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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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Foreword

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Contents

Foreword

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

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

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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document specifies the Radio Resource Control protocol for the UE-E-UTRAN radio interface.

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] 3GPP TS nn.nnn: "Radio Interface Protocol Architecture".

Editor's note: Document not yet available.

[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-A: 'Physical Layer Standard for cdma2000 Spread Spectrum Systems – Release A'.

[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); "Multiplexing and channel coding".

[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-B–v 1.0: 'Band Class Specification for cdma2000 Spread Spectrum Systems'

[25] 3GPP2 C.S0005-A: 'Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems – Release A, Addendum 2'

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

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

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

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

[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 C.S0002-A_v6.0 'Physical Layer Standard for cdma2000 Spread Spectrum Systems - Release A'

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

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

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].

(For further study).

3.2 Abbreviations

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

1xRTT	CDMA2000 1x Radio Transmission Technology
AM	Acknowledged Mode
ASN.1	Abstract Syntax Notation.1
ARQ	Automatic Repeat Request
AS	Access Stratum
BCCH	Broadcast Control Channel
BCH	Broadcast Channel
CCCH	Common Control Channel
CCO	Cell Change Order
CP	Control Plane
C-RNTI	Cell RNTI
CSG	Closed Subscriber Group
DCCH	Dedicated Control Channel
DRB	(user) Data Radio Bearer
DRX	Discontinuous Reception
DTCH	Dedicated Traffic Channel
DL	Downlink
DL-SCH	Downlink Shared Channel
ETWS	Earthquake and Tsunami Warning System
E-UTRA	Evolved Universal Terrestrial Radio Access
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
ENB	Evolved Node B
EPC	Enhanced Packet Core
EPS	Enhanced Packet System
FLOOR	Mathematical function used to "round down" i.e. to the nearest integer having a lower value
FDD	Frequency Division Duplex
FFS	For Further Study
GERAN	GSM/EDGE Radio Access Network
GSM	Global System for Mobile Communications
HARQ	Hybrid Automatic Repeat Request
HRPD	CDMA2000 High Rate Packet Data
IE	Information element
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
kB	Kilobyte (1024 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
MIB	Master Information Block
N/A	Not Applicable
NACC	Network Assisted Cell Change

NAS	Non Access Stratum
PCCH	Paging Control Channel
PDU	Protocol Data Unit
PDCP	Packet Data Convergence Protocol
PLMN	Public Land Mobile Network
QoS	Quality of Service
RACH	Random Access CHannel
RAT	Radio Access Technology
RB	Radio Bearer
RLC	Radio Link Control
RNTI	Radio Network Temporary Identifier
RRC	Radio Resource Control
RSCP	Received Signal Code Power
RSRP	Reference Signal Received Power
RSSI	Received Signal Strength Indicator
SAE	System Architecture Evolution
SAP	Service Access Point
SI	Scheduling Information
SIB	System Information Block
SI-RNTI	System Information RNTI
SRB	Signalling Radio Bearer
S-TMSI	SAE Temporary Mobile Station Identifier
TA	Tracking Area
TDD	Time Division Duplex
TM	Transparent Mode
TPC-RNTI	Transmit Power Control RNTI
UE	User Equipment
UICC	Universal Integrated Circuit Card
UL	Uplink
UM	Unacknowledged Mode
UL-SCH	Uplink Shared Channel
UP	User Plane
UTRAN	Universal Terrestrial Radio Access 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

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.

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;
    - Performs neighbouring cell measurements and cell (re-)selection;
    - Acquires system information.
- **RRC_CONNECTED**:
  - Transfer of unicast data to/from UE.
  - At lower layers, the UE may be configured with a UE specific DRX.
  - Network controlled mobility, i.e. handover and cell change order with network assistance (NACC) to GERAN;
  - The UE:
    - 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.

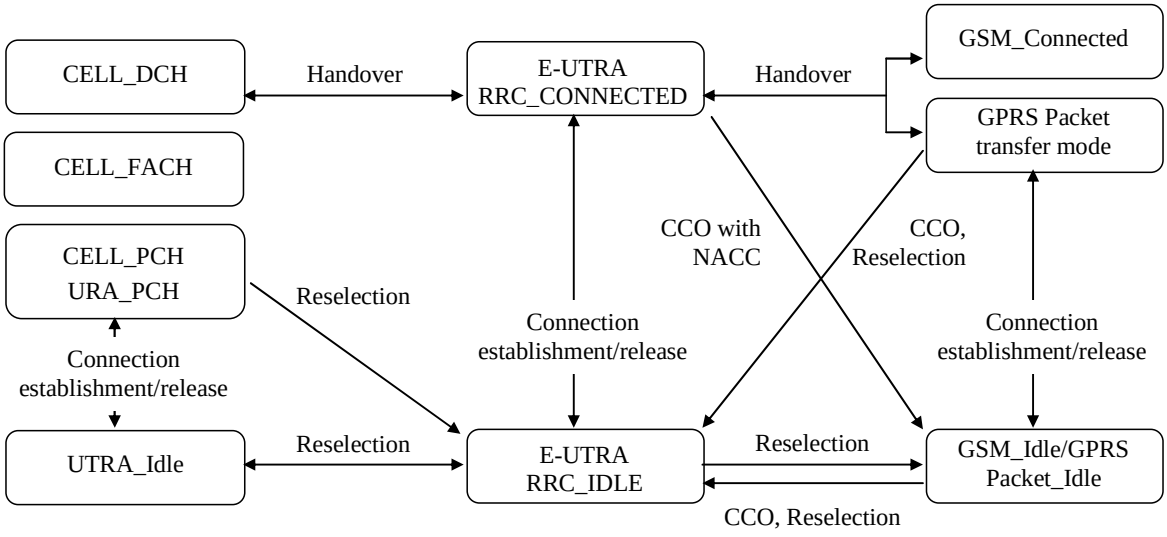

Figure 4.2.1-1: E-UTRA states and inter RAT mobility procedures, 3GPP

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.

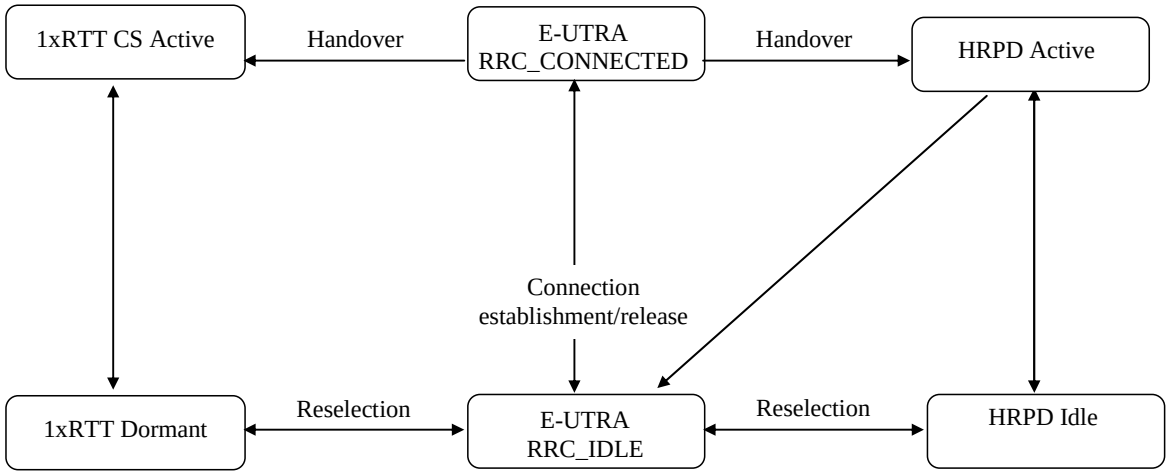

Figure 4.2.1-2: Mobility procedures between E-UTRA and CDMA2000

Editor's note: In Fig. 4.2.1-2, the procedure name is missing for some transitions. Terminology to be added is FFS.

The inter-RAT handover procedure(s) supports the case of signalling, conversational services (including a 'voice call continuity' procedure [FFS depending on SA2 discussions]), non- conversational services and combinations of these. The mobility between E-UTRA and non-3GPP systems other than CDMA2000 is FFS.

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, Idle/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 NAS messages, 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, including those containing a NAS or a non-3GPP message, are integrity protected and ciphered by PDCP. NAS independently applies integrity protection and ciphering to the NAS messages.

4.3 Services

4.3.1 Services provided to upper layers

The RRC protocol offers the following services to upper layers:

- Broadcast of general control information;
- Notification of UEs in RRC_IDLE, e.g. about a terminating call, for ETWS;
- 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 Control layer (e.g. integrity and ciphering) are provided in [8]. The services provided by Radio Link Control layer (e.g. the RLC modes) are specified in [7]. Further details about the services provided by Medium Access Control layer (e.g. the logical channels) are provided in [6]. The services provided by physical layer (e.g. the transport channels) are specified in [3].

4.4 Functions

The RRC protocol includes the following main functions:

- Broadcast of system information:
  - Including NAS common information;

Editor's note: It seems there is no NAS common information anymore

  - 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.
- 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 (CP) and AS ciphering (CP, UP);
  - RRC connection mobility including e.g. intra-frequency and inter-frequency handover, associated security handling, i.e. key and/ or 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;
  - QoS control including assignment/ modification of semi-persistent 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 mobility);
  - Configuration and (de-)activation 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;

NOTE Random access is specified entirely in the MAC i.e. including initial 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 there is a section other (5.6) that covers e.g. NAS dedicated information transfer, UE capability transfer. Finally, section 5.7 specifies the general error handling.

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: E-UTRAN may initiate a subsequent procedure prior to receiving the UEs response of a previously initiated procedure.

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;

Editor's note: The above is based on the following working assumptions: a) so far no need has been identified for an activation time, b) for procedure completion there is not need to wait for an L2 ACK

Editor's note: The UE can only initiate the UL information transfer procedure while in RRC_CONNECTED, i.e. this does not include the transient states while the UE is waiting for a response to connection request or a connection re-establishment request.

Editor's note: The UE continuously ongoing actions in idle and connected (i.e. normative versions of the statements in 4.2.1) are specified within the respective sections, e.g. system information, paging (36.304), measurements. Same applies for the actions upon state transitions.

To be completed

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 *schedulingInformation* included in *SystemInformationBlockType1*, with restrictions that: each SIB is contained only in a single SI message, only SIBs having the same scheduling requirement (periodicity) can be mapped to the same SI message, and *SystemInformationBlockType2* is always mapped to the SI message that corresponds to the first entry in the list of SI messages in *schedulingInformation*. There may be multiple SI messages transmitted with the same periodicity. *SystemInformationBlockType1* and all SI messages are transmitted on DL-SCH.

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.

Editor's note: In the unlikely event that serving cell paging and target cell DBCH overlap in time one of the two activities will need to be prioritised. This may lead into paging reception loss or increases in cell reselection interruption time.

5.2.1.3 System information validity and notification of changes

Change of system information (other than for ETWS) only occurs at specific radio frames i.e. the concept of a modification period is used. SI messages 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 *modificationPeriod*= 0. The *modificationPeriod* 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 knows that the current system information is valid until the next modification period boundary. After this boundary, the UE acquires the new system information. There is a (short) period during which the UE does not have valid system information.

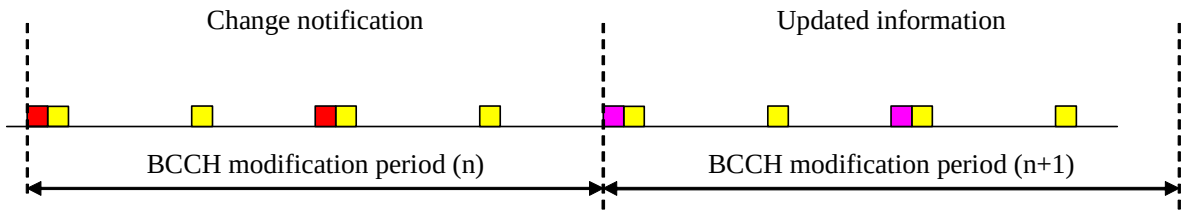

Figure 5.2.1.3-1: Change of system Information

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 changes 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 SI message has changed.

SystemInformationBlockType1 includes a value tag that indicates if a change has occurred in the SI messages. UEs may use this value tag e.g. upon return from out of coverage, to verify if the previously acquired system information is still valid. The UE considers system information to be valid for at most 3 hours from the moment it was received.

The UE verifies that acquired system information remains valid either by checking the value tag in *SystemInformationBlockType1* after the modification period boundary or, by attempting to find the *systemInfoModification* indication at least *modificationPeriodCoeff* times during a modificationPeriod in case no paging is received. If no paging message is received by the UE during a modificationPeriod, the UE may assume that no change of system information will occur in the next modificationPeriod. 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 will occur in the next modificationPeriod or not.

Editor's note: The UE requirements corresponding with the above descriptive text are still to be captured elsewhere, e.g. within the paging procedure which may trigger the BCCH acquisition procedure.

5.2.1.4 Indication of ETWS primary notification

ETWS primary notification can occur at any point in time. The *Paging* message is used to inform UEs in RRC_IDLE and UEs in RRC_CONNECTED about presence of an ETWS primary notification. If the UE receives a *Paging* message including the *etws-PrimaryNotificationIndication*, it knows that the ETWS primary notification is present. ETWS primary notification is contained in *SystemInformationBlockType10*.

Editor's note: The details of when the ETWS capable UEs read paging in RRC_CONNECTED is FFS.

Editor's note: Indication of ETWS secondary notification is FFS, which of the mechanisms described in 5.2.1.3 or 5.2.1.4 will be used.

5.2.2 System information acquisition

5.2.2.1 General

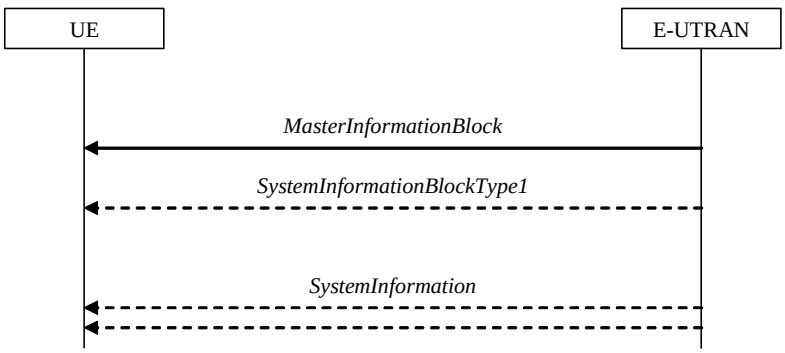

Figure 5.2.2.1-1: System information acquisition, normal

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 to 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 and upon exceeding the maximum validity duration.

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* messages as well as *SystemInformationBlockType2* through *SystemInformationBlockType8*, depending on support of the concerned RATs, and *SystemInformationBlockType9*;

2> if in RRC_CONNECTED:

3> the *MasterInformationBlock*, the *SystemInformationBlockType1* and the *SystemInformationBlockType2* messages as well as *SystemInformationBlockType8*, depending on support of CDMA2000, and *SystemInformationBlockType9;*

2> if the UE is ETWS capable:

3> the *SystemInformationBlockType10* and the *SystemInformationBlockType11* in addition to the above system information required for RRC_IDLE and RRC_CONNECTED;

1> consider any stored system information to be invalid if it was received more than 3 hours ago;

1> consider any stored system information to be invalid if the value tag included in the *SystemInformationBlockType1* message transmitted on BCCH is different from the one of the stored system information;

5.2.2.4 System information acquisition by the UE

The UE shall

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;

1> if the procedure is triggered by an ETWS primary notification:

2> start acquiring the ETWS primary notification immediately, i.e., without waiting until the beginning of the next modification period;

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 the system information required in RRC_IDLE, as defined in 5.2.3.

1> following successful handover completion to a cell 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 the system information required in RRC_CONNECTED, as defined in 5.2.3;

Editor's note: It has been agreed that the time critical information, i.e. the information required to continue the user plane in the target cell, shall be included in the handover command. The UE obtains the other information, e.g. the modification period, from system information.

1> following a request from CDMA upper layers:

2> acquire *SystemInformationBlockType8*, as defined in 5.2.3;

Editor's note: It is FFS if there is a need to explicitly specify which operations the UE is not required to perform prior to receiving the required system information i.e. this may be implied from the other, not time critical, configuration information.

1> not initiate the RRC connection establishment or RRC connection re-establishment procedure if it does not have a valid version of the system information required in RRC_CONNECTED, as defined in 5.2.2.3.

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.

5.2.2.5 Essential system information missing

The UE shall

1> if in RRC_IDLE and the cell does not transmit the *MasterInformationBlock*, the *SystemInformationBlockType1* or the *SystemInformationBlockType2*:

2> Consider the cell to be 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>

To be completed

Editor's note: The aim is to specify only a minimum of specific behaviour in these sections

5.2.2.7 Actions upon reception of the *SystemInformationBlockType1* message

Upon receiving the *SystemInformationBlockType1* message the UE shall:

1> forward the IE *cellIdentity* to upper layers;

1> forward the IE *TrackingAreaCode* to upper layers;

To be completed

5.2.2.8 Actions upon reception of *SystemInformation* messages

Upon receiving a *SystemInformation* message the UE shall:

1>

To be completed

Editor's note: The following sections aim to cover specific actions e.g. the triggering of a procedure upon receipt of an IE within a SIB. UE handling related to IEs may also be included in the procedures using the information e.g. the connection establishment includes actions related to the access class barring info. For some SIBs a section may not be needed.

