry not including *MultiBandInfoList*.

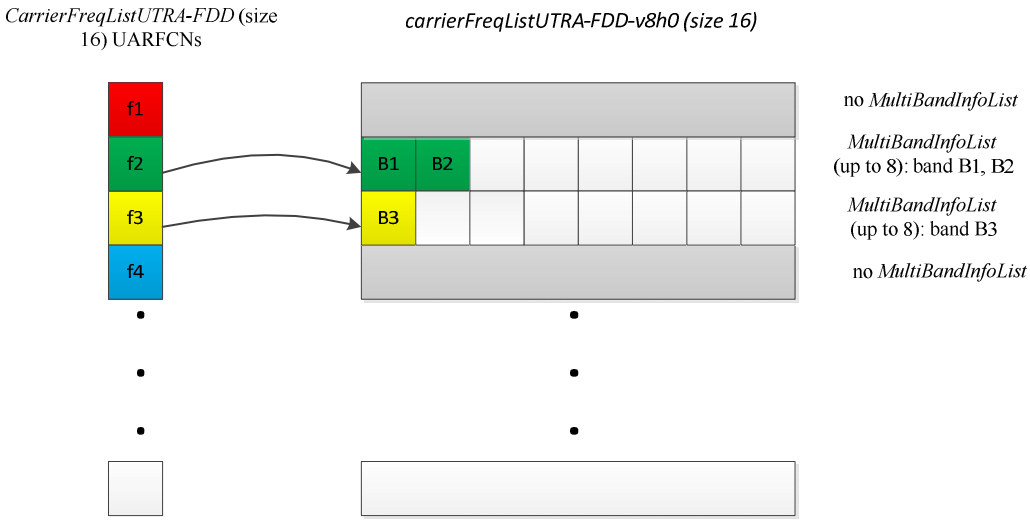


**Figure D.1.3-1: Mapping of UARFCNs to *MultiBandInfoList***

# Annex E (informative): Change history

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Old** | **New** |
| 12/2007 | RP-38 | RP-070920 | - | | Approved at TSG-RAN #38 and placed under Change Control | 1.0.0 | 8.0.0 |
| 03/2008 | RP-39 | RP-080163 | 0001 | 4 | CR to 36.331 with Miscellaneous corrections | 8.0.0 | 8.1.0 |
| 03/2008 | RP-39 | RP-080164 | 0002 | 2 | CR to 36.331 to convert RRC to agreed ASN.1 format | 8.0.0 | 8.1.0 |
| 05/2008 | RP-40 | RP-080361 | 0003 | 1 | CR to 36.331 on Miscellaneous clarifications/ corrections | 8.1.0 | 8.2.0 |
| 09/2008 | RP-41 | RP-080693 | 0005 | - | CR on Miscellaneous corrections and clarifications | 8.2.0 | 8.3.0 |
| 12/2008 | RP-42 | RP-081021 | 0006 | - | Miscellaneous corrections and clarifications | 8.3.0 | 8.4.0 |
| 03/2009 | RP-43 | RP-090131 | 0007 | - | Correction to the Counter Check procedure | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0008 | - | CR to 36.331-UE Actions on Receiving SIB11 | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0009 | 1 | Spare usage on BCCH | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0010 | - | Issues in handling optional IE upon absence in GERAN NCL | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0011 | - | CR to 36.331 on Removal of useless RLC re-establishment at RB release | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0012 | 1 | Clarification to RRC level padding at PCCH and BCCH | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0013 | - | Removal of Inter-RAT message | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0014 | - | Padding of the SRB-ID for security input | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0015 | - | Validity of ETWS SIB | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0016 | 1 | Configuration of the Two-Intervals-SPS | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0017 | - | Corrections on Scaling Factor Values of Qhyst | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0018 | 1 | Optionality of srsMaxUppts | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0019 | - | CR for discussion on field name for common and dedicated IE | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0020 | - | Corrections to Connected mode mobility | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0021 | - | Clarification regarding the measurement reporting procedure | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0022 | 1 | Corrections on s-Measure | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0023 | 1 | R1 of CR0023 (R2-091029) on combination of SPS and TTI bundling for TDD | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0024 | - | L3 filtering for path loss measurements | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0025 | 1 | S-measure handling for reportCGI | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0026 | 1 | Measurement configuration clean up | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0027 | - | Alignment of measurement quantities for UTRA | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0028 | - | CR to 36.331 on L1 parameters ranges alignment | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0029 | - | Default configuration for transmissionMode | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0030 | - | CR to 36.331 on RRC Parameters for MAC, RLC and PDCP | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0031 | 1 | CR to 36.331 - Clarification on Configured PRACH Freq Offset | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0032 | - | Clarification on TTI bundling configuration | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0033 | 1 | Update of R2-091039 on Inter-RAT UE Capability | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090133 | 0034 | - | Feature Group Support Indicators | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0036 | - | Corrections to RLF detection | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0037 | - | Indication of Dedicated Priority | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0038 | 2 | Security Clean up | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0039 | - | Correction of TTT value range | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0040 | - | Correction on CDMA measurement result IE | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0041 | 1 | Clarification of Measurement Reporting | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0042 | - | Spare values in DL and UL Bandwidth in MIB and SIB2 | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0044 | 1 | Clarifications to System Information Block Type 8 | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0045 | - | Reception of ETWS secondary notification | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0046 | 1 | Validity time for ETWS message Id and Sequence No | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0047 | - | CR for Timers and constants values used during handover to E-UTRA | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0048 | - | Inter-RAT Security Clarification | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0049 | - | CR to 36.331 on consistent naming of 1xRTT identifiers | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0050 | - | Capturing RRC behavior regarding NAS local release | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0051 | - | Report CGI before T321 expiry and UE null reporting | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0052 | - | System Information and 3 hour validity | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0053 | 1 | Inter-Node AS Signalling | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0054 | - | Set of values for the parameter "messagePowerOffsetGroupB" | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0055 | - | CR to paging reception for ETWS capable UEs in RRC_CONNECTED | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0056 | 1 | CR for CSG related items in 36.331 | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0057 | 1 | SRS common configuration | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0058 | - | RRC processing delay | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0059 | - | CR for HNB Name | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0060 | 3 | Handover to EUTRA delta configuration | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0063 | - | Delivery of Message Identifier and Serial Number to upper layers for ETWS | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0066 | - | Clarification on the maximum size of cell lists | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0067 | - | Missing RRC messages in 'Protection of RRC messages' | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0069 | 1 | Clarification on NAS Security Container | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0071 | - | Extension of range of CQI/PMI configuration index | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0072 | 1 | Access barring alleviation in RRC connection establishment | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090367 | 0077 | 6 | Corrections to feature group support indicators | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0078 | - | CR from email discussion to capture DRX and TTT handling | 8.4.0 | 8.5.0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | RP-43 | RP-090131 | 0079 | 1 | Need Code handling on BCCH messages | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0080 | - | Unification of T300 and T301 and removal of miscallaneous FFSs | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0084 | 1 | Proposed CR modifying the code-point definitions of neighbourCellConfiguration | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0087 | 2 | Remove Redundant Optionality in SIB8 | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0089 | - | Corrections to the generic error handling | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0090 | - | Configurability of T301 | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0091 | 1 | Correction related to TTT | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0095 | - | CR for 36.331 on SPS-config | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0096 | 2 | CR for Deactivation of periodical measurement | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0099 | 2 | SMC and reconfiguration | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0101 | - | TDD handover | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0102 | - | Corrections to system information acquisition | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0106 | - | Some Corrections and Clarifications to 36.331 | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0109 | - | Clarification on the Maximum number of ROHC context sessions parameter | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0110 | - | Transmission of rrm-Config at Inter-RAT Handover | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0111 | 1 | Use of SameRefSignalsInNeighbor parameter | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0112 | - | Default serving cell offset for measurement event A3 | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0114 | - | dl-EARFCN missing in HandoverPreparationInformation | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0115 | - | Cleanup of references to 36.101 | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0117 | - | Correction to the value range of UE-Categories | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0122 | 1 | Correction on RRC connection re-establishment | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0124 | - | Performing Measurements to report CGI for CDMA2000 | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0125 | - | CDMA2000-SystemTimeInfo in VarMeasurementConfiguration | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0126 | - | UE Capability Information for CDMA2000 1xRTT | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0127 | - | CDMA2000 related editorial changes | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0128 | - | Draft CR to 36.331 on State mismatch recovery at re-establishment | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0129 | 1 | Draft CR to 36.331 on Renaming of AC barring related IEs | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0130 | 2 | Draft CR to 36.331 on Inheriting of dedicated priorities at inter-RAT reselection | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0135 | - | Proposed CR to 36.331 Description alignment for paging parameter, nB | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0139 | 2 | Miscellaneous corrections and clarifications resulting from ASN.1 review | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0141 | 1 | Correction regarding Redirection Information fo GERAN | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0142 | - | Further ASN.1 review related issues | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0143 | - | Periodic measurements | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0144 | 1 | Further analysis on code point "OFF" for ri-ConfigIndex | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0145 | 1 | Adding and deleting same measurement or configuration in one message | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0147 | - | Corrections to IE dataCodingScheme in SIB11 | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0148 | - | Clarification on Mobility from E-UTRA | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0149 | - | 36.331 CR related to 'not applicable' | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0150 | 1 | UE radio capability transfer | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0151 | - | CR to 36.331 on value of CDMA band classes | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0152 | - | Corrections to DRB modification | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0153 | - | Correction to presence condition for pdcp-config | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090131 | 0155 | - | TDD HARQ-ACK feedback mode | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090275 | 0157 | - | Corrections regarding use of carrierFreq for CDMA (SIB8) and GERAN (measObject) | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090321 | 0156 | 1 | Sending of GERAN SI/PSI information at Inter-RAT Handover | 8.4.0 | 8.5.0 |
| | RP-43 | RP-090339 | 0158 | - | Clarification of CSG support | 8.4.0 | 8.5.0 |
| 06/2009 | RP-44 | RP-090516 | 0159 | - | Octet alignment of VarShortMAC-Input | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0160 | 3 | Minor corrections to the feature grouping | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0161 | - | Security clarification | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0162 | 1 | Sending of GERAN SI/PSI information at Inter-RAT Handover | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0163 | 1 | Correction of UE measurement model | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0164 | - | Restricting the reconfiguration of UM RLC SN field size | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0165 | 1 | 36.331 CR on Clarification on cell change order from GERAN to E-UTRAN | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0166 | - | 36.331 CR - Handling of expired TAT and failed D-SR | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0167 | 1 | Proposed CR to 36.331 Clarification on mandatory information in AS-Config | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0168 | 2 | Miscellaneous small corrections | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0173 | - | Clarification on the basis of delta signalling | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0177 | - | CR on Alignment of CCCH and DCCH handling of missing mandatory field | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0180 | 2 | Handling of Measurement Context During HO Preparation | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0181 | - | Clarification of key-eNodeB-Star in AdditionalReestabInfo | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0182 | 1 | UE Capability Transfer | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0186 | 1 | Clarification regarding mobility from E-UTRA in-between SMC and SRB2/DRB setup | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0188 | 1 | Correction and completion of specification conventions | 8.5.0 | 8.6.0 |