5.2.2.9 Actions upon reception of *SystemInformationBlockType2*

Upon receiving *SystemInformationBlockType2*, the UE shall:

1> if a (UE specific) paging cycle was received (signalling details FFS):

Editor's note: It is FFS is the UE specific DRX value is signalled by NAS or AS.

2> Apply the lowest of the paging cycle and the *defaultPagingCycle* included in the *radioResourceConfigCommon;*

1> else:

2> Apply the *defaultPagingCycle* included in the *radioResourceConfigCommon;*

1> if the IE *mbsfn-SubframeConfiguration* is included:

2> consider that no other DL assignments occur in the MBSFN subframes indicated in the IE *mbsfn-SubframeConfiguration*:

1> TBS

5.2.2.10 Actions upon reception of *SystemInformationBlockType3*

Upon receiving *SystemInformationBlockType3*, the UE shall:

1> TBS

5.2.2.11 Actions upon reception of *SystemInformationBlockType4*

Upon receiving *SystemInformationBlockType4*, the UE shall:

1> TBS

5.2.2.12 Actions upon reception of *SystemInformationBlockType5*

Upon receiving *SystemInformationBlockType5*, the UE shall:

1> TBS

5.2.2.13 Actions upon reception of *SystemInformationBlockType6*

Upon receiving *SystemInformationBlockType6*, the UE shall:

1> TBS

5.2.2.14 Actions upon reception of *SystemInformationBlockType7*

Upon receiving *SystemInformationBlockType7*, the UE shall:

1> TBS

5.2.2.15 Actions upon reception of *SystemInformationBlockType8*

Upon receiving *SystemInformationBlockType8*, the UE shall:

1> if the IE *hrpd-PreRegistrationInfo* is included and UE has not received it within a *RRCConnectionReconfiguration* message after entering this cell:

2> forward the *hrpd-PreRegistrationInfo* to CDMA upper layers;

1> if the IE *onexrtt-CSFBRegistrationInfo* is included:

2> forward the *onexrtt-CSFBRegistrationInfo* to the CDMA upper layers and only use this information for CS registration towards 1xRTT in the EUTRA cell in which it was received;

1> if the IE *onexrtt-LongCodeState* is included:

2> forward the *onexrtt-LongCodeState* to CDMA upper layers;

1> if the IE *CDMA2000-SystemTimeInfo* is included:

2> forward the *CDMA2000-SystemTimeInfo* to CDMA upper layers;

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

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

1> TBC

5.2.2.16 Actions upon reception of *SystemInformationBlockType9*

Upon receiving *SystemInformationBlockType9*, the UE shall:

1> forward the *HNBID* to upper layers;

5.2.2.17 Actions upon reception of *SystemInformationBlockType10*

Upon receiving *SystemInformationBlockType10*, the UE shall:

1> forward the *etws-PrimaryNotification* to upper layers;

5.2.2.18 Actions upon reception of *SystemInformationBlockType11*

Upon receiving *SystemInformationBlockType11*, the UE shall:

1> if all the *etws-SecondaryNotification* segments are received:

2> forward the complete *etws-SecondaryNotification* to upper layers;

1> else:

2> continue reception of *SystemInformationBlockType11*;

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 *schedulingInformation* 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 next radio frame for which SFN mod T = FLOOR(x/10), where T is the *si-Periodicity* of the concerned SI message;

Editor's note: It is FFS whether SFN mod T = FLOOR(x/10) + 8 should be used instead.

NOTE: E-UTRAN should configure an SI-window of 1ms only if all SIs are scheduled before sub-frame #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 command when security is activated.

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 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 radio bearers) are both integrity protected and ciphered.

After having initiated the initial security activation procedure, E-UTRAN initiates the establishment of SRB2 and of radio bearers carrying user data (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 for DRBs, security is always activated from the start, i.e. the E-UTRAN does not establish these bearers prior to activating security.

5.3.1.2 Security

AS security comprises of the integrity protection of RRC signalling as well as the encryption of RRC signalling and user data. RRC handles the integrity protection configuration (integrity protection algorithm and the AS base-key - KeNB), which is common for signalling radio bearers SRB1 and SRB2. RRC also handles the ciphering configuration (ciphering algorithm and the AS base-key - KeNB), which is common for all radio bearers, i.e. the configuration is used for the radio bearers carrying signalling (SRB1, SRB2) as well as for those carrying user data (DRBs).

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). Use of a "NULL" integrity protection algorithm is FFS.

NOTE 1 Security is always activated although in some cases a "NULL" algorithm may be used, e.g. in case of UICC-less emergency calls

NOTE 2 Lower layers discard RRC messages for which the integrity check has failed

The AS applies three different security keys: one for the integrity protection of RRC signalling, one for the encryption of RRC signalling and one for the encryption of user data. All three AS keys (in the following referred to as AS derived-keys) are derived from an AS base-key, which is eNB specific (K_{eNB}).

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.

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 AS keys (both the base-key and the derived-keys) change upon every handover and connection re-establishment. No additional AS-parameters (i.e. specific for this purpose) are exchanged to serve as inputs for the derivation of the new AS keys. An intra cell handover procedure may be used to change the keys in RRC_CONNECTED.

For each radio bearer an independent counter (COUNT) is used as input for ciphering. For SRBs, the same COUNT is used as input for integrity protection. Except for identical re-transmissions, 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 (SN). In addition, an overflow counter mechanism is used: the hyper frame number (HFN). 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 AS base-key, 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.

5.3.1.3 Connected mode mobility

In RRC_CONNECTED, the network controls UE mobility, i.e. the network decides when the UE shall move to which cell (which may be on another frequency or RAT). 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 information from the UE.

For mobility within E-UTRA, handover is the only procedure that is defined. Before sending the handover command to the UE, the source eNB prepares one or more target cells. 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. 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 radio bearers.

After receiving the handover command, the UE attempts to access the target cell at the first available RACH occasion, i.e. the handover is asynchronous. Consequently, when allocating a dedicated preamble for the random access in the target cell, 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 handover confirmation.

After the successful completion of handover, PDCP SDUs may be re-transmitted in the target cell. This only applies for radio bearers carrying user data and using RLC-AM mode. The further details are specified in [8].

After the successful completion of handover, the SN and the HFN are reset except for the radio bearers carrying user data and using RLC-AM mode (for which both SN and HFN continue). The further details are specified in [8].

Editor's note: W.r.t. handover there is one UE behaviour 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 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.

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 or about an ETWS primary 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 identify multiple UEs within a *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 Paging records included in the *Paging* message:

2> If the *ue-identity* included in the *pagingRecordList* matches one of the UE identities allocated by upper layers:

3> forward the *ue-Identity*, the *cn-Domain* and the *pagingCause* 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-PrimaryNotificationIndication* is included and the UE is ETWS capable:

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

2> acquire *SystemInformationBlockType10*;

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

3> acquire *SystemInformationBlockType11*;

5.3.3 RRC connection establishment

5.3.3.1 General

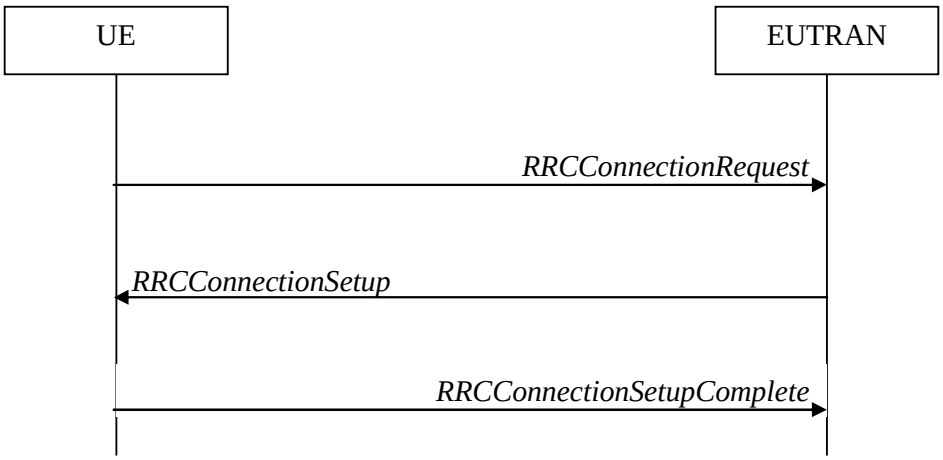

Figure 5.3.3.1-1: RRC connection establishment, successful

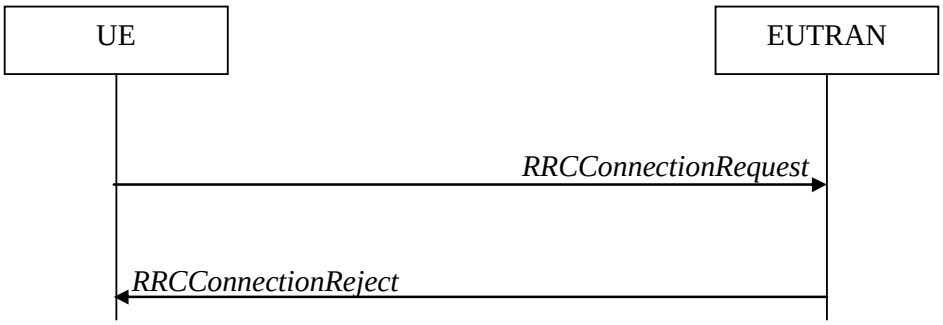

Figure 5.3.3.1-2: RRC connection establishment, network reject

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.

5.3.3.2 Initiation

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

Upon initiation of the procedure, the UE shall:

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

2> if timer T302 is running:

3> consider access to the cell as barred;

2> else:

3> consider access to the cell as not barred;

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

2> if *SystemInformationBlockType2* includes the *accessBarringInformation* and the *accessClassBarringForEmergencyCalls* is set to TRUE:

3> consider access to the cell as barred;

2> else:

3> consider access to the cell as not barred;

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

2> if timer T302 or T303 is running:

3> consider access to the cell as barred;

2> else if *SystemInformationBlockType2* includes the *accessBarringInformation* and the *accessBarringForOriginatingCalls* 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 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.

3> for at least one of these Access Classes the *accessClassBarring* in the *accessClassBarringList* contained in *accessBarringForOriginatingCalls* is set to *FALSE*:

4> consider access to the cell as not barred;

3> else:

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

4> if "*rand*" is lower than the value indicated by *accessProbabilityFactor* included in *accessBarringForOriginatingCalls*:

5> consider access to the cell as not barred;

4> else:

5> consider access to the cell as barred;

2> else:

3> consider access to the cell as not barred;

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

2> if timer T302 or T305 is running:

3> consider access to the cell as barred;

2> else if *SystemInformationBlockType2* includes the *accessBarringInformation* and the *accessBarringForSignalling* 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> for at least one of these Access Classes the *accessClassBarring* in the *accessClassBarringList* contained in *accessBarringForSignalling* is set to *FALSE*:

4> consider access to the cell as not barred;

3> else:

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

4> if "*rand*" is lower than the value indicated by *accessProbabilityFactor* included in *accessBarringForSignalling*:

5> consider access to the cell as not barred;

4> else:

5> consider access to the cell as barred;

2> else:

3> consider access to the cell as not barred;

1> If access to the cell, as specified above, is not barred:

2> apply the default configuration applicable for the *antennaInformation* as specified in 9.2.3, until explicitly receiving a configuration;

2> start timer T300;

2> 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 re-selection.

1> else:

2> if the UE is establishing the RRC connection for mobile originating calls and if both timers T302 and T303 are not running:

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

3> start timer T303 with the timer value calculated as follows, using the *accessBarringTime* included in *accessBarringForOriginatingCalls*:

T303= (0.7+ 0.6 * *rand*) * *accessBarringTime*

2> else if the UE is establishing the RRC connection for mobile originating signalling and if both timers T302 and T305 are not running:

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

3> start timer T305 with the timer value calculated as follows, using the *accessBarringTime* included in *accessBarringForSignalling*:

T305= (0.7+ 0.6 * *rand*) * *accessBarringTime*

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

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 IE *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 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 layers allocate a C-RNTI. For further details see TS 36.321 [6];

The UE shall:

1> establish SRB1 in accordance with the received *radioResourceConfiguration* and as specified in 5.3.10;

1> If stored, discard the Inter-frequency priority information and the Inter-RAT priority information provided via dedicated signalling using the IE *idleModeMobilityControlInfo*;

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 T320, if running;

1> enter RRC_CONNECTED state;

1> stop the cell re-selection procedure;

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

2> set the *selectedPLMN-Identity* to the PLMN selected by upper layers [TS 23.122, TS 24.008] from the PLMN(s) included in the plmn-IdentityList broadcast, within *SystemInformationBlockType1*, in the cell where the RRC connection was established;

2> if upper layers provide the "Registered MME", set the *registeredMME* as follows:

3> if the PLMN identity of the "*Registered MME"* is different from the PLMN selected by the upper layers, set the IE *plmnIdentity* to the value received from upper layers;

3> set the IEs *mmegi* and *mmec* to the value received from upper layers;

2> set the *nas-DedicatedInformation* to include the information received from upper layers;

2> submit the *RRCConnectionSetupComplete* message to lower layers for transmission, upon which the procedure ends.

5.3.3.5 Cell re-selection while T300 is running

The UE shall:

1> If cell reselection occurswhile T300 is running:

2> stop timer T300;

2> stop timer T302, if running;

2> stop timer T303, if running;

2> stop timer T305, if running;

2> reset MAC;

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

5.3.3.6 T300 expiry

The UE shall:

1> If timer T300 expires:

2> reset MAC;

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

5.3.3.7 T302, T303 or T305 expiry

The UE shall:

1> if timer T302 expires:

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;

1> if timer T303 expires:

2> if timer T302 is not running:

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

1> if timer T305 expires:

2> if timer T302 is not running:

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

5.3.3.8 Reception of the *RRCConnectionReject* by the UE

The UE shall:

1> stop timer T300;

1> reset MAC;

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

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

5.3.4 Initial security activation

5.3.4.1 General

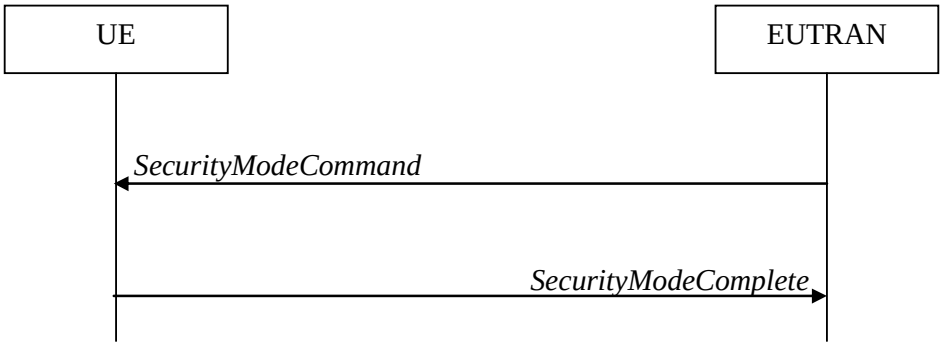

Figure 5.3.4.1-1: Security mode command, successful

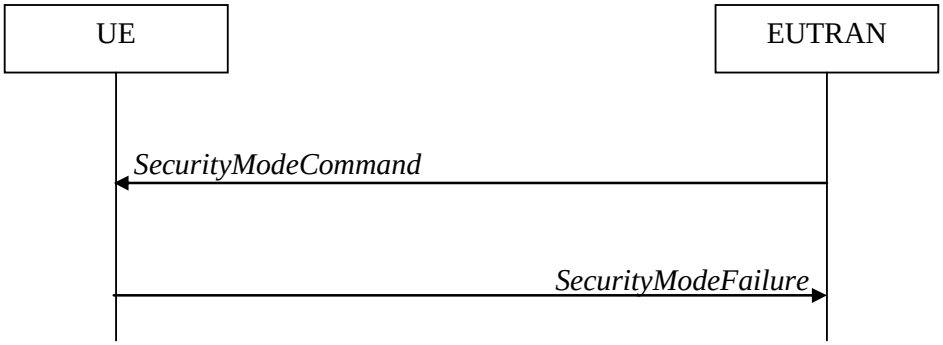

Figure 5.3.4.1-2: Security mode command, failure

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> 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;

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

2> configure lower layers to apply integrity protection using the indicated algorithm 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 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> 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

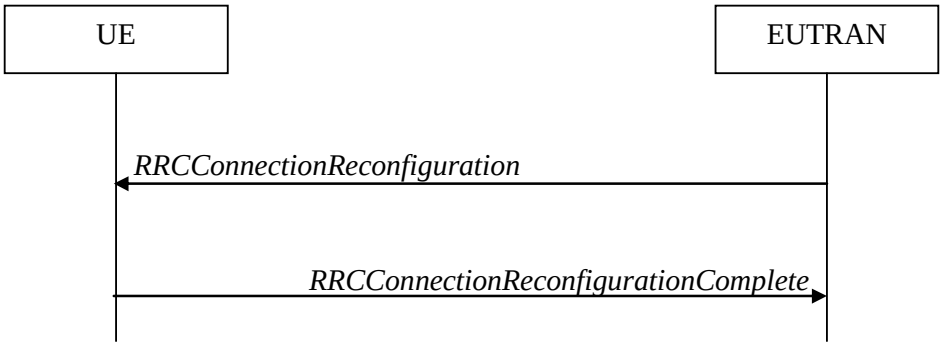

Figure 5.3.5.1-1: RRC connection reconfiguration, successful

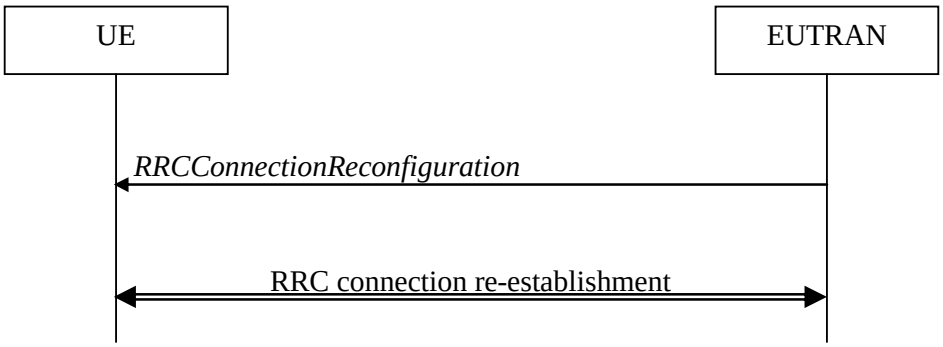

Figure 5.3.5.1-2: RRC connection reconfiguration, failure

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. 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 *mobilityControlInformation* is included only when AS-security has been activated;
- the establishment of RBs (other than SRB1, that is established during RRC connection establishment) is included only when AS-security has been activated;

5.3.5.3 Reception of a RRCConnectionReconfiguration not including the mobilityControlInformation by the UE

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

1> If the RRCConnectionReconfiguration message includes the *radioResourceConfiguration*:

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

1> If the *RRCConnectionReconfiguration* message includes the ue-*RelatedInformation*:

2> set the C-RNTI to the value of the *newUE-Identity*, if received;

1> If the *RRCConnectionReconfiguration* message includes the *nas-DedicatedInformation*:

2> Forward the *nas-DedicatedInformation* to upper layers;

1> If the *RRCConnectionReconfiguration* message includes the *measurementConfiguration*:

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

1> if this is the first *RRCConnectionReconfiguration* message after successful completion of the RRC Connection Re-establishment procedure, indicate to PDCP to complete the PDCP re-establishment procedure for all DRBs that are established, if any;

NOTE: If the *RRCConnectionReconfiguration* message includes the establishment of radio bearers others 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> submit the *RRCConnectionReconfigurationComplete* message to lower layers for transmission using the new configuration, upon which the procedure ends;

5.3.5.4 Reception of a *RRCConnectionReconfiguration* including the *mobilityControlInformation* by the UE (handover)

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.

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

1> stop timer T310 and T312, if running;

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

1> request PDCP to initiate the PDCP Re-establishment procedure for all RBs that are established;

NOTE 2: The handling of the radio bearers after the successful completion of the L2 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 [8].

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

1> If the RRCConnectionReconfiguration message includes the *radioResourceConfiguration*:

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

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

1> if the *eutra-CarrierFreq* is included:

2> consider the target cell to be one on the frequency indicated by the *eutra-CarrierFreq* with a physical cell identity indicated by the *targetCellIdentity*;

1> else:

2> consider the target cell to be one on the current frequency with a physical cell identity indicated by the *targetCellIdentity*;

1> if the *dl-Bandwidth* is included:

2> for the target cell, apply the downlink bandwidth indicated by the *dl-Bandwidth;*

1> else:

2> for the target cell, apply the same downlink bandwidth as for the current cell*;*

1> if the *ul-Bandwidth* is included:

2> for the target cell, apply the uplink bandwidth indicated by the *ul-Bandwidth;*

1> else:

2> for the target cell, apply the same uplink bandwidth as for the current cell*;*

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

1> If the *RRCConnectionReconfiguration* message includes the *securityConfiguration*:

2> apply the AS-derived keys associated with the AS-base key indicated by the *keyIndicator*;

2> configure lower layers to apply the indicated integrity protection algorithm, i.e. the indicated integrity protection configuration shall be applied to all subsequent messages received and sent by the UE in the target cell, including the message used to indicate the successful completion of the procedure;

2> configure lower layers to apply the indicated ciphering algorithm, i.e. the indicated ciphering configuration shall be applied to all subsequent messages received and sent by the UE in the target cell, including the message used to indicate the successful completion of the procedure;

1> If the *RRCConnectionReconfiguration* message includes the *measurementConfiguration*:

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

1> synchronise to the DL of the target cell;

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

1> If MAC successfully completes the random access procedure:

2> stop timer T304;

2> If the *physicalConfigDedicated* is included in the *RRCConnectionReconfiguration* message:

3> If the UE needs the SFN of the target cell to apply the PUCCH and Sounding RS configuration:

4> apply the new PUCCH and Sounding RS configuration upon acquiring the SFN of the target cell;

3> else:

4> apply the new PUCCH and Sounding RS configuration;

2> indicate to PDCP to complete the PDCP Re-establishment procedure for all DRBs that are established, if any;

2> the procedure ends.

Editor's note: It has been agreed that the UE is not required to determine the SFN of the target cell by acquiring system information from that cell before performing RACH access in the target cell.

Editor"s note The handling of the radio configuration is covered by the general reconfiguration procedure. It has been agreed that the configuration used in the target cell may either be specified as a delta to the one used in the serving cell or by providing the full configuration (signalling details are FFS)

Editor"s note Currently it is specified that the keyIndicator always needs to be provided upon handover as a result of which the securityConfiguration becomes mandatory in case of handover. If however the securityConfiguration would be optional in case of handover, the case the IE is not included needs to be covered also.

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

NOTE: 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 dedicated preambles, if provided within the *rach-ConfigDedicated*, are not available for use by the UE anymore.

2> revert back to the configuration used in the source cell, excluding the physical layer configuration;

NOTE 2: The UE reverts to the RRC configuration as well as the layer 2 configuration (PDCP/RLC/MAC) used in the source cell.

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

5.3.7 RRC connection re-establishment

5.3.7.1 General

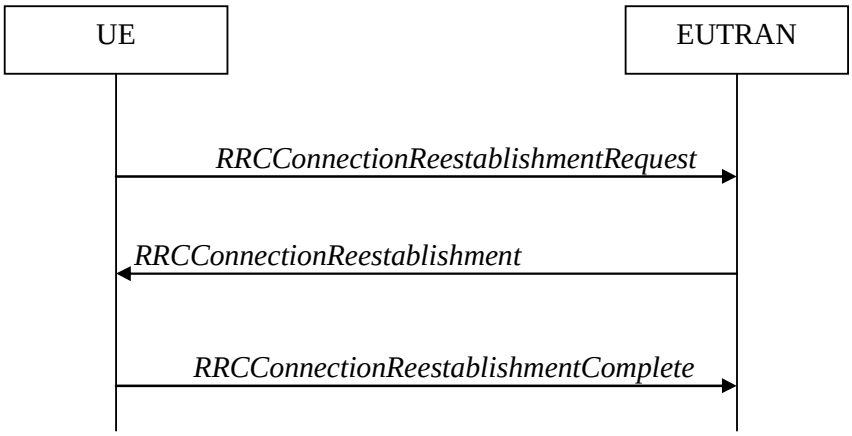

Figure 5.3.7.1-1: RRC connection re-establishment, successful

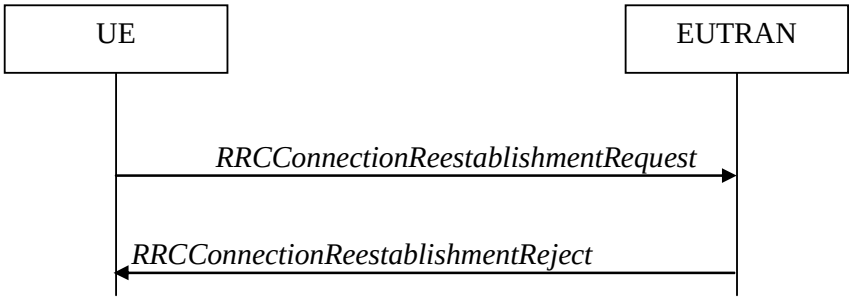

Figure 5.3.7.1-2: RRC connection re-establishment, failure

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

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 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 security without changing algorithms.

5.3.7.2 Initiation

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

1> after having detected radio link failure, in accordance with 5.3.11; or

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

1> upon integrity 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> start timer T311;

1> request PDCP to initiate the PDCP Re-establishment procedure for all RBs that are established;

NOTE 1: The handling of the radio bearers after the successful completion of the L2 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 [8].

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

1> select a suitable cell in accordance with the cell selection process as specified in [4];

5.3.7.3 Actions upon (re-)entry of service area while T311 is running

Upon (re-)entry of service area while T311 is running, the UE shall:

1> Upon selecting an E-UTRA cell:

2> stop timer T311;

2> start timer T301;

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

NOTE 1: The criteria for re-entry of service area specified in 5.3.11.4.

NOTE 2: This procedure applies also if the UE returns to the source cell

1> Upon selecting an inter-RAT cell:

2> perform the actions upon moving from RRC_CONNECTED to RRC_IDLE as specified in 5.3.12.

5.3.7.4 Actions related to transmission of *RRCConnectionReestablishmentRequest* message

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

1> set the IE *ue-Identity* as follows:

2> set the *c-RNTI* to the C-RNTI used in the source cell (handover failure case) or used in the cell in which the trigger for the re-establishment occurred (other cases);

2> set the *cellIdentity* to the Physical layer identity of the source cell (handover failure case) or of the cell 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 concatenation of the ASN.1 encoded *CellIdentity* of the current cell, *PhysicalCellIdentity* of the cell the UE was connected to prior to the failure and *C-RNTI* that the UE had in the cell it was connected to prior to the failure;

3> with the integrity protection key and integrity protection algorithm that was used in the cell the UE was connected to prior to the failure; and

3> with all input bits for COUNT, BEARER and DIRECTION set to binary ones.

1> set the IE *reestablishmentCause* as follows:

2> if the re-establishment procedure was initiated due to reconfiguration failure as specified in 5.3.5.5 (the UE is unable to comply with the reconfiguration):

3> set the *reestablishmentCause* to the value "*reconfigurationFailure*";

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

3> set the *reestablishmentCause* to the value "*handoverFailure*";

2> else:

3> set the *reestablishmentCause* to the value "*otherFailure*";

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

5.3.7.5 Reception of the *RRCConnectionReestablishment* by the UE

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

The UE shall:

1> Stop timer T301;

1> resume SRB1 after reconfiguring it in accordance with the received *radioResourceConfiguration* and as specified in 5.3.10;

Editor's note: It has been agreed that the procedure is the same irrespective of whether the UE returns to the same cell. So, e.g. the UE always derives a new AS base-key (K_{eNB})

1> configure lower layers to re-activate integrity protection using the previously configured algorithm immediately, i.e. integrity protection shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

1> configure lower layers to apply ciphering using the previously configured algorithm 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> send the *RRCConnectionReestablishmentComplete* message as specified in 5.3.7.6;

1> Resume the RRC connection with the restriction that the use of all radio bearers other than SRB1 is suspended until a subsequent *RRCConnectionReconfiguration* message is received;

Editor's note: A subsequent RRC connection reconfiguration procedure is used to re-activate the measurements. The concerned *RRCConnectionReconfiguration* message can, for the RLC/MAC & measurement configuration, either apply delta or full signalling. In case of "full signalling" the UE completely deletes the existing configuration and replaces this with the newly received configuration. The use of "full signalling" for PDCP is FFS, but should be aligned with what is agreed for handover. Upon successful connection re-establishment, the UE applies the same rules to the measurement configuration as defined for the case of handover.

5.3.7.6 Actions related to transmission of *RRCConnectionReestablishmentComplete* message

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

5.3.7.7 T311 expiry

Upon T311 expiry, the UE shall:

1> perform the actions upon moving from RRC_CONNECTED to RRC_IDLE as specified in 5.3.12.

Editor's note: It is up to upper layers to take further action. To facilitate this, the cause of the release may need to be indicated to upper layers.

5.3.7.8 Expiry of T301 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 [4], the UE shall:

2> perform the actions upon moving from RRC_CONNECTED to RRC_IDLE as specified in 5.3.12.

Editor's note: It is up to upper layers to take further action. To facilitate this, the cause of the release may need to be indicated to upper layers.

5.3.7.9 Reception of RRCConnectionReestablishmentReject by the UE

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

1> perform the actions upon moving from RRC_CONNECTED to RRC_IDLE as specified in 5.3.12.

Editor's note: It is up to upper layers to take further action. To facilitate this, the cause of the release may need to be indicated to upper layers.

5.3.8 RRC connection release

5.3.8.1 General

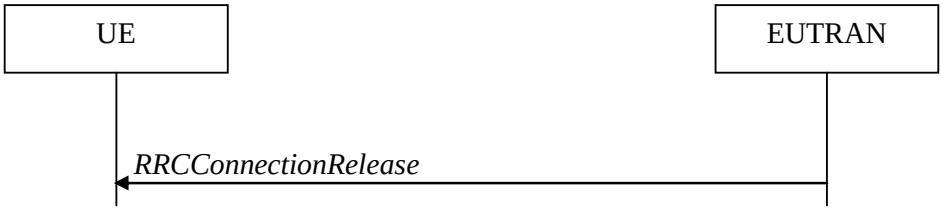

Figure 5.3.8.1-1: RRC connection release, successful

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. It is FFS if redirection can be done from E-UTRAN before security is activated.

Editor's note: Awaiting reply from SA3 (in response to R2-080602)

5.3.8.3 Reception of the *RRCConnectionRelease* by the UE

The UE shall:

1> delay the following actions defined in this sub-clause 60ms 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 *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> use the idle mobility parameters broadcast in the system information;

1> If the *releaseCause* is set to *"load balancing TAU required"*

2> inform the upper layers that a load balancing TA update is required;

1> If the *RRCConnectionRelease* message includes the *redirectionInformation* :

2> select a suitable cell on the (E-UTRA or inter-RAT) frequency indicated by the *redirectionInformation* in accordance with the cell selection process as specified in [4];

1> perform the actions upon moving from RRC_CONNECTED to RRC_IDLE as specified in 5.3.12.

5.3.8.4 T320 expiry

The UE shall:

1> If T320 expires:

2> discard the cell reselection priority information provided by dedicated signalling;

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 and to bar access to the current cell.

NOTE: Upper layers invoke the procedure 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:

1> perform the actions upon moving from RRC_CONNECTED to RRC_IDLE as specified in 5.3.12.

1> consider the cell used prior to entering idle mode to be barred according to TS 36.304 [4] for a period of 300s.

5.3.10 Radio resource configuration

5.3.10.1 SRB addition/ modification

The UE shall:

1> if the received *radioResourceConfiguration* includes the *srb-ToAddModifyList*:

2> for each *srb-Identity* value included in the *srb-ToAddModifyList* that is not part of the current UE configuration (SRB establishment):

3> if the *rlc-Configuration* is set to "*explicit*":

4> establish an RLC entity in accordance with the received *RLC-Configuration* IE;

3> else if the *rlc-Configuration* is set to "*default*":

4> establish an RLC entity in accordance with the default configuration applicable for this *srb-identity* as specified in 9.2.1;

3> if the *logicalChannelConfig* is set to "*explicit*":

4> establish a DCCH logical channel in accordance with the received *LogicalChannelConfig* IE;

3> else if the *logicalChannelConfig* is set to "*default*":

4> establish a DCCH logical channel in accordance with the default configuration applicable for this *srb-identity* as specified in 9.2.1;

2> for each *srb-Identity* value included in the *srb-ToAddModifyList* that is part of the current UE configuration (SRB reconfiguration):

3> if the *rlc-Configuration* is set to "*explicit*":

4> reconfigure the RLC entity in accordance with the received *RLC-Configuration* IE;

3> else if the *rlc-Configuration* is set to "*default*":

4> reconfigure the RLC entity in accordance with the default configuration applicable for this *srb-identity* as specified in 9.2.1.1;

3> if the *logicalChannelConfig* is set to "*explicit*":

4> reconfigure the DCCH logical channel in accordance with the received *LogicalChannelConfig* IE;

3> else if the *logicalChannelConfig* is set to "*default*":

4> reconfigure the DCCH logical channel in accordance with the default configuration applicable for this *srb-identity* as specified in 9.2.1.1;

NOTE "Infinity" is the only applicable value for the *prioritizedBitRate* for SRB1 and SRB2

5.3.10.2 DRB release

The UE shall:

1> if the received *radioResourceConfiguration* includes the *drb-ToReleaseList*:

2> for each *drb-Identity* value included in the *drb-ToReleaseList* that is part of the current UE configuration (DRB release):

3> release the PDCP entity;

3> release the RLC entity;

3> release the DTCH logical channel;

2> indicate the release of the DRB(s) to upper layers;

5.3.10.3 DRB addition/ modification

NOTE: Reconfiguration of the RLC mode of DRBs is not supported

The UE shall:

1> if the received *radioResourceConfiguration* includes the *drb-ToAddModifyList*:

2> for each *drb-Identity* value included in the *drb-ToAddModifyList* that is not part of the current UE configuration (DRB establishment):

3> establish a PDCP entity in accordance with the received *PDCP-Configuration* IE;

3> establish an RLC entity in accordance with the received *RLC-Configuration* IE;