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|---|---|---|---|---|---|---|---|
| | RP-44 | RP-090516 | 0195 | 2 | RB combination in feature group indicator | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0196 | 1 | CR for need code for fields in mobilityControlInfo | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090497 | 0197 | - | Alignment of pusch-HoppingOffset with 36.211 | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090570 | 0198 | - | Explicit srb-Identity values for SRB1 and SRB2 | 8.5.0 | 8.6.0 |
| | RP-44 | RP-090516 | 0199 | - | Removing use of *defaultValue* for *mac-MainConfig* | 8.5.0 | 8.6.0 |
| 09/2009 | RP-45 | RP-090906 | 0200 | - | Proposed update of the feature grouping | 8.6.0 | 8.7.0 |
| | RP-45 | RP-090906 | 0201 | - | Clarification on measurement object configuration for serving frequency | 8.6.0 | 8.7.0 |
| | RP-45 | RP-090906 | 0202 | - | Correction regarding SRVCC | 8.6.0 | 8.7.0 |
| | RP-45 | RP-090906 | 0203 | - | Indication of DRB Release during HO | 8.6.0 | 8.7.0 |
| | RP-45 | RP-090906 | 0204 | 1 | Correction regarding application of dedicated resource configuration upon handover | 8.6.0 | 8.7.0 |
| | RP-45 | RP-090906 | 0205 | - | REL-9 protocol extensions in RRC | 8.6.0 | 8.7.0 |
| | RP-45 | RP-090906 | 0206 | - | In-order delivery of NAS PDUs at RRC connection reconfiguration | 8.6.0 | 8.7.0 |
| | RP-45 | RP-090906 | 0207 | - | Correction on Threshold of Measurement Event | 8.6.0 | 8.7.0 |
| | RP-45 | RP-090906 | 0210 | - | Clarification on dedicated resource of RA procedure | 8.6.0 | 8.7.0 |
| | RP-45 | RP-090906 | 0213 | 1 | Cell barring when MasterInformationBlock or SystemInformationBlock1 is missing | 8.6.0 | 8.7.0 |
| | RP-45 | RP-090915 | 0218 | - | Security threat with duplicate detection for ETWS | 8.6.0 | 8.7.0 |
| | RP-45 | RP-090906 | 0224 | - | Clarification on supported handover types in feature grouping | 8.6.0 | 8.7.0 |
| | RP-45 | RP-090906 | 0250 | 1 | Handling of unsupported / non-comprehended frequency band and emission requirement | 8.6.0 | 8.7.0 |
| | RP-45 | RP-090906 | 0251 | - | RB combinations in feature group indicator 20 | 8.6.0 | 8.7.0 |
| 09/2009 | RP-45 | RP-090934 | 0220 | 1 | Introduction of Per-QCI radio link failure timers (option 1) | 8.7.0 | 9.0.0 |
| | RP-45 | RP-090926 | 0222 | - | Null integrity protection algorithm | 8.7.0 | 9.0.0 |
| | RP-45 | RP-090926 | 0223 | - | Emergency Support Indicator in BCCH | 8.70 | 9.0.0 |
| | RP-45 | RP-090934 | 0230 | 2 | CR to 36.331 for Enhanced CSFB to 1xRTT with concurrent PS handover | 8.7.0 | 9.0.0 |
| | RP-45 | RP-090934 | 0243 | - | REL-9 on Miscellaneous editorial corrections | 8.7.0 | 9.0.0 |
| | RP-45 | RP-090934 | 0247 | - | Periodic CQI/PMI/RI masking | 8.7.0 | 9.0.0 |
| | RP-45 | RP-090933 | 0252 | - | Introduction of CMAS | 8.7.0 | 9.0.0 |
| 12/2009 | RP-46 | RP-091346 | 0253 | 1 | (Rel-9)-clarification on the description of redirectedCarrierInfo | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0254 | 1 | Adding references to RRC processing delay for inter-RAT mobiltiy messages | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091314 | 0256 | - | Alignment of srs-Bandwidth with 36.211 | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091341 | 0257 | 5 | Baseline CR capturing eMBMS agreements | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091343 | 0258 | 3 | Capturing agreements on inbound mobility | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091314 | 0260 | - | Clarification of preRegistrationZoneID/secondaryPreRegistrationZoneID | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0261 | - | Clarification on NCC for IRAT HO | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091314 | 0263 | - | Clarification on P-max | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091314 | 0265 | 1 | Clarification on the definition of maxCellMeas | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0266 | - | Correction of q-RxLevMin reference in SIB7 | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0267 | - | Correction on SPS-Config field descriptions | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0268 | 1 | correction on the definition of CellsTriggeredList | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091345 | 0269 | - | Correction relating to CMAS UE capability | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091314 | 0271 | 1 | Feature grouping bit for SRVCC handover | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091314 | 0272 | 1 | Correction and completion of extension guidelines | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091344 | 0273 | - | RACH optimization Stage-3 | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091345 | 0274 | - | Stage 3 correction for CMAS | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0276 | 1 | SR prohibit mechanism for UL SPS | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0277 | - | Parameters used for enhanced 1xRTT CS fallback | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0281 | - | Correction on UTRAN UE Capability transfer | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0285 | - | Maximum number of CDMA2000 neighbors in SIB8 | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091340 | 0288 | 1 | Introduction of UE Rx-Tx Time Difference measurement | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0297 | - | Introduction of SR prohibit timer | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0298 | - | Remove FFSs from RAN2 specifications | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091343 | 0301 | 1 | Renaming Allowed CSG List (36.331 Rel-9) | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0305 | - | Re-introduction of message segment discard time | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0306 | 1 | Application of ASN.1 extension guidelines | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0309 | 1 | Support for Dual Radio 1xCSFB | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0311 | - | Shorter SR periodicity | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091342 | 0316 | - | CR to 36.331 for Introduction of Dual Layer Transmission | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091343 | 0318 | 1 | Draft CR to 36.331 on Network ordered SI reporting | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091346 | 0322 | - | UE e1xcsfb capabilities correction | 9.0.0 | 9.1.0 |
| | RP-46 | RP-091331 | 0327 | 1 | Clarification on coding of ETWS related IEs | 9.0.0 | 9.1.0 |
| 03/2010 | RP-47 | RP-100285 | 0331 | - | Clarification of CGI reporting | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100305 | 0332 | - | Clarification on MCCH change notification | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0333 | - | Clarification on measurement for serving cell only | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100306 | 0334 | - | Clarification on proximity indication configuraiton in handover to E-UTRA | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0335 | - | Clarification on radio resource configuration in handover to E-UTRA procedure | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0336 | - | Clarification on UE maximum transmission power | 9.1.0 | 9.2.0 |