3> establish a DTCH logical channel in accordance with the received *LogicalChannelConfig* IE;

2> indicate the establishment of the DRB(s) to upper layers;

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

3> reconfigure the PDCP entity in accordance with the received *PDCP-Configuration* IE;

3> reconfigure the RLC entity in accordance with the received *RLC-Configuration* IE;

3> reconfigure the DTCH logical channel in accordance with the received *LogicalChannelConfig* IE;

5.3.10.4 Transport channel reconfiguration

The UE shall:

1> if the received *radioResourceConfiguration* includes the IE *MAC-MainConfiguration*:

2> if the current UE configuration does not include a DL-SCH transport channel configuration (DL-SCH establishment):

3> if the *transportChannelConfig* is set to "*explicit":*

4> establish an DL-SCH transport channel in accordance with the received *dl-SCH-Configuration*;

3> else if the *transportChannelConfig* is set to "*default*":

4> establish a DL-SCH transport channel in accordance with the default configuration for SRB1 as specified in 9.2.1.1;

2> else:

3> if the *transportChannelConfig* is set to "*explicit":*

4> reconfigure the DL-SCH transport channel in accordance with the received *dl-SCH-Configuration*;

3> else if the *transportChannelConfig* is set to "*default*":

4> reconfigure the DL-SCH transport channel in accordance with the default configuration for SRB1 as specified in 9.2.1.1;

2> if the current UE configuration does not include a UL-SCH transport channel configuration (UL-SCH establishment):

3> if the *transportChannelConfig* is set to "*explicit*"

4> establish an UL-SCH transport channel in accordance with the received *ul-SCH-Configuration*;

3> else if the *transportChannelConfig* is set to "*default*":

4> establish a UL-SCH transport channel in accordance with the default configuration for SRB1 as specified in 9.2.1.1;

2> else:

3> if the *transportChannelConfig* is set to "*explicit*"

4> reconfigure the UL-SCH transport channel in accordance with the received *ul-SCH-Configuration*;

3> else if the *transportChannelConfig* is set to "*default*":

4> reconfigure the UL-SCH transport channel in accordance with the default configuration for SRB1 as specified in 9.2.1.1;

5.3.10.5 Physical channel reconfiguration

The UE shall:

1> if the received *radioResourceConfiguration* includes the *physicalConfigDedicated*:

2> if the current UE configuration does not include a physical channel configuration (physical channel establishment):

3> establish the physical channel configuration in accordance with the received *physicalConfigDedicated*;

2> else:

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

1> apply the default configuration applicable for the *antennaInformation* as specified in 9.2.3, until explicitly receiving a configuration;

1> if the received *RRCConnectionReconfiguration* message includes the *mobilityControlInformation*:

2> if SPS resource is activated:

3> deactivate SPS resource;

5.3.11 Radio link failure related actions

5.3.11.1 Initiation

The UE shall:

1> while T300, T301, T304 or T311 is running:

2> do not act upon radio link problem indications provided by lower layers, i.e. neither act upon receiving indications about physical layer failure problems nor upon receiving indications about Random Access (RA) problems;

NOTE Radio link problems is the term used to cover the following lower layer problems: physical layer problem, Random Access problem

Upon detecting physical layer problems, the UE shall:

1> start a timer T310.

The criteria for detecting physical layer problems are FFS i.e. whether RRC considers this condition to be met upon receiving a certain number of physical layer failure indications within a predefined time-period.

It is FFS if a counter will be used instead of timer T310.

Upon receiving a Random Access problem indication from the MAC, the UE shall:

1> start a timer T312.

5.3.11.2 Radio link recovery

Upon detecting physical layer recovery while T310 was running, the UE shall:

1> stop timer T310.

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

The criteria for detecting physical layer recovery are FFS.

Upon receiving an indication that the MAC recovered from the Random Access problem while T312 was running, the UE shall:

1> stop timer T312.

5.3.11.3 T310 or T312 expiry or RLC failure indication

Upon T310 or T312 expiry or upon indication from RLC that the maximum number of retransmissions has been reached, the UE detects radio link failure and shall:

1> If security is not activated:

2> perform the actions upon moving from RRC_CONNECTED to RRC_IDLE as specified in 5.3.12;

1> else:

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

5.3.11.4 Criteria for re-entry of service area

The criteria for re-entry of service area, i.e. for detecting "in service" are FFS.

5.3.12 UE actions upon moving from RRC_CONNECTED to RRC_IDLE

Upon moving from RRC_CONNECTED to RRC_IDLE, the UE shall:

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

Editor's note: The above is to stop ongoing procedures e.g. random access.

1> stop all timers that are running except T320;

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

1> indicate the release of the RRC connection to upper layers;

1> enter RRC_IDLE.

5.4 Inter-RAT mobility

5.4.1 Introduction

The general principles of connected mode mobility are described in 5.3.1.3. 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.

For inter RAT mobility from E-UTRA a single procedure is defined that supports both handover and cell change order possibly with network assistance (NACC).

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

NOTE The E-UTRA procedures are based on the assumption that handover to E-UTRA is performed only after integrity protection has been activated in UTRAN

5.4.2 Handover to E-UTRA

5.4.2.1 General

Editor's note: It may be desirable to avoid, to some extend, duplication of specification for parts that are common for the regular RRC connection reconfiguration procedure and the inter RAT handover case.

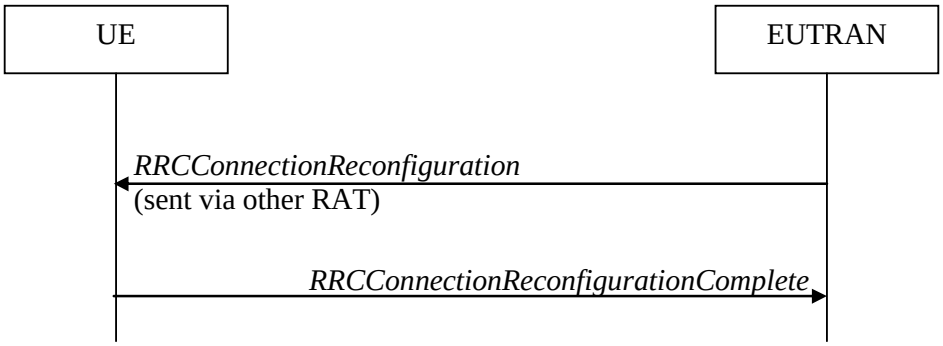

Figure 5.4.2.1-1: Handover to E-UTRA, successful

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;

Editor's note: The entire procedure needs updating to align with the regular handover procedure.

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

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

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

1> consider the target cell to be one on the frequency indicated by the *eutra-CarrierFreq* with a physical cell identity indicated by the *targetCellIdentity*;

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

1> for the target cell, apply the uplink bandwidth indicated by the *ul-Bandwidth;*

Editor's note: It is FFS if a *keyIndicator* is used to indicate if the UE shall apply the AS-derived keys associated either with the last used or an unused/ cached Kasme;

1> configure lower layers to apply the indicated integrity protection algorithm 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 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 *RRCConnectionReconfiguration* message includes the *measurementConfiguration*:

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

1> synchronise to the DL of the target cell;

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

1> If MAC successfully completes the random access procedure:

2> stop timer T304;

2> If the *physicalConfigDedicated* is included in the *RRCConnectionReconfiguration* message:

3> If the UE needs the SFN of the target cell to apply the PUCCH and Sounding RS configuration:

4> apply the new PUCCH and Sounding RS configuration upon acquiring the SFN of the target cell;

3> else:

4> apply the new PUCCH and Sounding RS configuration;

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

Editor's note: It is FFS if 36.331 needs to include a timer to supervise the RA procedure or whether for all cases there are timers running in the other RATs that already provide the required functionality.

Editor's note: It has been agreed that the UE is not required to determine the SFN of the target cell by acquiring system information from that cell.

Editor's note: The handling of outstanding signalling/ data may need to be clarified.

Editor's note: There may be a need to re-map information regarding e.g. EPS bearers, security context, initialisation of variables

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: 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

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 both:

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

The mobility from E-UTRA procedure applies when SRBs are established, possibly in combination with DRBs.

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 by sending a *MobilityFromEUTRACommand* message. E-UTRA initiates the procedure only when security has been activated.

5.4.3.3 Reception of the *MobilityFromEUTRACommand* by the UE

The UE shall:

1> stop timer T310 and T312, if running

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

1> consider inter-RAT mobility is initiated towards the RAT indicated by the *targetRAT-Type* included in the *MobilityFromEUTRACommand* message;

1> If the inter-RAT message contained in the *targetRAT-MessageContainer* concerns a "handover command":

2> access the target cell indicated in the inter-RAT message in accordance with the specifications of the target RAT;

2> If the *MobilityFromEUTRACommand* message includes a subset of the established DRBs (FFS):

3> inform upper layers about the failure to continue the DRBs not included in the *MobilityFromEUTRACommand* message;

1> else (the inter-RAT message contained in the *targetRAT-MessageContainer* concerns a "cell change order"):

2> establish the connection to the target cell indicated in the inter-RAT message in accordance with the specifications of the target RAT;

5.4.3.4 Successful completion of the mobility from E-UTRA

Upon successfully completing the handover or the cell change order, the UE shall:

1> perform the actions applicable upon moving from RRC_CONNECTED to RRC_IDLE as specified in 5.3.12.

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:

2> If the *MobilityFromEUTRACommand* message included the *csFallbackIndicator:*

3> indicate to upper layers that the CS Fallback procedure has failed;

2> revert back to the configuration used in the source cell, excluding the physical layer configuration;

NOTE: The UE reverts to the RRC configuration as well as to the layer 2 configuration (PDCP/RLC/MAC) used in the source cell.

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

5.4.4 Handover from E-UTRA preparation request (CDMA2000)

5.4.4.1 General

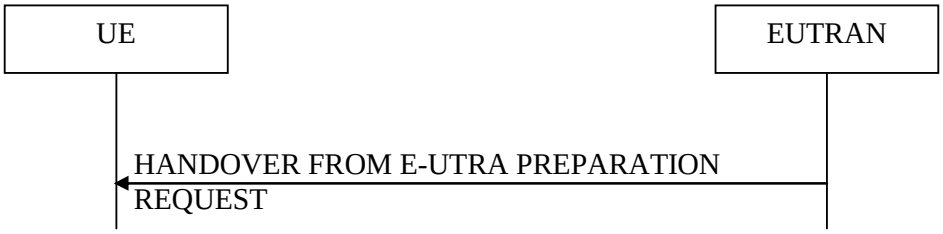

Figure 5.4.4.1-1: Handover from E-UTRA preparation request

The purpose of this procedure is to trigger the UE to prepare for handover to CDMA2000 by requesting a connection with this network. This procedure applies to CDMA2000 capable UEs only.

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 by sending a *HandoverFromEUTRAPreparationRequest* message. E-UTRA initiates the procedure only when 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> Indicate the request to prepare handover and forward the *cdma2000-Type* and the *cdma2000-MobilityParameters*, if present, to the CDMA upper layers;

1> If cdma2000-Type = type1XRTT forward the cdma2000-RAND to the CDMA upper layers.

Upon receiving the request to prepare handover, CDMA upper layers establish a connection with the CDMA network. This involves exchanging CDMA2000 dedicated information, using the UL/ DL information transfer procedure.

Editor's note: It is desirable to specify the requirements listed in the above paragraph elsewhere since it is outside the scope of this specification.

5.4.5 UL handover preparation transfer (CDMA2000)

5.4.5.1 General

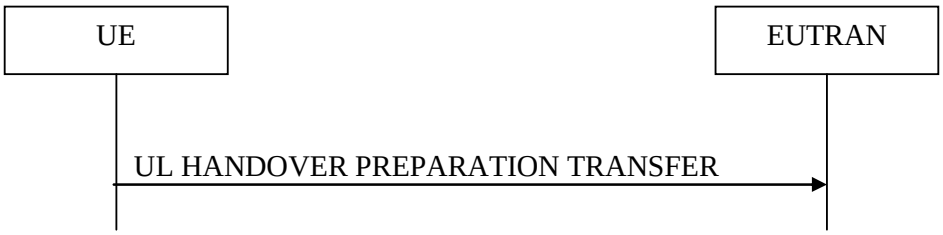

Figure 5.4.5.1-1: UL handover preparation transfer

The purpose of this procedure is to tunnel the handover related CDMA2000 dedicated information from UE to E-UTRAN when requested by the higher layers. The procedure is triggered by the higher layers on receipt of *HandoverFromEUTRAPreparationRequest* message. 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 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 cdma2000-DedicatedInfo;

1> If the cdma2000-Type = type1XRTT:

2> Set the cdma2000-MEID to the value received from the CDMA2000 upper layers

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;

5.5 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 state by means of dedicated signalling, i.e. using the *RRCConnectionReconfiguration* message.

The UE can be requested to perform the following types of measurement:

- Intra-frequency measurements: measurements at the downlink carrier frequency of the serving cell.
- Inter-frequency measurements: measurements at frequencies that differ from the downlink carrier frequency of the serving cell.
- Inter-RAT measurements of UTRA frequencies.

- Inter-RAT measurements of GERAN frequencies.
- Inter-RAT measurements of CDMA2000 HRPD or 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.
2. **Reporting configurations**: A list of reporting configurations where each reporting configuration consists of the following:
   - Reporting criteria: The criteria 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 for intra-frequency measurements, one for inter-frequency measurements and one 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. It is FFS if the measurement gaps are common for all gap assisted measurements.

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 Measurement objects are specified per RAT type, with the E-UTRA measurement object list including both the intra-frequency object (i.e. the object corresponding to the serving frequency) and the inter-frequency object(s). The Reporting configuration includes separate lists for E-UTRA, Inter-RAT, and for periodical reporting configurations. The E-UTRA reporting configuration list includes both intra- and inter-frequency reporting configurations (and events). There is a single Measurement identities list. Any E-UTRA measurement object can be linked to any E-UTRA reporting configuration. Some E-UTRA reporting configurations may not be linked to a measurement object.

The measurement procedures distinguish the following types of cells:

1. The serving cell.
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, listed cells and detected cells. For Inter-RAT UTRA the UE measures and reports on listed cells. For Inter-RAT GERAN the UE measures and reports on detected cells. For Inter-RAT CDMA2000 the UE measures and reports on listed cells.

Editor's note: RAN2 specifications are based on the assumption that CSG cells of home deployment type are not be indicated within the neighbour list. Furthermore, the assumption is that for non-home deployments, the physical layer identity is unique within the area of a large macro cell (i.e. as for UTRAN).

Editors note: It is FFS if w.r.t. measurement gap configuration additional mechanisms are required to support handover to a CSG cell of home deployment type e.g. whether for this mobility scenario the UE should request the measurement gap.

5.5.2 Measurement configuration

5.5.2.1 General

E-UTRAN applies the procedure as follows:

- to configure at most one measurement identity using a reporting configuration with the purpose set to "*reportCGI*";

The UE shall:

1> if the received *measurementConfiguration* includes the *measObjectToRemoveList*:

2> perform the Measurement object removal procedure as specified in 5.5.2.4;

1> if the received *measurementConfiguration* includes the *measObjectToAddModifyList*:

2> perform the Measurement object addition/ modification procedure as specified in 5.5.2.5;

1> if the received *measurementConfiguration* includes the *reportConfigToRemoveList*:

2> perform the Reporting configuration removal procedure as specified in 5.5.2.6;

1> if the received *measurementConfiguration* includes the *reportConfigToAddModifyList*:

2> perform the Reporting configuration addition/ modification procedure as specified in 5.5.2.7;

1> if the received *measurementConfiguration* includes the *measIdToRemoveList*:

2> perform the Measurement identity removal procedure as specified in 5.5.2.2;

1> if the received *measurementConfiguration* includes the *measIdToAddModifyList*:

2> perform the Measurement identity addition/ modification procedure as specified in 5.5.2.3;

1> if the received *measurementConfiguration* includes the *quantityConfig*:

2> perform the Quantity configuration procedure as specified in 5.5.2.8;

1> if the received *measurementConfiguration* includes the *measGapConfig*:

2> perform the Measurement gap configuration procedure as specified in 5.5.2.9;

1> if the received *measurementConfiguration* includes the *s-Measure*:

2> set the parameter *s-Measure* within *VarMeasurementConfiguration* to the received value of *s-Measure*;

1> if the IE *hrpd-PreRegistrationInfo* is included:

2> forward the *hrpd-PreRegistrationInfo* to CDMA upper layers;

1> if the received *measurementConfiguration* includes the *mbsfn-NeighbourCellConfig*:

2> set the parameter *mbsfn-NeighbourCellConfig* within *VarMeasurementConfiguration* to the received value of *mbsfn-NeighbourCellConfig*;

1> if the received *measurementConfiguration* includes the *speedDependentParameters*:

2> set the parameter *speedDependentParameters* within *VarMeasurementConfiguration* to the received value of *speedDependentParameters*;

5.5.2.2 Measurement identity removal

The UE shall:

1> for each *measId* value included in the *measIdToRemoveList*:

2> remove the entry, from the parameter *measIdList* within *VarMeasurementConfiguration*, with the corresponding *measId* value;

2> remove the entry within the *VarMeasurementReports* for this *measId*, if included;

Editors note It has been agreed that the UE should NOT autonomously delete any unused measurement objects or reporting configurations.

5.5.2.3 Measurement identity addition/ modification

E-UTRAN applies the procedure as follows:

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

The UE shall:

1> for each *measId* value included in the *measIdToAddModifyList*:

2> if an entry is included in the parameter *measIdList* within *VarMeasurementConfiguration* with the corresponding *measId* value:

3> set the entry with the corresponding *measId* value within *VarMeasurementConfiguration* to the corresponding entry of the received parameter *measIdToAddModifyList*;

2> else:

3> add the entry with the corresponding *measId* value to the *VarMeasurementConfiguration* and set it to the corresponding entry of the received parameter *measIdToAddModifyList*;

Editors note It has been agreed that the UE should NOT autonomously delete any unused measurement objects or reporting configurations.

5.5.2.4 Measurement object removal

The UE shall:

1> for each *measObjId* value included in the *MeasObjectToRemoveList*:

2> remove, from the parameter *MeasObjectList* within *VarMeasurementConfiguration*, the entry with the corresponding *measObjId* value;

2> remove, from the parameter *measIdList* within *VarMeasurementConfiguration*, the entry(ies) with the corresponding *measObjId* value, if included;

2> if an entry is removed from the *measIdList* within *VarMeasurementConfiguration:*

3> remove the entry within the *VarMeasurementReports* for this *measId*, if included;

5.5.2.5 Measurement object addition/ modification

The UE shall:

1> for each *measObjId* value included in the *measObjectToAddModifyList*:

2> if an entry is included in the parameter *measObjectList* within *VarMeasurementConfiguration* with the corresponding *measObjId* value:

3> for all IEs, other than the *cellsToAddModifyList*, the *blacklistedCellsToAddModifyList, the cellsToRemoveList* and the *blackListedCellsToRemoveList* of the corresponding measurement object within *VarMeasurementConfiguration*:

4> set the entry with the corresponding *measObjId* value within *VarMeasurementConfiguration* to the corresponding entry of the received parameter *measObjectToAddModifyList*;

3> if the concerned received measurement object includes the *cellsToRemoveList*:

4> for each *cellIndex* value included in the *cellsToRemoveList*:

5> remove, from the parameter *cellsToAddModifyList* of the concerned measurement object within *VarMeasurementConfiguration*, the entry with the matching *cellIndex* value;

3> if the concerned received measurement object includes the *cellsToAddModifyList*:

4> for each *cellIndex* value included in the *cellsToAddModifyList*:

5> if an entry is included in the parameter *cellsToAddModifyList* of the concerned measurement object within *VarMeasurementConfiguration* with the corresponding *cellIndex* value:

6> set the entry with the corresponding *cellIndex* value within the corresponding *cellsToAddModifyList* within *VarMeasurementConfiguration* to the corresponding entry of the received parameter *cellsToAddModifyList*;

5> else:

6> add the entry with the corresponding *cellIndex* value to the *VarMeasurementConfiguration* and set it to the corresponding entry of the received parameter *cellsToAddModifyList*;

3> if the concerned received measurement object includes the *blacklistedCellsToRemoveList*:

4> for each *cellIndex* value included in the *blacklistedCellsToRemoveList*:

5> remove, from the parameter *blacklistedCellsToAddModifyList* of the concerned measurement object within *VarMeasurementConfiguration*, the entry with the matching *cellIndex* value;

3> if the concerned received measurement object includes the *blacklistedCellsToAddModifyList*:

4> for each *cellIndex* value included in the *blacklistedCellsToAddModifyList*:

5> if an entry is included in the parameter *blacklistedCellsToAddModifyList* of the concerned measurement object within *VarMeasurementConfiguration* with the corresponding *cellIndex* value:

6> set the entry with the corresponding *cellIndex* value within the corresponding *blacklistedCellsToAddModifyList* within *VarMeasurementConfiguration* to the corresponding entry of the received parameter *blacklistedCellsToAddModifyList*;

5> else:

6> add the entry with the corresponding *cellIndex* value to the *VarMeasurementConfiguration* and set it to the corresponding entry of the received parameter *blacklistedCellsToAddModifyList*;

2> else:

3> add the entry with the corresponding *measObjId* value to the *VarMeasurementConfiguration* and set it to the corresponding entry of the received parameter *measObjectToAddModifyList*;

5.5.2.6 Reporting configuration removal

The UE shall:

1> for each *reportConfigId* value included in the *reportConfigToRemoveList*:

2> remove, from the parameter *reportConfigList* within *VarMeasurementConfiguration,* the entry with the corresponding *reportConfigId* value;

2> if the removed entry included *reportCGI* set to "*TRUE"*:

3> Stop timer T321, if running;

2> remove, from the parameter *measIdList* within *VarMeasurementConfiguration,* the entry(ies) with the corresponding *reportConfigId* value, if included;

2> if an entry is removed from the *measIdList* within *VarMeasurementConfiguration:*

3> remove the entry within the *VarMeasurementReports* for this *measId, if included*;

5.5.2.7 Reporting configuration addition/ modification

The UE shall:

1> for each *reportConfigId* value included in the *reportConfigToAddModifyList*:

2> if an entry is included in the parameter *reportConfigList* within *VarMeasurementConfiguration* with the corresponding *reportConfigId* value:

3> set the entry with the corresponding *reportConfigId* value within *VarMeasurementConfiguration* to the corresponding entry of the received parameter *reportConfigToAddModifyList*;

2> else:

3> add the entry with the corresponding *reportConfigId* value to the *VarMeasurementConfiguration* and set it to the corresponding entry of the received parameter *reportConfigToAddModifyList*;

2> if the entry included in the received *reportConfigToAddModifyList* includes *reportCGI* set to "*TRUE"*:

3> Stop timer T321, if running

3> If *reportConfigToAddModifyList* includes *reportConfigEUTRA*:

4> Start timer T321 with the timer value set to 1 second;

3> else:

4> Start timer T321 with the timer value set to 8 seconds.

5.5.2.8 Quantity configuration

If the IE *QuantityConfig* is received the UE shall, depending on the measurement quantity, apply filtering of the measurements for that measurement quantity according to the formula below. This filtering shall be performed by the UE before UE event evaluation. The UE shall depending on the reporting quantity also filter the measurements reported in the IE *MeasuredResults*. The filtering shall be performed according to the following formula.

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

The variables in the formula are defined as follows:

$\boldsymbol{F_n}$ is the updated filtered measurement result

$\boldsymbol{F_{n-1}}$ is the old filtered measurement result

$\boldsymbol{M_n}$ is the latest received measurement result from physical layer measurements, the unit used for $\boldsymbol{M_n}$ is the same unit as the reported unit in the *MeasurementReport* message or the unit used in the event evaluation.

$\boldsymbol{a} = 1/2^{(k/4)}$, where k is the parameter received in the *filterCoefficent* field of the IE *QuantityConfig*.

NOTE: if $\boldsymbol{k}$ is set to 0 that will mean no layer 3 filtering.

In order to initialise the averaging filter, $\boldsymbol{F_0}$ is set to $\boldsymbol{M_1}$ when the first measurement result from the physical layer measurement is received.

The physical layer measurement results are sampled once every measurement period. Both the measurement period and the accuracy for a certain measurement are defined in [2].

Layer 3 filtering is applicable to all UE measurement quantities listed in [1]. The layer 3 filtering shall be performed in the same domain as the measurement or reporting is done, i.e. logarithmic filtering for logarithmic measurements, etc.

There shall only be one layer 3 filter per measurement quantity.

5.5.2.9 Measurement gap configuration

The UE shall:

1> if *gapActivation* is set to *activate*

2> if a measurement gap configuration is active, deactivate the measurement gap configuration;

2> activate the measurement gap configuration indicated by the received *gapPattern* at the SFN and subframe number indicated by the parameters *startSFN* and *startSubframeNumber*.

1> else

2> deactivate the measurement gap configuration.

5.5.3 Performing measurements

The UE supports measurement using a reporting configuration with the purpose set to "*reportCGI*", if the network provides sufficient idle periods.

The UE shall:

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

2> If measurement gaps are active or

2> the UE does not require measurement gaps to perform the concerned measurement or

2> the UE should attempt to perform the concerned measurement during idle periods:

3> If *s-Measure* is not configured or

3> If *s-Measure* is configured and the serving cell quality (RSRP value) is lower than this value:

4> If for the concerned measurement *purpose* is included in the *reportConfig* and set to "*reportCGI"*:

5> If timer T321 is running:

6> determine the global cell identity of the cell indicated by the *cellForWhichToReportCGI* included in the associated measurement object by acquiring the relevant system information from the concerned cell;

4> else:

5> Perform the corresponding measurements of neighbouring cells on the frequencies and RATs indicated in the concerned *measObject* and

5> Perform the evaluation of reporting criteria as specified in section 5.5.4;

5.5.4 Measurement report triggering

5.5.4.1 General

The UE shall:

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

2> if the *triggerType* is set to "*event*" consider a neighbouring cell on the associated frequency/ set of frequencies (GERAN) to be applicable as follows:

3> if the corresponding *measObject* concerns UTRA or CDMA2000: when the concerned cell is included in the *cellsToAddModifyList* defined within the *VarMeasurementConfiguration* for this *measId* (i.e. the cell is included in the white-list);

3> if the corresponding *measObject* concerns GERAN: when the concerned cell matches the *ncc-Permitted* defined within the *VarMeasurementConfiguration* for this *measId*;

3> if the corresponding *measObject* concerns EUTRA: when the concerned cell is not included in the *blackListedCellsToAddModifyList* defined within the *VarMeasurementConfiguration* for this *measId*;

2> else consider a neighbouring cell on the associated frequency to be applicable as follows:

3> if the corresponding *measObject* concerns UTRA or CDMA2000: when the concerned cell is included in the *cellsToAddModifyList* defined within the *VarMeasurementConfiguration* for this *measId* (i.e. the cell is included in the white-list) or the corresponding reportingConfig includes a *purpose* set to "*reportStrongestCellsForSON*" or to "*reportCGI*";

3> if the corresponding *measObject* concerns GERAN: when the concerned cell matches the *ncc-Permitted* defined within the *VarMeasurementConfiguration* for this *measId* or the corresponding reportingConfig includes a *purpose* set to "*reportStrongestCellsForSON*" or to "*reportCGI*";

3> if the corresponding *measObject* concerns EUTRA: when the concerned cell is not included in the *blackListedCellsToAddModifyList* defined within the *VarMeasurementConfiguration* 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 *VarMeasurementConfiguration*, is fulfilled for one or more applicable cells for a duration exceeding the value of timeToTrigger defined for this event within the *VarMeasurementConfiguration* or:

2> if the *triggerType* is set to "*periodical*" and a (first) measurement result is available:

3> if the *VarMeasurementReports* does not include an entry for this *measId*:

4> include an entry within the *VarMeasurementReports* for this *measId*;

4> set the *numberOfReportsSent* defined within the V*arMeasurementReports* for this *measId* to 0;

3> include the concerned cell(s) in the *cellsToReportList* defined within the V*arMeasurementReports* for this *measId*, if not included;

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

2> Upon expiry of the periodical reporting timer for this:

3> if the *triggerType* is set to "*periodical*":

4> clear the *cellsToReportList* defined within the *VarMeasurementReports* for this *measId* and include the applicable cell(s) in the *cellsToReportList;*

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

2> if the leaving condition applicable for this event is fulfilled for one or more of the cells included in the *cellsToReportList* defined within the V*arMeasurementReports* for this *measId* for a duration exceeding the value of *timeToTrigger* defined within the *VarMeasurementConfiguration* for this event:

3> remove the concerned cell(s) in the *cellsToReportList* defined within the V*arMeasurementReports* for this *measId*;

5.5.4.2 Event A1 (Serving becomes better than threshold)

The UE shall:

1> apply inequality A1-1, as specified below, as the entry condition for this event;

1> apply inequality A1-2, as specified below, as the leaving condition for this event;

Inequality A1-1 (Entering condition)

$Ms - Hys > Thresh$

Inequality A1-2 (Leaving condition)

$Ms + Hys < Thresh$

The variables in the formula are defined as follows:

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

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

Thresh is the threshold parameter for this event (i.e. *a1-Threshold* as defined within the *VarMeasurementConfiguration* 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 dBm in case ***Ms*** is expressed in dBm; otherwise it is expressed in dB

5.5.4.3 Event A2 (Serving becomes worse than threshold)

The UE shall:

1> apply inequality A2-1, as specified below, as the entry condition for this event;

1> apply inequality A2-2, as specified below, as the leaving condition for this event;

Inequality A2-1 (Entering condition)

$Ms + Hys < Thresh$

Inequality A2-2 (Leaving condition)

$Ms - Hys > Thresh$

The variables in the formula are defined as follows:

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

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

Thresh is the threshold parameter for this event (i.e. *a2-Threshold* as defined within the *VarMeasurementConfiguration* 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 dBm in case ***Ms*** is expressed in dBm; otherwise it is expressed in dB

5.5.4.4 Event A3 (Neighbour becomes offset better than serving)

The UE shall:

1> apply inequality A3-1, as specified below, as the entry condition for this event;

1> apply inequality A3-2, as specified below, as the leaving condition for this event;

Inequality A3-1 (Entering condition)

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

Inequality A3-2 (Leaving condition)

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

The variables in the formula are defined as follows:

Mn is the measurement result of the neighbouring cell.

Ofn is the frequency specific offset of the frequency of the neighbour cell (equals *Ofs* for intra-frequency measurements and is included in *MeasObjectEUTRA* corresponding to the inter frequency as *offsetFreq* for inter-frequency measurements)

Ocn is the cell specific offset of the neighbour cell. If not configured zero offset shall be applied (included in *MeasObjectEUTRA* of the serving frequency as parameter *cellIndividualOffset* for intra-f measurements and included in *MeasObjectEUTRA* corresponding to the inter frequency as parameter *cellIndividualOffset* for inter-frequency measurements).

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

Ofs is the frequency specific offset of the serving frequency (i.e. *offsetFreq* within the *MeasObjectEUTRA* corresponding to the serving frequency)

Ocs is the cell specific offset of the serving cell (included in *MeasObjectEUTRA* of the serving frequency as parameter *cellIndividualOffset*)

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

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

Mn, Ms are expressed in dBm in case of RSRP, or in dB in case of RSRQ

Ofn, Ocn, Ofs, Ocs, Hys, Off are expressed in dB

5.5.4.5 Event A4 (Neighbour becomes better than threshold)

The UE shall:

1> apply inequality A4-1, as specified below, as the entry condition for this event;

1> apply inequality A4-2, as specified below, as the leaving condition for this event;

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

Ofn is the frequency specific offset of the frequency of the neighbour cell

Ocn is the cell specific offset of the neighbour cell

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

Thresh is the threshold parameter for this event (i.e. *a4-Threshold* as defined within the *VarMeasurementConfiguration* 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 dBm in case ***Ms*** is expressed in dBm; otherwise it is expressed in dB

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

The UE shall:

1> apply inequality A5-1 and equation A5-2 i.e. both have to be fulfilled, as specified below, as the entry condition for this event;

1> apply inequality A5-3 and equation A5-4 i.e. at least one of the two has to be fulfilled, as specified below, as the leaving condition for this event;

Inequality A5-1 (Entering condition 1)

$$Ms + Hys < Thresh1$$

Inequality A5-2 (Entering condition 2)

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

Inequality A5-3 (Leaving condition 1)

$$Ms - Hys > Thresh1$$

Inequality A5-4 (Leaving condition 2)

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

The variables in the formula are defined as follows:

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

Mn is the measurement result of the neighbouring cell.

Ofn is the frequency specific offset of the frequency of the neighbour cell

Ocn is the cell specific offset of the neighbour cell

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

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

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

Mn, Ms 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 dBm in case ***Ms*** is expressed in dBm; otherwise it is expressed in dB

Thresh2 is expressed in dBm in case ***Mn*** is expressed in dBm; otherwise it is 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> apply inequality B1-1, as specified below, as the entry condition for this event;

1> apply inequality B1-2, as specified below, as the leaving condition for this event;

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 neighbouring inter RAT cell.

Ofn is the frequency specific offset of the frequency of the neighbour cell

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

Thresh is the threshold parameter for this event (i.e. *b1-Threshold* as defined within the *VarMeasurementConfiguration* for this event)

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

Ofn, Hys are expressed in dB

Thresh is expressed in dBm in case ***Mn*** is expressed in dBm; otherwise it is expressed in dB

5.5.4.8 Event B2 (Serving 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> apply inequality B2-1 and inequality B2-2 i.e. both have to be fulfilled, as specified below, as the entry condition for this event;

1> apply inequality B3-3 and inequality B2-4 i.e. at least one of the two has to be fulfilled, as specified below, as the leaving condition for this event;

Inequality B2-1 (Entering condition 1)

$Ms + Hys < Thresh1$

Inequality B2-2 (Entering condition 2)

$Mn + Ofn - Hys > Thresh2$

Inequality B2-3 (Leaving condition 1)

$Ms - Hys > Thresh1$

Inequality B2-4 (Leaving condition 2)

$Mn + Ofn + Hys < Thresh2$

The variables in the formula are defined as follows:

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

Mn is the measurement result of the neighbouring inter RAT cell.