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|---|---|---|---|---|---|---|---|
| | RP-47 | RP-100308 | 0337 | - | Correction to field descriptions of UE-EUTRA-Capability | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100305 | 0338 | - | Correction to MBMS scheduling terminology | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0339 | - | Corrections to SIB8 | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100306 | 0340 | - | CR 36.331 R9 for Unifying SI reading for ANR and inbound mobility | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0341 | 1 | CR to 36.331 for 1xRTT pre-registration information in SIB8 | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100305 | 0342 | - | CR to 36.331 on corrections for MBMS | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100306 | 0343 | 1 | CR to 36.331 on CSG identity reporting | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0344 | 2 | CR to 36.331 on Optionality of Rel-9 UE features | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0345 | 1 | CR to 36.331 on Service Specific Acces Control (SSAC) | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0346 | - | Introduction of power-limited device indication in UE capability. | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100305 | 0347 | - | Missing agreement in MCCH change notification. | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100305 | 0348 | 1 | Corrections related to MCCH change notification and value ranges | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100306 | 0349 | 2 | Prohibit timer for proximity indication | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100306 | 0350 | 1 | Proximity Indication after handover and re-establishment | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100305 | 0351 | - | Specifying the exact mapping of notificationIndicator in SIB13 to PDCCH bits | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0352 | - | Corrections out of ASN.1 review scope | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0353 | - | CR on clarification of system information change | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100285 | 0358 | - | Measurement Result CDMA2000 Cell | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100304 | 0361 | - | Correction on the range of UE Rx-Tx time difference measurement result | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100305 | 0362 | - | Small clarifications regarding MBMS | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0363 | - | Introduction of REL-9 indication within field accessStratumRelease | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100306 | 0364 | - | Extending mobility description to cover inbound mobility | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0365 | 1 | Clarification regarding enhanced CSFB to 1XRTT | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0368 | - | Handling of dedicated RLF timers | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100305 | 0370 | 1 | Clarification on UE's behavior of receiving MBMS service | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100305 | 0371 | - | MBMS Service ID and Session ID | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100305 | 0372 | 1 | Inclusion of non-MBSFN region length in SIB13 | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100309 | 0374 | 1 | CR to 36.331 for e1xCSFB access class barring parameters in SIB8 | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0375 | - | Multiple 1xRTT/HRPD target cells in MobilityFromEUTRACommand | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0376 | - | Independent support indicators for Dual-Rx CSFB and S102 in SIB8 | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100285 | 0378 | - | Clarification on DRX StartOffset for TDD | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0379 | 1 | Miscellaneous corrections from REL-9 ASN.1 review | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0381 | - | Need codes and missing conventions | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0383 | 1 | Introduction of Full Configuration Handover for handling earlier eNB releases | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0385 | - | Clarification to SFN reference in RRC | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0390 | - | RSRP and RSRQ based Thresholds | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100189 | 0392 | 3 | Redirection enhancements to GERAN | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0398 | - | Cell reselection enhancements CR for 36.331 | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100307 | 0401 | 3 | CR on UE-originated RLFreporting for MRO SON use case | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100309 | 0402 | 3 | CR to 36.331 on Redirection enhancements to UTRAN | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100306 | 0403 | 2 | Proximity status indication handling at mobility | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100305 | 0404 | - | Upper layer aspect of MBSFN area id | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0405 | - | Redirection for enhanced 1xRTT CS fallback with concurrent PSHO | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100301 | 0406 | - | Avoiding interleaving transmission of CMAS notifications | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100308 | 0407 | 1 | Introduction of UE GERAN DTM capability indicator | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100381 | 0408 | 2 | Introducing provisions for late ASN.1 corrections | 9.1.0 | 9.2.0 |
| | RP-47 | RP-100245 | 0411 | - | Correction/ alignment of REL-9 UE capability signalling | 9.1.0 | 9.2.0 |
| 06/2010 | RP-48 | RP-100553 | 0412 | - | Clarification for mapping between warning message and CB-data | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100556 | 0413 | - | Clarification of radio link failure related actions | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100554 | 0414 | - | Clarification on UE actions upon leaving RRC_CONNECTED | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100553 | 0415 | - | Correction on CMAS system information | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100554 | 0416 | 1 | Corrections to MBMS | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100536 | 0418 | - | Decoding of unknown future extensions | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100556 | 0419 | 1 | Miscellaneous small corrections and clarifications | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100551 | 0420 | - | Prohibit timer for proximity indication | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100556 | 0421 | - | RLF report for MRO correction | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100546 | 0423 | 1 | Missing UTRA bands in IRAT-ParametersUTRA-FDD | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100556 | 0424 | - | Correction on handling of dedicated RLF timers | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100556 | 0431 | 1 | Protection of RRC messages | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100556 | 0433 | - | Handling missing Essential system information | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100551 | 0434 | 1 | Clarification on UMTS CSG detected cell reporting in LTE | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100556 | 0436 | - | Introducing provisions for late corrections | 9.2.0 | 9.3.0 |
| | RP-48 | RP-100556 | 0437 | - | Clarification regarding / alignment of REL-9 UE capabilities | 9.2.0 | 9.3.0 |
| 09/2010 | RP-49 | RP-100845 | 0440 | - | Correction to 3GPP2 reference for interworking with cdma2000 1x | 9.3.0 | 9.4.0 |
| | RP-49 | RP-100851 | 0441 | - | Clarification on UL handover preparation transfer | 9.3.0 | 9.4.0 |
| | RP-49 | RP-100851 | 0442 | 1 | Clarifications regarding fullConfiguration | 9.3.0 | 9.4.0 |