Ofn is the frequency specific offset of the frequency of the neighbour cell

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

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

Thresh2 is the threshold parameter for this event (i.e. *b2-Threshold2* as defined within the *VarMeasurementConfiguration* for this event)

Ms 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 neighbouring inter RAT cell

Ofn, Hys are expressed in dB

Thresh1 is expressed in dBm in case ***Ms*** is expressed in dBm; otherwise it is expressed in dB

Thresh2 is expressed in dBm in case ***Mn*** is expressed in dBm; otherwise it is expressed in dB

5.5.5 Measurement reporting

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

1> set the IE *measId* to the measurement identity that triggered the measurement reporting;

1> set the *mobilityMeasResults* to include all cells included in the *cellsToReportList* as defined within the V*arMeasurementReports* for this *measId*

1> for each included cell include the filtered measured results in accordance with the *reportConfigList* defined in variable *VarMeasurementConfiguration* for that *measId*, ordered as follows:

2> If for E-UTRA the *reportQuantity is set as "both":*

3> include the E-UTRA cells in order of decreasing *triggerQuantity*, i.e. the best cell is included first;

2> else*:*

3> include the cells in order of decreasing *reportQuantity*, i.e. the best cell is included first.

Editor's note: It is FFS whether, if multiple cells meet the criteria, ordering is also applied irrespective of the cells carrier frequency

1> increment the *numberOfReportsSent* as defined within the V*arMeasurementReports* for this *measId* by 1;

1> if the *numberOfReportsSent* as defined within the V*arMeasurementReports* for this *measId* is less than to reportAmount as defined within the reporting configuration for this event as defined in variable *VarMeasurementConfiguration*:

2> start the periodical reporting timer with the value of *reportInterval* as defined within the *VarMeasurementConfiguration* for this *measId*;

1> if the measured results are for CDMA:

2> set the *preRegistrationStatus* to the UE"s cdma upper layer"s HRPD preRegistrationStatus;

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

Editor's note: It is FFS which additional cells may be included in a report, e.g. cells of another type (e.g. best inter-frequency cell included in an intra-frequency report.

Editor's note: It is FFS if, for the case of a SON report of the strongest cell(s) on the carrier, the UE is required to report more than one cell.

5.5.6 Measurement related actions

5.5.6.1 Actions upon handover

5.5.6.1.1 General

After handover, the UE may re-use measurement samples obtained prior to handover.

5.5.6.1.2 Measurement related actions upon intra-frequency handover

The UE shall:

1> If the *RRCConnectionReconfiguration* message triggering the handover does not include the IE measurement configuration:

2> continue the intra-frequency, inter-frequency and inter-RAT measurements without modifying the measurement configuration.

5.5.6.1.3 Measurement related actions upon inter-frequency handover

E-UTRAN applies the handover procedure as follows:

- when performing the handover procedure, as specified in 5.3.5.4, ensure that a *measObjId* is configured with the *eutra-CarrierInfo* set to the target frequency;

The UE shall:

1> If the *RRCConnectionReconfiguration* message triggering the handover does not include the IE measurement configuration:

2> continue the intra-frequency measurements as follows:

3> for each *measId* value in the parameter *measIdList* within *VarMeasurementConfiguration* that is linked to the *measObjId* value in the parameter *measObjectList* within *VarMeasurementConfiguration* whose *eutra-CarrierInfo* is set to the source carrier frequency:

4> link this *measId* value to the *measObjId* value in the parameter *measObjectList* within *VarMeasurementConfiguration* whose *eutra-CarrierInfo* is set to the target frequency;

2> stop all inter-frequency and inter-RAT measurements while keeping the measurement configuration unchanged;

NOTE 2 The UE resumes the applicable inter-frequency measurements after the E-UTRAN has configured the corresponding measurement object and activated the (corresponding) measurement gap(s)

2> deactivate the measurement gap, if activated.

NOTE If the IE *measurementConfiguration* is included, then the normal procedure in 5.5.2 is performed

5.5.6.2 Speed dependant scaling of measurement related parameters

The UE shall adjust the value of the following parameters configured by the E-UTRAN depending on the UE speed: Time to trigger. 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 *speedDependentParameters* within *VarMeasurementConfiguration*;

1> if high mobility state is detected:

2> multiply *timeToTrigger* by *timeToTriggerSF-High* within *VarMeasurementConfiguration*;

1> else if medium mobility state is detected:

2> multiply *timeToTrigger* by *timeToTriggerSF-Medium* within *VarMeasurementConfiguration*;

1> else

2> no scaling is applied;

5.6 Other

5.6.1 DL information transfer

5.6.1.1 General

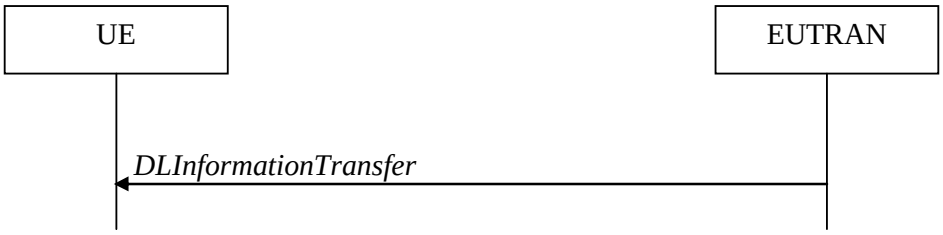

Figure 5.6.1.1-1: DL information transfer

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 CHOICE *informationType* is set to *nas3GPP*:

2> Forward the *NAS-DedicatedInformation* to the NAS upper layers.

1> If CHOICE *informationType* is set to *cdma2000*:

2> Forward the *cdma2000-Type* and the *cdma2000-DedicatedInfo* to the CDMA upper layers.

5.6.2 UL information transfer

5.6.2.1 General

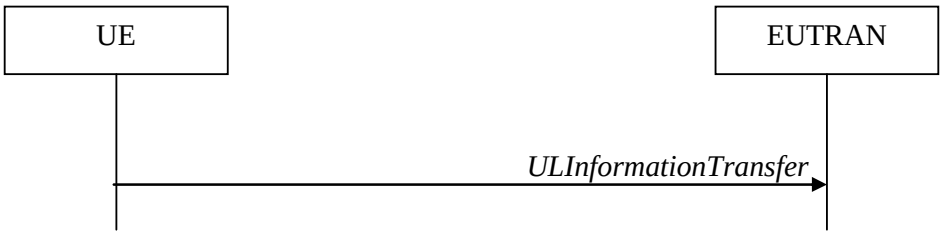

Figure 5.6.2.1-1: UL information transfer

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. 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 *informationType* to *nas3GPP*.

2> Include the *NAS-DedicatedInformation*.

1> If there is a need to transfer CDMA2000 information:

2> Set the *informationType* to *cdma2000*;

2> Include the *cdma2000-Type* and the *cdma2000-DedicatedInfo*;

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;

Editor's note: Awaiting confirmation from CT1 (in response to R2-080604)

5.6.3 UE capability transfer

5.6.3.1 General

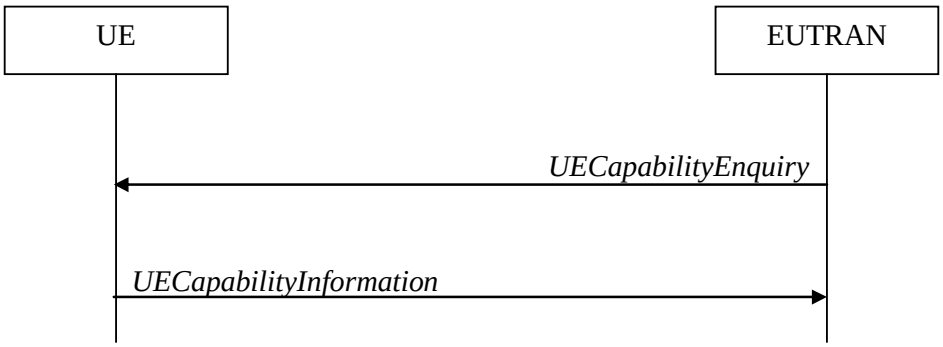

Figure 5.6.3.1-1: UE capability transfer

The purpose of this procedure is to transfer UE radio access capability information from the UE to E-UTRAN.

Editor's note: It is FFS if the security capabilities received via S1 can always be trusted. If this is not the case, there may be a need to support protection against bid down attacks. Awaiting reply from SA3 (in response to R2-080540).

NOTE: The UE capability transfer procedure is based on the assumption that core network deletes the UE capabilities upon detach. Furthermore, the only mechanism for the UE to initiate a change of the UE capabilities used by the network is to perform a detach and re-attach.

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-RadioAccessCapRequest* includes E-UTRA:

3> include the *UE-EUTRA-Capability* within a *ueCapabilitiesRAT-Container* and with the *rat-Type* set to *eutra*;

2> If the UE radio access capability request includes GERAN:

3> include the UE radio access capabilities for GERAN within a *ueCapabilitiesRAT-Container* and with the *rat-Type* set to *geran*;

2> If the UE radio access capability request includes UTRA:

3> include the UE radio access capabilities for UTRA within a *ueCapabilitiesRAT-Container* and with the *rat-Type* set to *utran*;

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

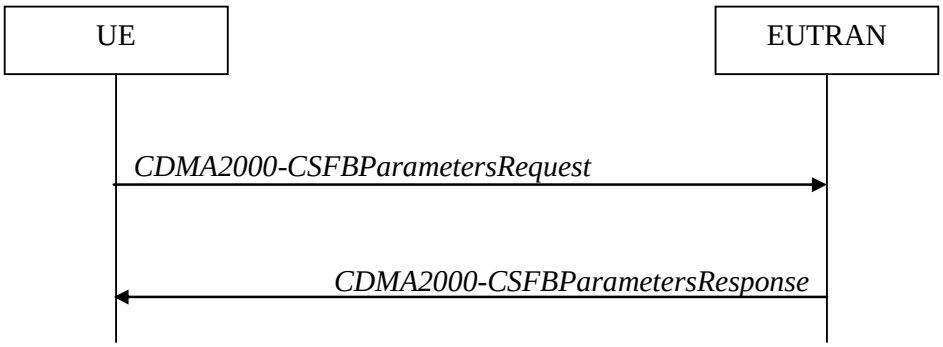

Figure 5.6.4.1-1: CSFB to 1x Parameter transfer

The purpose of this procedure is to transfer the CDMA2000 1xRTT parameters required to register the UE in the 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 CDMA upper layers. The UE initiates the CSFB to 1x Parameter transfer procedure by sending the *CDMA2000-CSFBParametersRequest* message.

5.6.4.3 Actions related to transmission of *CDMA2000-CSFBParametersRequest* message

The UE shall

1> submit the *CDMA2000-CSFBParametersRequest* message to lower layers for transmission using the current configuration.

5.6.4.4 Reception of the *CDMA2000-CSFBParametersResponse* message

Upon reception of the *CDMA2000-CSFBParametersResponse* message, the UE shall:

1> forward the *cdma2000-Rand* and the *cdma2000-OneXRTTMobilityParameters* to the CDMA 1xRTT upper layers;

5.7 Generic error handling

6 Protocol data units, formats and parameters (tabular & ASN.1)

6.1 General

The contents of each RRC message is specified in subclause 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 subclause 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. For the downlink direction, all comment text tags are available for use; in the uplink direction, only the 'Need OP' tag should be used. 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*	*Conditionally present* An information element for which the need is specified by means of conditions. For each *conditionTag*, the need is specified in a tabular form following the ASN.1 segment.
Need OP	*Optionally present* An information element that is optional to signal. For downlink messages, the UE is not required to take any special action on presence or absence of the IE beyond what is specified in the procedural text or the field description table following the ASN.1 segment.
Need OC (Used in downlink only)	*Optionally present, Continue* An information element that is optional to signal and related to a stateful functionality. If the message is received by the UE, and in case the information element is absent, the UE shall continue to use the existing value (and the associated functionality).
Need OD (Used in downlink only)	*Optionally present, Discontinue* An information element that is optional to signal and related to a stateful functionality. If the message is received by the UE, and in case the information element is absent, the UE shall discontinue/ stop to use the existing value (and the associated functionality).

Editor's note: The use of extension markers is FFS.

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.

It is FFS whether or not the following messages should be introduced:

- *HandoverToEUTRACommand* (The RRC connection reconfiguration message is currently used, i.e. it is FFS if a specific message is needed)
- *UECapabilityInformationCompact* (The need to introduce a message including a size optimised/ reduced version of the UE capabilities is FFS)

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
```

– 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 on the downlink DCCH logical channel.

```
-- ASN1START

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

DL-DCCH-MessageType ::= CHOICE {
    c1                      CHOICE {
        cdma2000-CSFBParametersResponse         CDMA2000-CSFBParametersResponse,
        dlInformationTransfer                   DLInformationTransfer,
        handoverFromEUTRAPreparationRequest     HandoverFromEUTRAPreparationRequest,
        mobilityFromEUTRACommand                MobilityFromEUTRACommand,
        rrcConnectionReconfiguration            RRCConnectionReconfiguration,
        rrcConnectionRelease                    RRCConnectionRelease,
        securityModeCommand                     SecurityModeCommand,
        ueCapabilityEnquiry                     UECapabilityEnquiry
    },
    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 on the uplink DCCH logical channel.

```
-- ASN1START

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

UL-DCCH-MessageType ::= CHOICE {
    c1                      CHOICE {
        cdma2000-CSFBParametersRequest          CDMA2000-CSFBParametersRequest,
        measurementReport                       MeasurementReport,
        rrcConnectionReconfigurationComplete    RRCConnectionReconfigurationComplete,
        rrcConnectionReestablishmentComplete    RRCConnectionReestablishmentComplete,
        rrcConnectionSetupComplete              RRCConnectionSetupComplete,
        rrcStatus                               RRCStatus,
        securityModeComplete                    SecurityModeComplete,
```

```
        securityModeFailure                     SecurityModeFailure,
        ueCapabilityInformation                 UECapabilityInformation,
        ulHandoverPreparationTransfer           ULHandoverPreparationTransfer,
        ulInformationTransfer                   ULInformationTransfer,
        spare5 NULL, spare4 NULL,
        spare3 NULL, spare2 NULL, spare1 NULL
    },
    messageClassExtension   SEQUENCE {}
}

-- ASN1STOP
```

6.2.2 Message definitions

– CDMA2000-CSFBParametersRequest

The *CDMA2000-CSFBParametersRequest* message is used by the UE to obtain the CDMA2000 1x Parameters from the network. The UE needs these parameters to generate the 1xRTT Registration message used to register with the CDMA2000 1xRTT Network which is required to support CSFB to 1xRTT.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

***CDMA2000-CSFBParametersRequest* message**

```
-- ASN1START

CDMA2000-CSFBParametersRequest ::= SEQUENCE {
    criticalExtensions                  CHOICE {
        cdma2000-CSFBParametersRequest-r8   CDMA2000-CSFBParametersRequest-r8-IEs,
        criticalExtensions                  SEQUENCE {}
    }
}

CDMA2000-CSFBParametersRequest-r8-IEs ::= SEQUENCE {
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}
-- ASN1STOP
```

***CDMA2000-CSFBParametersRequest* field descriptions**
%fieldIdentifier%

– CDMA2000-CSFBParametersResponse

The *CDMA2000- CSFBParametersResponse* message is used to provide the CDMA2000 1x Parameters to the UE so the UE can register with the CDMA2000 1xRTT Network to support CSFB to 1xRTT.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

***CDMA2000- CSFBParametersResponse* message**

```
-- ASN1START

CDMA2000-CSFBParametersResponse ::= SEQUENCE {
```

```
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                      CHOICE {
        cdma2000-1xParametersForCSFB-r8         CDMA2000-CSFBParametersResponse-r8-IEs,
        criticalExtensions                      SEQUENCE {}
    }
}

CDMA2000-CSFBParametersResponse-r8-IEs ::= SEQUENCE {
    cdma2000-RAND                           BIT STRING (SIZE (32)),
    cdma2000-MobilityParameters             OCTET STRING,
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

***CDMA2000-CSFBParametersResponse* field descriptions**
cdma2000-RAND A 32 bit random value, generated by the eNB, passed to the CDMA2000 upper layers.
cdma2000-MobilityParameters This information contains the same parameters provided to the UE for SRVCC support. These parameters are defined by 3GPP2 in [ref].

– DLInformationTransfer

The *DLInformationTransfer* message is used for the downlink transfer of dedicated NAS information.

Signalling radio bearer: SRB2 or SRB1 (only if SRB2 not established yet)

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
        },
        criticalExtensions                  SEQUENCE {}
    }
}

DLInformationTransfer-r8-IEs ::=    SEQUENCE {
    informationType                     CHOICE {
        nas3GPP                             NAS-DedicatedInformation,
        cdma2000                            SEQUENCE {
            cdma2000-Type                       CDMA2000-Type,
            cdma2000-DedicatedInfo              OCTET STRING
        }
    },
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

***DLInformationTransfer* field descriptions**
nas3GPP Field description is FFS.
cdma2000-Type Field description is FFS.
cdma2000-DedicatedInfo This IE is used to transfer UE specific CDMA2000 information between the network and the UE. The RRC layer is transparent for this information.

– HandoverFromEUTRAPreparationRequest (CDMA2000)

The *HandoverFromEUTRAPreparationRequest* message is used to trigger the handover preparation procedure with a CDMA2000 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
        },
        criticalExtensions                  SEQUENCE {}
    }
}

HandoverFromEUTRAPreparationRequest-r8-IEs ::= SEQUENCE {
    cdma2000-Type                       CDMA2000-Type,
    cdma2000-RAND                       BIT STRING (SIZE (32))      OPTIONAL,   -- Cond cdma2000-Type
    cdma2000-MobilityParameters         OCTET STRING                OPTIONAL,    -- Need OP
    nonCriticalExtension                SEQUENCE {}                 OPTIONAL
}

-- ASN1STOP
```

***HandoverFromEUTRAPreparationRequest* field descriptions**
cdma2000-Type Field description is FFS.
cdma2000-RAND A 32 bit random value, generated by the eNB, passed to the CDMA2000 upper layers. Present only if the cdma2000-Type = type1XRTT.
cdma2000-MobilityParameters For 1xRTT his information contains the parameters provided to the UE for SRVCC support. These parameters are defined by 3GPP2 in [ref].

Conditional presence	Explanation
cdma2000-Type	The IE is mandatory present if the cdma2000-Type = type1XRTT; otherwise it is not needed.

– 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-SystemBandwidth                  ENUMERATED {n6, n15, n25, n50, n75, n100, spare10,
                                                    spare9, spare8, spare7, spare6, spare5,
                                                    spare4, spare3, spare2, spare1},
    phich-Configuration                 PHICH-Configuration,
    systemFrameNumber                   BIT STRING (SIZE (8))
}


-- ASN1STOP
```

***MasterInformationBlock* field descriptions**
dl-SystemBandwidth The transmission bandwidth configuration (NRB). n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on
systemFrameNumber Defines the 8 most significant bits of the SFN. 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).

– 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
        },
        criticalExtensions                  SEQUENCE {}
    }
}

MeasurementReport-r8-IEs ::=        SEQUENCE {
    measuredResults                     MeasuredResults,
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

MeasurementReport field descriptions
measuredResults
Field description is FFS

– MobilityFromEUTRACommand

The *MobilityFromEUTRACommand* message is used to command handover or a cell change from E-UTRA to another RAT (3GPP or non-3GPP).

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,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensions                  SEQUENCE {}
    }
}

MobilityFromEUTRACommand-r8-IEs ::= SEQUENCE {
    t304                                ENUMERATED {
                                            ms100, ms200, ms500, ms1000,
                                            ms2000, ms4000, ms8000, spare},
    targetRAT-Type                      ENUMERATED {
                                            utra, geran, cdma2000-1XRTT, cdma2000-HRPD, spare4,
                                            spare3, spare2, spare1, ...},
    targetRAT-MessageContainer          OCTET STRING,
    csFallbackIndicator                 ENUMERATED {true}                   OPTIONAL,   -- Need OP
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

MobilityFromEUTRACommand field descriptions
t304
Timer T304 as described in section 7.3. Value ms100 corresponds with 100 ms, ms200 corresponds with 200 ms and so on.
targetRAT-Type
Indicates the target RAT type.
targetRAT-MessageContainer
Used to carry messages corresponding to specifications from the target RAT.
csFallbackIndicator
Indicates that the CS Fallback procedure is triggered.

– 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 OP
    systemInfoModification              ENUMERATED {true}                   OPTIONAL,   -- Need OP
    etws-PrimaryNotificationIndication  ENUMERATED {true}                   OPTIONAL,   -- Need OP
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

PagingRecordList ::=                SEQUENCE (SIZE (1..maxPageRec)) OF SEQUENCE {
        ue-Identity                     PagingUE-Identity,
        cn-Domain                       ENUMERATED  {ps, cs},
        pagingCause                     PagingCause,
        ...
    }

-- ASN1STOP
```

Paging field descriptions
ue-Identity Field description is FFS.
cn-Domain Indicates the origin of paging.
pagingCause Field description is FFS.
systemInfoModification If present: indication of a BCCH modification.
etws-PrimaryNotificationIndication If present: indication of an ETWS primary notification.

– RRCConnectionReconfiguration

The *RRCConnectionReconfiguration* message is the command to modify an RRC connection. It may convey information for measurement configuration, mobility control, dedicated NAS information, radio resource configuration (including RBs, transport channel configuration and physical channel configuration), security configuration and UE related information.

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
        },
```

```
        criticalExtensions                  SEQUENCE {}
    }
}

RRCConnectionReconfiguration-r8-IEs ::= SEQUENCE {
    measurementConfiguration            MeasurementConfiguration        OPTIONAL,   -- Need OC
    mobilityControlInformation          MobilityControlInformation      OPTIONAL,   -- Need OP
    nas-DedicatedInformation            NAS-DedicatedInformation        OPTIONAL,   -- Cond nonHO
    radioResourceConfiguration          RadioResourceConfigDedicated    OPTIONAL,   -- Need OC
    securityConfiguration               SecurityConfiguration           OPTIONAL,   -- Cond Handover
    ue-RelatedInformation               UE-RelatedInformation           OPTIONAL,   -- Need OC
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

***RRCConnectionReconfiguration* field descriptions**
measurementConfiguration This IE 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.
mobilityControlInformation This IE includes parameters relevant for network controlled mobility to/within E-UTRA.
nas-DedicatedInformation This IE is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for this information.
radioResourceConfiguration This IE is used to setup/modify/release RBs, to setup/modifiy transport channel configurations and to setup/modify physical channels.
securityConfiguration This IE is used to configure AS integrity protection (CP) and AS ciphering (CP and UP).
ue-RelatedInformation This IE is used to convey miscellaneous UE related information.

Conditional presence	Explanation
Handover	The IE is mandatory present in case of inter-RAT handover to E-UTRA; it is optionally present in case of handover within E-UTRA; otherwise it is not needed.
nonHO	The IE is not needed in case of handover within E-UTRA or to E-UTRA; otherwise it is optional present.

Editor's note: The "*Handover*" condition seems to be based on procedure requirements and should possibly not be specified here; rather a need "OP".

– 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,
        criticalExtensions                  SEQUENCE {}
    }
}
```

```
RRCConnectionReconfigurationComplete-r8-IEs ::= SEQUENCE {
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

***RRCConnectionReconfigurationComplete* field descriptions**
%fieldIdentifier%

Editor's note: (Temporary note, just for information, i.e. nothing to be captured) Also when this message is used to confirm a successful handover, the same transfer mechanism applies, i.e. SRB1, RLC AM, DCCH. Contention is handled at the MAC (control element including C-RNTI), while PDCP includes regular MAC-I. If segmentation is needed, the eNB may provide an additional allocation, e.g. in the sub-frame following Msg3 transmission.

– RRCConnectionReestablishment

The *RRCConnectionReestablishment* message is used to resolve contention and to establish SRBs.

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
        },
        criticalExtensions                  SEQUENCE {}
    }
}

RRCConnectionReestablishment-r8-IEs ::= SEQUENCE {
    radioResourceConfiguration          RadioResourceConfigDedicated,
    nextHopChainingCount                NextHopChainingCount,
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

***RRCConnectionReestablishment* field descriptions**
radioResourceConfiguration
Only SRB1 configuration information is applicable (modification, i.e., delta signalling)
nextHopChainingCount
Parameter NCC: See TS 33.401 [32]

Editor's note: For this message specific HARQ operation applies, i.e., only UEs for which the Initial UE identity matches provide a HARQ acknowledgment.

– 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,
        criticalExtensions                  SEQUENCE {}
    }
}

RRCConnectionReestablishmentComplete-r8-IEs ::= SEQUENCE {
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

***RRCConnectionReestablishmentComplete* field descriptions**
%fieldIdentifier%

– 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,
        criticalExtensions                  SEQUENCE {}
    }
}

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

-- ASN1STOP
```

***RRCConnectionReestablishmentReject* field descriptions**
%fieldIdentifier%

– 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,
        criticalExtensions                  SEQUENCE {}
    }
}

RRCConnectionReestablishmentRequest-r8-IEs ::= SEQUENCE {
    ue-Identity                         ReestabUE-Identity,
    reestablishmentCause                ReestablishmentCause,
    spare                               BIT STRING (SIZE (2))
}

-- ASN1STOP
```

***RRCConnectionReestablishmentRequest* field descriptions**
ue-Identity 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
        },
        criticalExtensions                  SEQUENCE {}
    }
}

RRCConnectionReject-r8-IEs ::=      SEQUENCE {
```

```
    waitTime                            INTEGER (1..16),
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

***RRCConnectionReject* field descriptions**
waitTime
Wait time value in seconds.

Editor's note: For this message specific HARQ operation applies, i.e. only UEs for which the Initial UE identity matches provide a HARQ acknowledgment.

– 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
        },
        criticalExtensions                  SEQUENCE {}
    }
}

RRCConnectionRelease-r8-IEs ::=     SEQUENCE {
    releaseCause                        ReleaseCause,
    redirectionInformation              RedirectionInformation              OPTIONAL,   -- Need OP
    idleModeMobilityControlInfo         IdleModeMobilityControlInfo         OPTIONAL,   -- Need OP
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

***RRCConnectionRelease* field descriptions**
redirectionInformation
Field description is FFS.
idleModeMobilityControlInfo
Field description is FFS.

– 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,
        criticalExtensions                  SEQUENCE {}
    }
}

RRCConnectionRequest-r8-IEs ::=     SEQUENCE {
    ue-Identity                         InitialUE-Identity,
    establishmentCause                  EstablishmentCause,
    spare                               BIT STRING (SIZE (1))
}

-- ASN1STOP
```

***RRCConnectionRequest* field descriptions**
ue-Identity UE identity included to facilitate contention resolution by lower layers.
establishmentCause Provides the establishment cause for the RRC connection request as provided by the upper layers.

Editor's note: It has been concluded that there is no need to transfer UE capability info early (i.e. redirection may be performed after the UE context is transferred across S1)

– 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
        },
        criticalExtensions                  SEQUENCE {}
    }
}

RRCConnectionSetup-r8-IEs ::=       SEQUENCE {
    radioResourceConfiguration          RadioResourceConfigDedicated,
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}
```

```
-- ASN1STOP
```

RRCConnectionSetup field descriptions
radioResourceConfiguration
Only SRB1 configuration information is applicable

Editor's note: For this message specific HARQ operation applies, i.e. only UEs for which the Initial UE identity matches provide a HARQ acknowledgment.

– 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
        },
        criticalExtensions                  SEQUENCE {}
    }
}

RRCConnectionSetupComplete-r8-IEs ::= SEQUENCE {
    selectedPLMN-Identity               SelectedPLMN-Identity,
    registeredMME                       RegisteredMME                       OPTIONAL,   -- Need OP
    nas-DedicatedInformation            NAS-DedicatedInformation,
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

RRCConnectionSetupComplete field descriptions
selectedPLMN-Identity
Index of the PLMN selected by the UE from the plmn-IdentyList included in SIB1.
registeredMME
The GUMMEI of the MME where the UE is registered.
nas-DedicatedInformation
Field description is FFS.

– RRCStatus

The *RRCStatus* message is used to indicate an RRC protocol error.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

***RRCStatus* message**

```
-- ASN1START

RRCStatus ::=                       SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        rrcStatus-r8                        RRCStatus-r8-IEs,
        criticalExtensions                  SEQUENCE {}
    }
}

RRCStatus-r8-IEs ::=                SEQUENCE {
    -- Enter the IEs here.                                                  FFS
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

***RRCStatus* field descriptions**
%fieldIdentifier%

– 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,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensions                  SEQUENCE {}
    }
}

SecurityModeCommand-r8-IEs ::=      SEQUENCE {
    securityConfiguration               SecurityConfiguration,
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

***SecurityModeCommand* field descriptions**
securityConfiguration Field description is FFS.

– 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,
        criticalExtensions                  SEQUENCE {}
    }
}

SecurityModeComplete-r8-IEs ::=     SEQUENCE {
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

***SecurityModeComplete* field descriptions**
%fieldIdentifier%

– 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,
        criticalExtensions                  SEQUENCE {}
    }
}

SecurityModeFailure-r8-IEs ::=      SEQUENCE {
    -- Enter the IEs here.                                                  FFS
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}
```

```
-- ASN1STOP
```

***SecurityModeFailure* field descriptions**
%fieldIdentifier%

– 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,
        criticalExtensions                  SEQUENCE {}
    }
}
SystemInformation-r8-IEs ::=        SEQUENCE {
    sib-TypeAndInfo                     SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {     -- Size is FFS
        sib2                            SystemInformationBlockType2,
        sib3                            SystemInformationBlockType3,
        sib4                            SystemInformationBlockType4,
        sib5                            SystemInformationBlockType5,
        sib6                            SystemInformationBlockType6,
        sib7                            SystemInformationBlockType7,
        sib8                            SystemInformationBlockType8,
        sib9                            SystemInformationBlockType9,
        sib10                           SystemInformationBlockType10,
        sib11                           SystemInformationBlockType11,
        ...
    },
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

***SystemInformation* field descriptions**

– 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

Editor's note RAN1 has agreed (R2-080475) that DL RX Tx power should be indicated on BCCH mapped to DL-SCH. FFS in which SIB and SI this should be provided

SystemInformationBlockType1 message

```
-- ASN1START

SystemInformationBlockType1 ::=     SEQUENCE {
    cellAccessRelatedInformation        SEQUENCE {
        plmn-IdentityList                   PLMN-IdentityList,
        trackingAreaCode                    TrackingAreaCode,
        cellIdentity                        CellIdentity,
        cellBarred                          ENUMERATED {barred, notBarred},
        intraFrequencyCellReselection       BOOLEAN                 OPTIONAL,   -- Cond CellBarred
        cellReservationExtension            ENUMERATED {reserved, notReserved},
        csg-Indication                      BOOLEAN
    },
    cellSelectionInfo                   SEQUENCE {
        q-Rxlevmin                          INTEGER (-70..-22),
        q-Rxlevminoffset                    INTEGER (1..8)          OPTIONAL    -- value range FFS
    },                                                                                  -- need FFS
    frequencyBandIndicator              INTEGER (1..64),
    schedulingInformation               SchedulingInformation,
    tdd-Configuration                   TDD-Configuration           OPTIONAL,
    si-WindowLength                     ENUMERATED {
                                            ms1, ms2, ms5, ms10, ms15, ms20,
                                            ms40, spare1},
    systemInformationValueTag           INTEGER (0..31),
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

PLMN-IdentityList ::=                   SEQUENCE (SIZE (1..6)) OF SEQUENCE {
    plmn-Identity                           PLMN-Identity,
    cellReservedForOperatorUse              ENUMERATED {reserved, notReserved}
}

SchedulingInformation  ::= SEQUENCE (SIZE (1..maxSI-Message)) OF SEQUENCE {
    si-Periodicity                      ENUMERATED {
                                            rf8, rf16, rf32, rf64, rf128, rf256, rf512,
                                            spare1, ...},
    sib-MappingInfo                     SIB-MappingInfo
}

SIB-MappingInfo  ::= SEQUENCE (SIZE (1..maxSIB)) OF SIB-Type

-- ASN1STOP
```

***SystemInformationBlockType1* field descriptions**
cellReservedForOperatorUse As defined in TS 36.304 [4]
trackingAreaCode Common TAC for all the PLMNs listed
cellBarred "Barred" means barred for all calls, as defined in TS 36.304 [4]
intraFrequencyCellReselection FFS if needed
cellReservationExtension As defined in TS 36.304 [4]
csg-Indication If set to TRUE the UE is only allowed to access the cell if the tracking area identity matches an entry in the "white list" that the UE has stored
q-Rxlevmin Actual value *Qrxlevmin* = IE value * 2 RSRP [dBm] FFS within *cellSelectionInfo*
q-Rxlevminoffset Actual value *Qrxlevminoffset* = IE value * 2 [dB] FFS within *cellSelectionInfo*
frequencyBandIndicator Defined in [36.101].
schedulingInformation
si-Periodicity Periodicity of the SI-message in radio frames, such that rf8 denotes 8 radio frames, rf16 denotes 16 radio frames, and so on.
sib-MappingInfo List of the SIBs mapped to this *SystemInformation* message.There is no mapping information of SIB2; it is always present in the first *SystemInformation* message listed in the *schedulingInformation* list.
si-WindowLength Common SI scheduling window for all SIs. Unit in milliseconds, where ms1 denotes 1 millisecond, ms2 denotes 2 milliseconds and so on.
systemInformationValueTag Common for all SIs

Conditional presence	Explanation
CellBarred	The IE is mandatory present if the IE *cellBarred* is set to TRUE; otherwise the IE is not needed.