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|---|---|---|---|---|---|---|---|
| | RP-49 | RP-100851 | 0443 | - | Clarifications regarding handover to E-UTRAN | 9.3.0 | 9.4.0 |
| | RP-49 | RP-100854 | 0444 | - | Correction on the table of conditionally mandatory Release 9 features | 9.3.0 | 9.4.0 |
| | RP-49 | RP-100851 | 0445 | - | Corrections to TS36.331 on MeasConfig IE | 9.3.0 | 9.4.0 |
| | RP-49 | RP-100853 | 0446 | 2 | CR to 36.331 on clarification for MBMS PTM RBs | 9.3.0 | 9.4.0 |
| | RP-49 | RP-100851 | 0447 | - | Introduction of late corrections container for E-UTRA UE capabilities | 9.3.0 | 9.4.0 |
| | RP-49 | RP-100851 | 0448 | - | Renaming of containers for late non-critical extensions | 9.3.0 | 9.4.0 |
| | RP-49 | RP-100851 | 0452 | - | Clarifications Regarding Redirection from LTE | 9.3.0 | 9.4.0 |
| | RP-49 | RP-100845 | 0456 | - | Description of multi-user MIMO functionality in feature group indicator table | 9.3.0 | 9.4.0 |
| | RP-49 | RP-100845 | 0458 | - | Correct the PEMAX_H to PEMAX | 9.3.0 | 9.4.0 |
| | RP-49 | RP-100851 | 0460 | - | Clarification for feature group indicator bit 11 | 9.3.0 | 9.4.0 |
| | RP-49 | RP-100851 | 0465 | 1 | Clarification of FGI setting for inter-RAT features not supported by the UE | 9.3.0 | 9.4.0 |
| | RP-49 | RP-101008 | 0475 | 1 | FGI settings in Rel-9 | 9.3.0 | 9.4.0 |
| 12/2010 | RP-50 | RP-101197 | 0483 | - | Clarification on Meaning of FGI Bits | 9.4.0 | 9.5.0 |
| | RP-50 | RP-101197 | 0485 | - | Clarification regarding reconfiguration of the quantityConfig | 9.4.0 | 9.5.0 |
| | RP-50 | RP-101210 | 0486 | 1 | Corrections to the presence of IE regarding DRX and CQI | 9.4.0 | 9.5.0 |
| | RP-50 | RP-101210 | 0493 | - | The field descriptions of MeasObjectEUTRA | 9.4.0 | 9.5.0 |
| | RP-50 | RP-101197 | 0498 | 1 | Clarification of FGI settings non ANR periodical measurement reporting | 9.4.0 | 9.5.0 |
| | RP-50 | RP-101209 | 0500 | - | Corrections to RLF Report | 9.4.0 | 9.5.0 |
| | RP-50 | RP-101206 | 0519 | 1 | T321 timer fix | 9.4.0 | 9.5.0 |
| | RP-50 | RP-101197 | 0524 | - | Restriction of AC barring parameter setting | 9.4.0 | 9.5.0 |
| | RP-50 | RP-101210 | 0525 | - | Removal of SEQUENCE OF SEQUENCE in UEInformationResponse | 9.4.0 | 9.5.0 |
| | RP-50 | RP-101197 | 0526 | 1 | Clarification regarding default configuration value N/A | 9.4.0 | 9.5.0 |
| | RP-50 | RP-101431 | 0532 | - | Splitting FGI bit 3 | 9.4.0 | 9.5.0 |
| | RP-50 | RP-101183 | 0476 | 4 | 36.331 CR on Introduction of Minimization of Drive Tests | 9.4.0 | 10.0.0 |
| | RP-50 | RP-101293 | 0477 | 4 | AC-Barring for Mobile Originating CSFB call | 9.4.0 | 10.0.0 |
| | RP-50 | RP-101214 | 0478 | - | Addition of UE-EUTRA-Capability descriptions | 9.4.0 | 10.0.0 |
| | RP-50 | RP-101214 | 0481 | - | Clarification on Default Configuration for CQI-ReportConfig | 9.4.0 | 10.0.0 |
| | RP-50 | RP-101215 | 0487 | - | CR to 36.331 adding e1xCSFB support for dual Rx/Tx UE | 9.4.0 | 10.0.0 |
| | RP-50 | RP-101227 | 0488 | 1 | Introduction of Carrier Aggregation and UL/ DL MIMO | 9.4.0 | 10.0.0 |
| | RP-50 | RP-101228 | 0489 | 1 | Introduction of relays in RRC | 9.4.0 | 10.0.0 |
| | RP-50 | RP-101214 | 0490 | 1 | Priority indication for CSFB with re-direction | 9.4.0 | 10.0.0 |
| | RP-50 | RP-101214 | 0491 | - | SIB Size Limitations | 9.4.0 | 10.0.0 |
| | RP-50 | RP-101214 | 0513 | - | Combined Quantity Report for IRAT measurement of UTRAN | 9.4.0 | 10.0.0 |
| | RP-50 | RP-101214 | 0527 | 1 | UE power saving and Local release | 9.4.0 | 10.0.0 |
| | RP-50 | RP-101429 | 0530 | 1 | Inclusion of new UE categories in Rel-10 | 9.4.0 | 10.0.0 |
| 03/2011 | RP-51 | RP-110282 | 0533 | - | 36331_CRxxx_Protection of Logged Measurements Configuration | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110294 | 0534 | 1 | Stage-3 CR for MBMS enhancement | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0535 | - | Clean up MDT-related text | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0536 | - | Clear MDT configuration and logs when the UE is not registered | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0537 | - | Correction to the field description of nB | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110289 | 0538 | - | CR on impact on UP with remove&add approach_2 | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0539 | - | CR to 36.331 on corrections for MDT | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110290 | 0543 | - | Introduction of CA/MIMO capability signalling and measurement capability signalling in CA | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0544 | - | MDT PDU related clarifications | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0545 | - | Correction on release of logged measurement configuration while in another RAT | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110289 | 0546 | - | Miscellaneous Corrections for CA Running RRC CR | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0547 | 1 | Miscellaneous small clarifications and corrections | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110293 | 0548 | 4 | Necessary changes for RLF reporting enhancements | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0549 | 1 | Memory size for logged measurements capable UE | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110289 | 0550 | - | Parameters confusion of non-CA and CA configurations | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110272 | 0553 | - | Presence condition for cellSelectionInfo-v920 in SIB1 | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0554 | 1 | Removal of MDT configuration at T330 expiry | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110289 | 0556 | 1 | Signalling aspects of existing LTE-A parameters | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0557 | 1 | Some Corrections on measurement | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110291 | 0558 | - | Stored system information for RNs | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110291 | 0559 | - | Support of Integrity Protection for Relay | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110290 | 0561 | 2 | Updates of L1 parameters for CA and UL/DL MIMO | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110291 | 0571 | 1 | Note for Dedicated SIB for RNs | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110272 | 0579 | - | Correction to cs-fallbackIndicator field description | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110289 | 0580 | - | Clarification to the default configuration of sCellDeactivationTimer | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110289 | 0581 | - | Miscellaneous corrections to TS 36.331 on Carrier Aggregation | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0584 | - | Correction of configuration description in SIB2 | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110265 | 0587 | - | Clarification of band indicator in handover from E-UTRAN to GERAN | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110285 | 0588 | 1 | 36331_CRxxxx Support of Delay Tolerant access requests | 10.0.0 | 10.1.0 |

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| | RP-51 | RP-110292 | 0590 | - | Update of R2-110807 on CSI measurement resource restriction for time domain ICIC | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110292 | 0591 | - | Update of R2-110821 on RRM/RLM resource restriction for time domain ICIC | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110290 | 0592 | - | Corrections on UE capability related parameters | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0596 | - | Validity time for location information in Immediate MDT | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0597 | - | CR to 36.331 adding UE capability indicator for dual Rx/Tx e1xCSFB | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110289 | 0598 | - | Miscellaneous corrections to CA | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0599 | - | Further correction to combined measurement report of UTRAN | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0600 | - | Correction to the reference of ETWS | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110269 | 0602 | 1 | Introduction of OTDOA inter-freq RSTD measurement indication procedure | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0603 | - | Correction of use of RRCConnectionReestablishment message for contention resolution | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0604 | - | CR to 36.331 on MDT neighbour cell measurements logging | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110272 | 0609 | - | Minor ASN.1 corrections for the UEInformationResponse message | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0613 | - | Clarification regarding dedicated RLF timers and constants | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0615 | - | Release of Logged Measurement Configuration | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0616 | - | Some corrections on TS 36.331 | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0623 | - | AC barring procedure clean up | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0624 | - | Counter proposal to R2-110826 on UE capabilities for MDT | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0628 | 1 | UE information report for RACH | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110289 | 0629 | 2 | Measurement on the deactivated SCells | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0632 | 1 | Trace configuration paremeters for Logged MDT | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0635 | - | Clarification on stop condition for timer T3330 | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110282 | 0637 | - | User consent for MDT | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0638 | - | Correction on the range of CQI resource index | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110272 | 0640 | 1 | Small corrections to ETWS & CMAS system information | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110290 | 0641 | 1 | UE capability signaling structure w.r.t carrier aggregation, MIMO and measurement gap | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110289 | 0642 | 1 | Normal PHR and the multiple uplink carriers | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0643 | 1 | Corrections to TS36.331 on SIB2 handling | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110280 | 0644 | 1 | Adding a Power Management indication in PHR | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110289 | 0646 | 1 | Clarification for CA and TTI bundling in RRC | 10.0.0 | 10.1.0 |
| | RP-51 | RP-110443 | 0648 | 1 | Updates to FGI settings | 10.0.0 | 10.1.0 |
| 06/2011 | RP-52 | RP-110836 | 0651 | - | Add MBMS counting procedure to processing delay requirement for RRC procedure Section 11.2 | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110830 | 0653 | - | Add pre Rel-10 procedures to processing delay requirement for RRC procedure Section 11.2 | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110847 | 0654 | 1 | Addition of a specific reference for physical configuration fields | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110839 | 0656 | - | Clarification of inter-frequency RSTD measurement indication procedure | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110830 | 0658 | - | Clarification of optionality of UE features without capability | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110839 | 0660 | - | Clarification on the definition of maxCellBlack | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110839 | 0661 | - | Clarification on upper layer requested connection release | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110850 | 0662 | 3 | Clarification regarding eICIC measurements | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110839 | 0663 | - | CR for s-measure handling | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110851 | 0664 | 1 | CR on clarification of RLF Report in Carrier Aggregation | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110830 | 0669 | - | FGI bit for handover between LTE FDD/TDD | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110847 | 0670 | 2 | Further updates on L1 parameters | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110839 | 0671 | 2 | General error handling for extension fields | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110851 | 0672 | 2 | Additional information for RLF report | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110843 | 0673 | - | Introduction of TCE ID for logged MDT | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110670 | 0674 | 4 | Miscellaneous corrections (related to review in preparation for ASN.1 freeze) | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110843 | 0675 | - | PLMN check for MDT logging | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110839 | 0677 | - | UE actions upon leaving RRC_CONNECTED | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110847 | 0678 | - | Clarification on bandEUTRA-r10 and supportedBandListEUTRA | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110837 | 0679 | - | Updated value range for the Extended Wait Timer | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110839 | 0680 | 1 | Value range of DRX-InactivityTimer | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110828 | 0693 | 1 | Correction for SR-VCC and QCI usage | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110847 | 0694 | - | Restructuring of CQI-ReportConfig-r10 | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110839 | 0695 | 2 | Correction on DL allocations in MBSFN subframes | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110850 | 0700 | - | Reference SFN for MeasSubframePattern | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110846 | 0701 | - | Clarifications to CA related field descriptions | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110847 | 0702 | - | Corrections to codebookSubsetRestriction and SRS parameters | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110834 | 0704 | - | Corrections to the handling of ri-ConfigIndex for TM9 | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110715 | 0710 | 2 | UE capabilities for Rel-10 LTE features with eICIC measurement restrictions as FGI (Alt.1) | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110839 | 0713 | - | CR to 36.331 on redirected utra-TDD carrier frequency | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110839 | 0714 | - | Explicit AS signalling for mapped PTMSI/GUTI | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110847 | 0718 | - | Counter proposal for Updates of mandatory information in AS-Config | 10.1.0 | 10.2.0 |

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| | RP-52 | RP-110839 | 0719 | - | CR for Reconfiguration of discardTimer in PDCP-Config | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110847 | 0723 | - | On the missing multiplicity of UE capability parameters | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110830 | 0735 | - | Radio frame alignment of CSA and MSP | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110847 | 0740 | - | Reconfiguration involving critically extended IEs (using fullFieldConfig i.e. option 2) | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110839 | 0744 | - | Counter proposal to R2-112753 on CR to remove CSG Identity validity limited to CSG cell | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110839 | 0746 | 1 | Increase of prioritisedBitRate | 10.1.0 | 10.2.0 |
| | RP-52 | RP-110847 | 0747 | - | CA and MIMO Capabilities in LTE Rel-10 | 10.1.0 | 10.2.0 |
| 09/2011 | RP-53 | RP-111297 | 0752 | - | TS36.331 Correction | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111297 | 0754 | - | maxNumberROHC-ContextSessions when no ROHC profile is supported | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111280 | 0757 | - | Correction to Subframe Allocation End in PMCH-Info | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111288 | 0761 | - | Correction on PUCCH configuration for Un interface | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111297 | 0762 | - | Miscellaneous corrections to 36.331 | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111278 | 0764 | 2 | 36.331 correction on CSG identity validity to allow introduction of CSG RAN sharing | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111283 | 0770 | 2 | AdditionalSpectrumEmissions in CA | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111297 | 0773 | - | CR to 36.331 on Small correction of PHR parameter | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111283 | 0775 | 2 | Clarifications to P-max on CA | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111280 | 0784 | - | Clarification on for which subframes signalling MCS applies | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111283 | 0792 | - | Corrections in RRC | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111297 | 0793 | - | Replace the tables with exception list in 10.5 AS-Config | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111297 | 0796 | - | Corrections to the field descriptions | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111283 | 0798 | - | Configuration of simultaneous PUCCH&PUSCH | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111297 | 0806 | - | Corrections to release of csi-SubframePatternConfig and cqi-Mask | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111272 | 0810 | - | GERAN SI format for cell change order&PS handover& enhanced redirection to GERAN | 10.2.0 | 10.3.0 |
| | RP-53 | RP-111283 | 0811 | - | Corrections to PUCCH-Config field descriptions | 10.2.0 | 10.3.0 |
| 12/2011 | RP-54 | RP-111711 | 0812 | 1 | Clarification of PCI range for CSG cells | 10.3.0 | 10.4.0 |
| | RP-54 | RP-111716 | 0813 | - | Clarifications to Default Radio Configurations | 10.3.0 | 10.4.0 |
| | RP-54 | RP-111716 | 0814 | 1 | Corrections to enhancedDualLayerTDD | 10.3.0 | 10.4.0 |
| | RP-54 | RP-111716 | 0815 | - | Miscellaneous small corrections | 10.3.0 | 10.4.0 |
| | RP-54 | RP-111716 | 0816 | 1 | Correction on notation of SRS transmission comb | 10.3.0 | 10.4.0 |
| | RP-54 | RP-111706 | 0823 | 1 | 36.331 CR SPS reconfiguration | 10.3.0 | 10.4.0 |
| | RP-54 | RP-111716 | 0827 | 2 | Clarification of list sizes in measurement configuration stored by UE | 10.3.0 | 10.4.0 |
| | RP-54 | RP-111706 | 0835 | - | Clarification of the event B1 and ANR related FGI bits | 10.3.0 | 10.4.0 |
| | RP-54 | RP-111714 | 0840 | 1 | Clarification on MBSFN and measurement resource restrictions | 10.3.0 | 10.4.0 |
| | RP-54 | RP-111706 | 0845 | - | Clarification on parallel message transmission upon connection re-establishment | 10.3.0 | 10.4.0 |
| 03/2012 | RP-55 | RP-120326 | 0855 | 1 | Limiting MBMS counting responses to within the PLMN | 10.4.0 | 10.5.0 |
| | RP-55 | RP-120321 | 0857 | - | CR to 36.331 on cdma2000 band classes and references | 10.4.0 | 10.5.0 |
| | RP-55 | RP-120326 | 0862 | 1 | Clarification on MBSFN and measurement resource restrictions | 10.4.0 | 10.5.0 |
| | RP-55 | RP-120325 | 0871 | - | On SIB10/11 Reception Timing | 10.4.0 | 10.5.0 |
| | RP-55 | RP-120326 | 0875 | 1 | Clarification on MBMS counting for uncipherable services | 10.4.0 | 10.5.0 |
| | RP-55 | RP-120325 | 0876 | - | Minor correction regarding limited service access on non-CSG-member cell | 10.4.0 | 10.5.0 |
| | RP-55 | RP-120326 | 0894 | - | Time to keep RLF Reporting logs | 10.4.0 | 10.5.0 |
| | RP-55 | RP-120356 | 0895 | 1 | Introducing means to signal different FDD/TDD Capabilities/FGIs for Dual-xDD UE | 10.4.0 | 10.5.0 |
| | RP-55 | RP-120321 | 0899 | - | Clarification on SRB2 resumption upon connection re-establishment (parallel message transmission) | 10.4.0 | 10.5.0 |
| | RP-55 | RP-120321 | 0900 | 1 | Duplicated ASN.1 naming correction | 10.4.0 | 10.5.0 |
| 06/2012 | RP-56 | RP-120805 | 0909 | - | SPS Reconfiguration | 10.5.0 | 10.6.0 |
| | RP-56 | RP-120805 | 0912 | 1 | Change in Scheduling Information for ETWS | 10.5.0 | 10.6.0 |
| | RP-56 | RP-120807 | 0914 | - | Clarification of mch-SchedulingPeriod configuration | 10.5.0 | 10.6.0 |
| | RP-56 | RP-120808 | 0916 | 1 | Change in Scheduling Information for CMAS | 10.5.0 | 10.6.0 |
| | RP-56 | RP-120814 | 0919 | 1 | Introducing means to signal different REL-10 FDD/TDD Capabilities/FGIs for Dual-xDD UE | 10.5.0 | 10.6.0 |
| | RP-56 | RP-120812 | 0920 | 1 | Clarification on setting of dedicated NS value for CA by E-UTRAN | 10.5.0 | 10.6.0 |
| | RP-56 | RP-120808 | 0931 | - | T321 value for UTRA SI acquisition | 10.5.0 | 10.6.0 |
| | RP-56 | RP-120813 | 0957 | 1 | Korean Public Alert System (KPAS) in relation to CMAS | 10.5.0 | 10.6.0 |
| | RP-56 | RP-120812 | 0969 | 1 | Introduction of supported bandwidth combinations for CA | 10.5.0 | 10.6.0 |
| | RP-56 | RP-120734 | 0970 | 1 | Introduction of multiple frequency band indicator | 10.5.0 | 10.6.0 |
| | RP-56 | RP-120825 | 0934 | - | Introduction of a new security algorithm ZUC | 10.5.0 | 11.0.0 |
| | RP-56 | RP-120813 | 0973 | 1 | EU-Alert in relation to CMAS | 10.5.0 | 11.0.0 |
| 09/2012 | RP-57 | RP-121371 | 0982 | 1 | Introduction of EAB | 11.0.0 | 11.1.0 |
| | RP-57 | RP-121381 | 0990 | - | Additional special subframe configuration related correction | 11.0.0 | 11.1.0 |
| | RP-57 | RP-121423 | 1000 | 4 | 36.331 CR introducing In-Device Coexistence (IDC) | 11.0.0 | 11.1.0 |
| | RP-57 | RP-121359 | 1008 | - | Voice support Capabilities | 11.0.0 | 11.1.0 |
| | RP-57 | RP-121361 | 1013 | - | Differentiating UTRAN modes in FGIs | 11.0.0 | 11.1.0 |
| | RP-57 | RP-121368 | 1022 | 1 | Introduction of absolute priority based measurements and reselection in CELL_FACH State in 36.331 | 11.0.0 | 11.1.0 |
| | RP-57 | RP-121370 | 1024 | - | Introducing MDT enhancements for REL-11 | 11.0.0 | 11.1.0 |

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| | RP-57 | RP-121349 | 1025 | 2 | Introducing Carrier aggregation enhancements for REL-11 | 11.0.0 | 11.1.0 |
| | RP-57 | RP-121375 | 1026 | - | Introducing MBMS enhancements for REL-11 | 11.0.0 | 11.1.0 |
| | RP-57 | RP-121376 | 1052 | 2 | Signaling support for CRS interference management in eICIC | 11.0.0 | 11.1.0 |
| | RP-57 | RP-121395 | 1055 | - | CR on scell measurement cycle | 11.0.0 | 11.1.0 |
| | RP-57 | RP-121395 | 1056 | - | CR on measurement report | 11.0.0 | 11.1.0 |
| | RP-57 | RP-121378 | 1057 | 3 | Introduction of 'Power preference indication' | 11.0.0 | 11.1.0 |
| | RP-57 | RP-121280 | 1060 | - | Correction for PUCCH/SRS Release | 11.0.0 | 11.1.0 |
| 12/2012 | RP-58 | RP-121933 | 1063 | - | Correction related to differentiating UTRAN modes in FGIs | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121936 | 1065 | - | Processing delay for RRCConnectionReconfiguration | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121953 | 1066 | 2 | Addition of the stage-3 agreements on IDC | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121951 | 1067 | 3 | Carrier Aggregation Enhancement RAN1 parameters | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121957 | 1068 | 1 | Clarification of SR period | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121957 | 1069 | 1 | Clarification on HandoverCommand message | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121957 | 1070 | - | Clarification on mobility related issues | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121946 | 1071 | 1 | Correction of the signaling for Uncertainty and Confidence | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121940 | 1072 | 2 | Corrections to MBMS Service Continuity | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121940 | 1073 | - | CR to 36.331 on SIB15 acquisition | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121957 | 1074 | 1 | Handling of 1xCSFB failure | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121957 | 1075 | - | Miscellaneous corrections | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121958 | 1076 | 1 | RAN overload control using RRC connection Rejection | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121954 | 1077 | - | RRC support for CoMP in UL | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121951 | 1078 | - | Some clarification to Carrier aggregation enhancements | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121939 | 1079 | 1 | Validity of EAB SIB and acquisition of SIB1 | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121922 | 1085 | - | Clarification for Multiple Frequency Band Indicators feature | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121924 | 1089 | 1 | Moving the TM5 capability | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121959 | 1093 | 1 | CR to 36.331 on introducing ROHC context continue for intra-ENB handover | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121946 | 1100 | - | Correction on MDT multi-PLMN support | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121953 | 1102 | - | Clarification and alignment of handling of other configuration | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121970 | 1103 | 6 | Introducing support for Coordinated Multi-Point (CoMP) operation | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121922 | 1105 | 2 | Introducing further UE aspects regarding multi band cells | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121947 | 1120 | - | CR to 36.331 on additional information in RLF report for inter-RAT MRO | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121952 | 1125 | 1 | Correction on Power preference indication | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121950 | 1127 | 1 | SIB1 provisioning via dedicated signalling | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121936 | 1128 | 2 | Measurement reporting of Scells | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121956 | 1129 | 1 | Introduction of EPDCCH parameters in TS 36.331 | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121961 | 1130 | 2 | Introduction of Rel-11 UE capabilities | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121958 | 1131 | - | Introducion of wideband RSRQ measurements | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121958 | 1146 | - | Introduction of network sharing for CDMA2000 inter-working | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121960 | 1157 | - | Broadcast of Time Info by Using a New SIB | 11.1.0 | 11.2.0 |
| | RP-58 | RP-121957 | 1175 | - | GERAN measurement object at ANR | 11.1.0 | 11.2.0 |
| 03/2013 | RP-59 | RP-130246 | 1182 | 2 | Miscellaneous corrections from review preceeding ASN.1 freeze | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130243 | 1186 | 2 | DL COMP capability related correction | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130231 | 1193 | 1 | Mandatory supporting of B1 measurement to UMTS FDD (FGI bit 15) | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130241 | 1197 | - | Clarification on MBMS Service Continuity | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130241 | 1198 | - | IDC Problem Reporting | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130247 | 1210 | - | Corrections on definition of CSG member cell | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130237 | 1211 | - | Extension of FBI and EARFCN | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130228 | 1220 | - | Invalidation of ETWS with security feature | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130225 | 1224 | - | Invalid measurement configuration with different (E)ARFCN | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130241 | 1231 | 2 | PPI and IDC indication upon handover | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130227 | 1235 | 1 | Correcting further UE aspects regarding multi band cells | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130248 | 1236 | 1 | Behaviour in case of excessive dedicated priority information | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130225 | 1241 | - | Clarification on EARFCN signalling in Mobility control info | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130241 | 1244 | - | IDC-SubframePattern length for FDD | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130249 | 1252 | - | Introduction of wideband RSRQ measurements in RRC_IDLE | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130240 | 1255 | - | Optional support of RLF report for inter-RAT MRO | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130233 | 1258 | 2 | The presence of bandcombination for non-CA capable UEs | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130248 | 1259 | - | Correction for event A5 | 11.2.0 | 11.3.0 |
| | RP-59 | RP-130332 | 1265 | - | Mandating the settings of FGI bit 14, 27 and 28 to true | 11.2.0 | 11.3.0 |
| 06/2013 | RP-60 | RP-130805 | 1267 | - | Clarification on the redirection to UTRA-TDD frequency in case of CSFB High Priority | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130804 | 1269 | 1 | Correction of wrong reference | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130809 | 1270 | - | Clarification to support of deprioritisation feature | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130809 | 1271 | - | Clarification on KASME key usage | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130808 | 1272 | - | Correction on multi-TA capability | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130808 | 1273 | - | MBMS interest indication upon handover/ re-establishment | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130808 | 1274 | - | Conditions RI reference inheriting CSI process (DL CoMP) | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130808 | 1275 | - | Clarification on NZP CSI-RS resource configuration for UE supporting 1 CSI process | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130808 | 1276 | - | Corrections to field description of pdsch-Start-r11 | 11.3.0 | 11.4.0 |

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|---|---|---|---|---|---|---|---|
| | RP-60 | RP-130809 | 1277 | - | Need code corrections in Rel-11 RRC | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130808 | 1278 | - | Miscellanous small corrections | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130809 | 1279 | 1 | FDD/TDD diff column correction for FGI31 | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130804 | 1282 | - | measCycleSCell upon SCell configuration | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130809 | 1294 | - | Clarification on RRC Connection Reconfiguration with Critical Extension | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130802 | 1298 | - | Security key generation in case of MFBI | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130804 | 1303 | 1 | Clarification on inclusion of non-CA band combinations | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130809 | 1308 | - | CR on ROHC parameter configuration in Rel-11 RRC | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130804 | 1315 | 2 | Clarification on UE CA capability | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130809 | 1321 | - | Updating 3GPP2 specification references | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130805 | 1323 | - | Clarification on the configuration of the extended PHR | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130805 | 1324 | - | Clarifications on SystemTimeInfoCDMA2000 IE | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130808 | 1325 | - | MFBI impact on MBMS service continuity | 11.3.0 | 11.4.0 |
| | RP-60 | RP-130819 | 1329 | 1 | MFBI aspects for dedicated signalling | 11.3.0 | 11.4.0 |
| 09/2013 | RP-61 | RP-131311 | 1335 | - | Clarification on PhysCellIdRange | 11.4.0 | 11.5.0 |
| | RP-61 | RP-131311 | 1339 | 1 | Correction on the first subframe of the measurement gap | 11.4.0 | 11.5.0 |
| | RP-61 | RP-131319 | 1340 | 1 | Correction for MFBI in SIB15 and SIB6 | 11.4.0 | 11.5.0 |
| | RP-61 | RP-131319 | 1343 | - | Clarification of MFBI impact on MBMS service continuity | 11.4.0 | 11.5.0 |
| | RP-61 | RP-131238 | 1344 | 2 | Clarification of UE action for otherwise in conditions | 11.4.0 | 11.5.0 |
| | RP-61 | RP-131311 | 1348 | - | Corrections to the 3GPP2 specification references in 36.331 | 11.4.0 | 11.5.0 |
| | RP-61 | RP-131318 | 1353 | - | Clarifications regarding the usage of "rlf-Cause" in case of handover failure | 11.4.0 | 11.5.0 |
| 12/2013 | RP-62 | RP-131986 | 1366 | - | Introduction of capability bit for UTRA MFBI | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131984 | 1368 | 1 | Addition of inter-frequency RSTD measurement capability indicator for OTDOA | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131989 | 1370 | - | Clarification on supportedBand | 11.5.0 | 11.6.0 |
| | RP-62 | RP-132003 | 1371 | - | Capturing mandatory/optional agreements on Rel-11 UE features | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131995 | 1372 | - | Clarification on otherwise behaviour | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131995 | 1373 | - | Corrections of the 3GPP2 references in TS 36.331 | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131991 | 1374 | - | measResultLastServCell for SON-HOF report | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131729 | 1375 | 1 | Clarification to timeInfoUTC field in SIB16 | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131991 | 1389 | - | Clarification on eRedirection to UMTS TDD with multiple UMTS TDD frequencies | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131995 | 1390 | - | Delta signalling for critical extension | 11.5.0 | 11.6.0 |
| | RP-62 | RP-132005 | 1391 | - | Capability signalling for CSI processes | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131991 | 1395 | 1 | Clarifications on Measurement | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131984 | 1397 | - | Correction to InterFreqRSTDMeasurementIndication field descriptions | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131984 | 1404 | - | Correction of Inter-frequency RSTD indication for multiple frequencies | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131993 | 1405 | 1 | Enabling SRVCC from GERAN without forwarding UE-EUTRA-Capability | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131995 | 1409 | 1 | System information and change monitoring procedure | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131991 | 1410 | 1 | Correction on presence of codebookSubsetRestriction-r10 | 11.5.0 | 11.6.0 |
| | RP-62 | RP-131998 | 1376 | - | Introducing UE support for inbound mobility to a shared CSG cell | 11.5.0 | 12.0.0 |
| | RP-62 | RP-132002 | 1378 | 2 | Introduction of support of further DL MIMO enhancement | 11.5.0 | 12.0.0 |
| | RP-62 | RP-131988 | 1379 | - | CR for SSAC in CONNECTED | 11.5.0 | 12.0.0 |
| | RP-62 | RP-132002 | 1406 | - | Update of CMAS reference to E-UTRAN specific sections in TS23.041 | 11.5.0 | 12.0.0 |
| 03/2014 | RP-63 | RP-140359 | 1424 | 1 | CR on introduction of Cell-specific time-to-trigger | 12.0.0 | 12.1.0 |
| | RP-63 | RP-140346 | 1435 | - | UE autonomous modification of cellsTriggered upon serving cell addition/ release | 12.0.0 | 12.1.0 |
| | RP-63 | RP-140359 | 1436 | 1 | Introduction of T312 | 12.0.0 | 12.1.0 |
| | RP-63 | RP-140362 | 1439 | 1 | Introduction of UE-supported EARFCN list in handover preparation information for MFBI | 12.0.0 | 12.1.0 |
| | RP-63 | RP-140352 | 1442 | - | Correction of Connection Establishement Failure Report | 12.0.0 | 12.1.0 |
| | RP-63 | RP-140356 | 1450 | 1 | Clarification on the presence of TDD special subframe | 12.0.0 | 12.1.0 |
| | RP-63 | RP-140359 | 1453 | - | Introduction of UE mobility history reporting (option 2) | 12.0.0 | 12.1.0 |
| | RP-63 | RP-140340 | 1455 | 1 | Clarification regarding need codes, conditions and ASN.1 defaults for extension fields | 12.0.0 | 12.1.0 |
| | RP-63 | RP-140340 | 1456 | - | ASN.1 issue with inter-node signalling (AS-Config) | 12.0.0 | 12.1.0 |
| | RP-63 | RP-140357 | 1457 | 1 | Clarification for the SIB occurrence in a single SI message | 12.0.0 | 12.1.0 |
| | RP-63 | RP-140364 | 1462 | - | New UE categories for DL 450Mbps class | 12.0.0 | 12.1.0 |
| | RP-63 | RP-140354 | 1463 | - | IoT indication for inter-band TDD CA with different UL/DL configuration | 12.0.0 | 12.1.0 |
| 06/2014 | RP-64 | RP-140869 | 1471 | - | Removal of comment line from EUTRA-UE-Variables imports | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140871 | 1475 | - | Correction on measObjectList in VarMeasConfig | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140879 | 1477 | - | Minor correction inbound mobility to shared CSG cell | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140873 | 1478 | - | Clarificaton on precedence of SCell SI provided dedicately | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140887 | 1479 | - | Support of the enhancement for TTI bundling for FDD | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140885 | 1490 | - | Corrections on timer T312 | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140885 | 1486 | - | Correction to the description of physCellIdRange in MeasObjectEUTRA | 12.1.0 | 12.2.0 |

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| | RP-64 | RP-140885 | 1506 | - | Corrections to UE mobility history information | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140873 | 1489 | - | ACK/NACK feedback mode on PUSCH | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140878 | 1556 | - | SIB15 enhancement for service availability information | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140888 | 1557 | - | Introduction of FDD/TDD CA UE capability | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140871 | 1545 | - | Clarification of E-UTRA MFBI signalling | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140892 | 1520 | 1 | Extended RLC LI field | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140873 | 1517 | 1 | Network-requested CA Band Combination Capability Signalling | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140873 | 1554 | 1 | Allowing TDD/FDD split for FGI111 and FGI112 | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140871 | 1551 | 1 | Inter-RAT ANR capability signalling in FGI33 when UE supports UTRA TDD only | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140884 | 1495 | 1 | Introduction of TDD eIMTA | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140885 | 1499 | 1 | Minor Corrections to T312 | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140892 | 1510 | 1 | Introduction of RRC Connection Establishment failure temporary Qoffset handling | 12.1.0 | 12.2.0 |
| | RP-64 | RP-140849 | 1555 | 2 | Introduction of UE capability for eMBMS reception on SCell and Non-Serving Cell | 12.1.0 | 12.2.0 |
| 09/2014 | RP-65 | RP-141494 | 1632 | - | FDD&TDD split for CA | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141505 | 1599 | - | UE capabilities for Hetnet mobility in TS 36.331 | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141499 | 1584 | - | Introduction of UE eIMTA capabilities | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141511 | 1567 | - | Corrections to extended RLC LI field | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141511 | 1603 | - | TAI reporting of last serving cell | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141498 | 1630 | 1 | Correction to Network-requested CA Band Combination Capability Signalling | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141496 | 1577 | 1 | Clarification on double indication of SAI in SIB15 | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141496 | 1597 | - | Clarification on MBMSCountingResponse | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141496 | 1623 | - | Clarification on the setting of SupportedBandCombination-v1130 | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141489 | 1574 | 1 | Correction of E-UTRAN UE capabilities description in HandoverPreparationInformation message field descriptions | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141507 | 1570 | - | Introducing MBSFN measurement by extension of logged measurements | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141510 | 1572 | 1 | Introduction of ACB skip for MMTEL voice/video and SMS | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141496 | 1615 | 1 | Clarification on determining MBMS frequencies of interest in MBMSInterestIndication | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141506 | 1579 | 1 | Introduction of signaling support for low complexity UEs | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141499 | 1601 | 1 | Rel-12 ASN.1 correction | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141511 | 1560 | 1 | Introduction of shorter MCH scheduling period | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141493 | 1611 | - | Clarification for time-domain resource restriction pattern applicable to neighbour cell RSRQ measurements | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141511 | 1559 | 2 | Correction to stop condition for "Chiba offset" | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141115 | 1636 | - | Mandating the FGI bit 31 to true | 12.2.0 | 12.3.0 |
| | RP-65 | RP-141618 | 1566 | 2 | Connected mode procedures and RRC signaling of WLAN/3GPP Radio Interworking for LTE | 12.2.0 | 12.3.0 |
| 12/2014 | RP-66 | RP-142122 | 1643 | - | Clarification on WLAN interworking | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142122 | 1644 | - | Correction on handling of dedicated parameters during re-establishment | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142122 | 1645 | - | Corrections to WLAN/3GPP Radio Interworking for LTE | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142122 | 1646 | - | Reduction of possible values for WLAN backhaul rate thresholds in LTE | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142140 | 1648 | - | PDCP SN size change during HO for RLC-UM mode bearers | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142124 | 1651 | - | Support of TTI bundling without resource allocation restriction for LTE coverage enhancements for Rel-12 | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142123 | 1652 | - | Corrections to eIMTA capabilities | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142140 | 1653 | - | ACB, ACB-skip, CSFB and SSAC signalling per PLMN | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142122 | 1642 | 1 | Minor corrections regarding WLAN interworking | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142115 | 1659 | - | Correction of remaining TBD for Rel-10 FGIs | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142117 | 1663 | - | New UE categories for DL 600Mbps | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142135 | 1687 | - | Introduction of Dual Connectivity | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142140 | 1697 | 1 | Prohibit timer for SR | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142133 | 1666 | - | Support of 256QAM in TS 36.331 (per band 256QAM capability report) | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142128 | 1690 | 1 | Introduction of increased number of frequencies to monitor | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142140 | 1696 | 2 | Introduction of extended RSRQ value range and new RSRQ definition | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142115 | 1650 | 1 | Introduction of signalling for serving cell interruptions | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142123 | 1655 | - | Correction for p0-Persistent-SubframeSet2 Handling | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142134 | 1681 | - | Introduction of missing Rel-12 UE capabilities | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142140 | 1647 | 1 | Extended RLC LI field correction | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142140 | 1656 | - | Outstanding Need OP for non-critical extension removal | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142140 | 1669 | 2 | Clarification on statusReportRequired handling | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142131 | 1698 | 2 | MCH BLER and RSRQ update for MBSFN MDT | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142130 | 1699 | 1 | Optionality support of UE mandatory features for Category 0 UEs | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142123 | 1661 | - | Further Clarifications on eIMTA and eICIC | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142113 | 1686 | 1 | UE capability for modified MPR behavior | 12.3.0 | 12.4.0 |
| | RP-66 | RP-142132 | 1664 | 1 | Support of Discovery Signals measurement in TS 36.331 | 12.3.0 | 12.4.0 |

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| | RP-66 | RP-142139 | 1670 | 2 | RRC Parameters for NAICS | 12.3.0 | 12.4.0 |
| | RP-66 | RP-141979 | 1700 | - | UE capability signaling for WLAN/3GPP radio interworking | 12.3.0 | 12.4.0 |
| | RP-66 | - | - | - | MCC editorial update | 12.4.0 | 12.4.1 |
| 03/2015 | RP-67 | RP-150373 | 1737 | - | Clarification on the setting of measScaleFactor without reducedMeasPerformance | 12.4.1 | 12.5.0 |
| | RP-67 | RP-150371 | 1747 | - | Clarification on Measurement Configuration handling | 12.4.1 | 12.5.0 |
| | RP-67 | RP-150371 | 1765 | - | Clarification to usage of field deltaTxD-OffsetPUCCH-Format1bCS-r11 in dedicated uplink power control parameter signalling | 12.4.1 | 12.5.0 |
| | RP-67 | RP-150370 | 1751 | - | Clarification on CSI measurement subframe set | 12.4.1 | 12.5.0 |
| | RP-67 | RP-150368 | 1795 | - | The absence of supportedMIMO-CapabilityUL-r10 | 12.4.1 | 12.5.0 |
| | RP-67 | RP-150370 | 1798 | - | Presence of codebookSubsetRestriction | 12.4.1 | 12.5.0 |
| | RP-67 | RP-150377 | 1768 | 2 | Miscellaneous changes resulting from review for REL-12 ASN.1 freeze | 12.4.1 | 12.5.0 |
| | RP-67 | RP-150374 | 1770 | 2 | Introduction of ProSe | 12.4.1 | 12.5.0 |

# History

| Document history | | |
|---|---|---|
| V12.3.0 | September 2014 | Publication |
| V12.4.1 | February 2015 | Publication |
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