– 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
        },
        criticalExtensions                  SEQUENCE {}
```

```
    }
}

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

-- ASN1STOP
```

***UECapabilityEnquiry* field descriptions**
ue-RadioAccesCapabilityReq
Field description is FFS.

– 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
        },
        criticalExtensions                  SEQUENCE {}
    }
}

UECapabilityInformation-r8-IEs ::=  SEQUENCE (SIZE (1..maxRAT-Capabilities)) OF SEQUENCE {
    rat-Type                            RAT-Type,
    ueCapabilitiesRAT-Container         OCTET STRING,
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

***UECapabilityInformation* field descriptions**
ueCapabilitesRAT-Container
Container for the UE capabilities of the indicated RAT. The encoding is defined in the specification of each RAT: For E-UTRA: the encoding of UE capabilities is defined in IE *UE-EUTRA-Capability*. For UTRA: the encoding of UE capabilities is defined in IE [FFS] TS 25.331 [19]. For GERAN: the encoding of UE capabilities is defined in IE [FFS] [24.008 and/or 44.018; FFS].

– 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
        },
        criticalExtensions                      SEQUENCE {}
    }
}

ULHandoverPreparationTransfer-r8-IEs ::= SEQUENCE {
    cdma2000-Type                       CDMA2000-Type,
    cdma2000-MEID                       BIT STRING (SIZE (56))  OPTIONAL,   -- Cond cdma2000-Type
    cdma2000-DedicatedInfo              OCTET STRING,
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

ULHandoverPreparationTransfer field descriptions
cdma2000-Type Field description is FFS.
cdma2000-DedicatedInfo Field description is FFS.
cdma2000-MEID The 56 bit mobile identification number provided by the CDMA Upper layers.

Conditional presence	Explanation
cdma2000-Type	The IE is mandatory present if the cdma2000-Type = type1XRTT; otherwise it is not needed.

– ULInformationTransfer

The *ULInformationTransfer* message is used for the uplink transfer of dedicated NAS information.

Signalling radio bearer: SRB2 or SRB1(only if SRB2 not established yet)

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
        },
        criticalExtensions                  SEQUENCE {}
    }
}
```

```
ULInformationTransfer-r8-IEs ::=    SEQUENCE {
    informationType                     CHOICE {
        nas3GPP                             NAS-DedicatedInformation,
        cdma2000                            SEQUENCE {
            cdma2000-Type                       CDMA2000-Type,
            cdma2000-DedicatedInfo              OCTET STRING
        }
    },
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

***ULInformationTransfer* field descriptions**
nas3GPP Field description is FFS.
cdma2000-Type Type of CDMA2000 network: 1xRTT or HRPD.
cdma2000-DedicatedInfo This IE is used to transfer UE specific CDMA2000 information between the network and the UE. The RRC layer is transparent for this information.

6.3 RRC information elements

6.3.1 System information blocks

Editor's note: This section was intended for IEs purely related to system information transmission aspects e.g. scheduling, SIB mapping. The SIB types may actually disappear once the further details of the SIs are agreed.
It is FFS if SYSTEM INFORMATION BLOCKS are introduced for the following:
- Dynamic common and shared channel configuration information, e.g. UL interference (FFS)
– SIB-Type

The IE *SIB-Type* is used %%

SIB-Type information element

```
-- ASN1START

SIB-Type ::=                        ENUMERATED {
                                        sibType2, sibType3, sibType4, sibType5,
                                        sibType6, sibType7, sibType8, sibType9,
                                        sibType10, sibType11, spare6, spare5,
                                        spare4, spare3, spare2, spare1, ...}

-- ASN1STOP
```

***SIB-Type* field descriptions**
Void

– SystemInformationBlockType2

The IE *SystemInformationBlockType2* contains radio resource configuration information that is common for all UEs.

NOTE 1: UE timers and constants related to functionality for which parameters are provided in another SIB are included in the corresponding SIB.

NOTE 2: It is FFS whether Uplink EARFCN should be moved to SIB 1. This relates to the discussion on UE capability for variable TX-RX frequency separation.

SystemInformationBlockType2 information element

```
-- ASN1START

SystemInformationBlockType2 ::=     SEQUENCE {
    accessBarringInformation            SEQUENCE {
        accessBarringForEmergencyCalls      BOOLEAN,
        accessBarringForSignalling          AccessClassBarringInformation   OPTIONAL,   -- Need OD
        accessBarringForOriginatingCalls    AccessClassBarringInformation   OPTIONAL    -- Need OD
    }       OPTIONAL,                                                                   -- Need OD
    radioResourceConfigCommon           RadioResourceConfigCommonSIB,
    ue-TimersAndConstants               UE-TimersAndConstants,
    frequencyInformation                SEQUENCE {
        ul-EARFCN                           INTEGER (0..maxEARFCN)          OPTIONAL,   -- Need OP
        ul-Bandwitdh                        ENUMERATED {
                                                n6, n15, n25, n50, n75, n100, spare10,
                                                spare9, spare8, spare7, spare6, spare5,
                                                spare4, spare3, spare2, spare1},
        additionalSpectrumEmission          INTEGER (0..31)
    },
    mbsfn-SubframeConfiguration         MBSFN-SubframeConfiguration         OPTIONAL,
    ...
}

AccessClassBarringInformation ::=   SEQUENCE {
    accessProbabilityFactor             ENUMERATED {
                                            p00, p05, p10, p15, p20, p25, p30, p40,
                                            p50, p60, p70, p75, p80, p85, p90, p95},
    accessBarringTime                   ENUMERATED {s4, s8, s16, s32, s64, s128, s256, s512},
    accessClassBarringList              AccessClassBarringList
}

AccessClassBarringList ::=          SEQUENCE (SIZE (maxAC)) OF SEQUENCE {
    accessClassBarring                  BOOLEAN
}

MBSFN-SubframeConfiguration ::=     SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF SEQUENCE {
    radioframeAllocationPeriod          ENUMERATED {n1, n2, n4, n8, n16, n32},
    radioframeAllocationOffset          INTEGER (0..7),
    subframeAllocation                  INTEGER (1..7)
}
-- ASN1STOP
```

Editor's note: The extension mechanisms in this system information block are FFS.

***SystemInformationBlockType2* field descriptions**
accessBarringForEmergencyCalls Access class barring for AC 10.
accessBarringForSignalling Access class barring for mobile originating signalling
accessBarringForOriginatingCalls Access class barring for mobile originating calls
accessProbabilityFactor If the random number drawn by the UE is lower than this value, access is allowed. Otherwise the access is barred.
accessBarringTime Mean access barring time in seconds.
accessClassBarringList Access class barring for AC 11-15. First in the list is for AC 11, second in the list is for AC 12, and so on
ul-EARFCN Default value determined from default TX-RX frequency separation defined in [36.101]
ul-Bandwidth Parameter: Uplink bandwidth [36.101]. Value n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on
additionalSpectrumEmission Defined in [36.101]
mbsfn-SubframeConfiguration Defines the subframes that are reserved for MBSFN in downlink
radioFrameAllocation Radio-frames that contain MBSFN subframes occur when equation *SFN* mod *radioFrameAllocationPeriod* = *radioFrameAllocationOffset* is satisfied. n1 denotes value 1, n2 denotes value 2, and so on
subframeAllocation Number of MBSFN subframes within a radio frame carrying MBSFN. The MBSFN subframes are allocated from the beginning of the radio-frame in consequtive order with the restriction that only those subframes that may carry MBSFN are allocated: subframes 0 and 5 are not allocated; subframe 4 is not allocated (FDD); subframes 1, 6 and uplink subframes are not allocated (TDD)

– 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},
        t-ReselectionEUTRAN                 INTEGER (0..7),
        speedDependentReselection           SEQUENCE {
            mobilityStateParameters             MobilityStateParameters,
            speedDependentScalingParameters     SEQUENCE {
                q-HystSF-Medium                     ENUMERATED {
                                                        db-6, dB-4, db-2, db0,
                                                        db2, db4, db6, spare},
                q-HystSF-High                       ENUMERATED {
                                                        db-6, dB-4, db-2, db0, db2,
                                                        db4, db6, spare},
                t-ReselectionEUTRAN-SF-Medium       ENUMERATED {oDot25, oDot5, oDot75, lDot0},
                t-ReselectionEUTRAN-SF-High         ENUMERATED {oDot25, oDot5, oDot75, lDot0}
            }                                   OPTIONAL                                -- Need OP
        }                                       OPTIONAL,                               -- Need OP
        sameRefSignalsInNeighbour           BOOLEAN,
        neighbourCellConfiguration          BIT STRING (SIZE (2))
    },
    cellReselectionServingFreqInfo      SEQUENCE {
        s-NonIntraSearch                    INTEGER (0..56)         OPTIONAL,
        threshServingLow                    INTEGER (0..56),
        cellReselectionPriority             INTEGER (0..7)          OPTIONAL
    },                                                                              -- need FFS
    intraFreqCellReselectionInfo        SEQUENCE {
```

```
        s-IntraSearch                       INTEGER (0..56)         OPTIONAL,
        measurementBandwidth                MeasurementBandwidth    OPTIONAL        -- Need OP
    },
    ...
}

-- ASN1STOP
```

Editor's note: The extension mechanisms in this system information block are FFS.

***SystemInformationBlockType3* field descriptions**
cellReselectionInfoCommon Cell re-selection information common for cells, e.g. *Ssearch*
q-Hyst Value *q-Hyst* in dB. Value dB1 corresponds to 1 dB, dB2 corresponds to 2 dB and so on.
q-HystSF-Medium Additional hysteresis apllied in Medium Mobility state to *q-Hyst*. In db. Value db-6 corresponds to -6dB, db-4 corresponds to -4dB and so on.
q-HystSF-High Additional hysteresis apllied in High Mobility state to *q-Hyst*. In db. Value db-6 corresponds to -6dB, db-4 corresponds to -4dB and so on.
t-ReselectionEUTRAN Cell reselection timer value $Treselection_{RAT}$ for E-UTRAN. In seconds
t-ReselectionEUTRAN-SF-Medium The IE *t-ReselectionEUTRAN* is multiplied with this factor if the UE is in Medium Mobility state. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5 , oDot75 corresponds to 0.75 and so on.
t-ReselectionEUTRAN-SF-High The IE *t-ReselectionEUTRAN* is multiplied with this factor if the UE is in High Mobility state. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5 , oDot75 corresponds to 0.75 and so on.
s-IntraSearch Actual value *s-IntraSearch* = IE value * 2 In dB
sameRefSignalsInNeighbour Valid only in TDD operation [RAN1 spec; FFS]. If TRUE: the UE may assume that the same reference signals are available in neighbour cells as in serving cell.
neighbourCellConfiguration Provides information related to MBSFN and TDD UL:DL configuration of neighbour cells 00: Not all neighbour cells have the same MBSFN subframe allocation as serving cell 10: All neighbour cells have same MBSFN subframe allocation as the serving cell 01: No MBSFN subframes are present in all neighbour cells 11: Different UL/DL allocation in neighbouring cells for TDD compared to the serving cell
servingFreqCellReselectionInfo
s-NonIntraSearch Actual value *s-NonIntraSearch* = IE value * 2 In dB
threshServingLow Actual value *threshServingLow* = IE value * 2 In dB
cellReselectionPriority Absolute priority of the serving layer (0 means: lowest priority)
intraFreqcellReselectionInfo
s-IntraSearch Actual value *s-IntraSearch* = IE value * 2 In dB
measurementBandwidth Measurement bandwidth information common for all neighbouring cells. If absent, the value represented by the *dl-SystemBandwidth* included in *MasterInformationBlock* applies (FFS)

– 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 {
    intraFreqNeighbouringCellList       IntraFreqNeighbouringCellList       OPTIONAL,
    intraFreqBlacklistedCellList        IntraFreqBlacklistedCellList        OPTIONAL,
    ...
}

IntraFreqNeighbouringCellList ::=       SEQUENCE (SIZE (1..maxCellIntra)) OF SEQUENCE {
    physicalCellIdentity                    PhysicalCellIdentity,
    q-OffsetCell                            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, spare1},
    ...
}

IntraFreqBlacklistedCellList ::=        SEQUENCE (SIZE (1..maxCellBlack)) OF SEQUENCE {
        physicalCellIdentity                PhysicalCellIdentity
}

-- ASN1STOP
```

Editor's note: The extension mechanisms in this system information block are FFS.

***SystemInformationBlockType4* field descriptions**
intraFreqNeighbouringCellList List of intra-frequency neighbouring cells with specific cell re-selection parameters.
q-OffsetCell The value in dB. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.
intraFreqBlacklistedCellList List of blacklisted intra-frequency neighbouring 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,
    ...
}

InterFreqCarrierFreqList ::=        SEQUENCE (SIZE (1..maxFreq)) OF SEQUENCE {
    eutra-CarrierFreq                   EUTRA-DL-CarrierFreq,
    t-ReselectionEUTRAN                 INTEGER (0..7),
    speedDependentScalingParameters     SEQUENCE {
        t-ReselectionEUTRAN-SF-Medium       ENUMERATED {oDot25, oDot5, oDot75, lDot0},
        t-ReselectionEUTRAN-SF-High         ENUMERATED {oDot25, oDot5, oDot75, lDot0}
    }                                                       OPTIONAL,       -- need OP
    threshX-High                        INTEGER (0..56),
    threshX-Low                         INTEGER (0..56),
    measurementBandwidth                MeasurementBandwidth,
    cellReselectionPriority             INTEGER (0..7)                      OPTIONAL,
    q-OffsetFreq                        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, spare1}                   DEFAULT dB0,
    interFreqNeighbouringCellList       InterFreqNeighbouringCellList   OPTIONAL,
    interFreqBlacklistedCellList        InterFreqBlacklistedCellList    OPTIONAL,
```

```
    ...
}

InterFreqNeighbouringCellList ::=   SEQUENCE (SIZE (1..maxCellInter)) OF SEQUENCE {
    physicalCellIdentity                PhysicalCellIdentity,
    q-OffsetCell                        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, spare}
}

InterFreqBlacklistedCellList ::=    SEQUENCE (SIZE (1..maxCellBlack)) OF SEQUENCE {
    physicalCellIdentity                PhysicalCellIdentity
}

-- ASN1STOP
```

Editor's note: The extension mechanisms in this system information block are FFS.

***SystemInformationBlockType5* field descriptions**
threshX-High Parameter "Thres$_{x,high}$" [36.304]. Actual value in dB = IE value * 2.
threshX-Low Parameter "Thres$_{x,low}$" [36.304]. Actual value in dB = IE value * 2.
t-ReselectionEUTRAN Cell reselection timer value Treselection$_{RAT}$ for E-UTRAN. In seconds
t-ReselectionEUTRAN-SF-Medium The IE *t-ReselectionEUTRAN* is multiplied with this factor if the UE is in Medium Mobility state. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5 , oDot75 corresponds to 0.75 and so on.
t-ReselectionEUTRAN-SF-High The IE *t-ReselectionEUTRAN* is multiplied with this factor if the UE is in High Mobility state. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5 , oDot75 corresponds to 0.75 and so on.
measurementBandwidth Measurement bandwidth common for all neighbouring cells on the frequency.
cellReselectionPriority Absolute priority of the E-UTRA carrier frequency (0 means: lowest priority)
q-OffsetFreq The value *q-OffsetFreq* in dB. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.
interFreqNeighbouringCellList List of inter-frequency neighbouring cells with specific cell re-selection parameters.
q-OffsetCell The value q-OffsetCell in dB. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.
interFreqBlacklistedCellList List of blacklisted inter-frequency neighbouring cells

– 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 as well as cell specific re-selection parameters.

Editor's note: In accordance with TS 36.300, cell specific parameters are not included in this SIB.

***SystemInformationBlockType6* information element**

```
-- ASN1START

SystemInformationBlockType6 ::=     SEQUENCE {
    utra-FDD-CarrierFreqList            UTRA-FDD-CarrierFreqList    OPTIONAL,
    utra-TDD-CarrierFreqList            UTRA-TDD-CarrierFreqList    OPTIONAL,
    t-ReselectionUTRA                   INTEGER (0..7),
    speedDependentScalingParameters     SEQUENCE {
        t-ReselectionUTRA-SF-Medium         ENUMERATED {oDot25, oDot5, oDot75, lDot0},
        t-ReselectionUTRA-SF-High           ENUMERATED {oDot25, oDot5, oDot75, lDot0}
    }                                                       OPTIONAL,           -- need OP
    ...
```

```
}

UTRA-FDD-CarrierFreqList ::=        SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF SEQUENCE {
    utra-CarrierFreq                    UTRA-DL-CarrierFreq,
    utra-CellReselectionPriority        INTEGER (0..7)                  OPTIONAL,
    threshX-High                        INTEGER (-70..-22),
    threshX-Low                         INTEGER (-70..-22),
    q-Rxlevmin                          INTEGER (-70..-22),         -- need FFS
    maxAllowedTxPower                   INTEGER (-50..33),          -- need and value range FFS
    q-Qualmin                           INTEGER (-24..0),           -- need and value range FFS
    ...
}

UTRA-TDD-CarrierFreqList ::=        SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF SEQUENCE {
    utra-CarrierFreq                    UTRA-DL-CarrierFreq,
    utra-CellReselectionPriority        INTEGER (0..7)                  OPTIONAL,
    threshX-High                        INTEGER (-70..-22),
    threshX-Low                         INTEGER (-70..-22),
    q-Rxlevmin                          INTEGER (-70..-22),         -- need FFS
    maxAllowedTxPower                   INTEGER (-50..33),          -- need and value range FFS
    ...
}

-- ASN1STOP
```

Editor's note: The extension mechanisms in this system information block are FFS.

***SystemInformationBlockType6* field descriptions**
t-ReselectionUTRA Cell reselection timer value $Treselection_{RAT}$ for UTRA. In seconds
t-ReselectionUTRA-SF-Medium The IE *t-ReselectionUTRA* is multiplied with this factor if the UE is in Medium Mobility state. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5 , oDot75 corresponds to 0.75 and so on.
t-ReselectionUTRA-SF-High The IE *t-ReselectionUTRA* is multiplied with this factor if the UE is in High Mobility state. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5 , oDot75 corresponds to 0.75 and so on.
utra-CellReselectionPriority Absolute priority of the RAT (0 means: lowest priority)
utra-CarrierFreqList List of carrier frequencies
threshX-High Actual value *threshHigh* = IE value * 2 In dBm
threshX-Low Actual value *threshLow* = IE value * 2 In dBm
q-Rxlevmin Actual value = IE value * 2+1 In dBm
maximumAllowedTxPower In dBm
q-Qualmin In dBm

– 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                  INTEGER (0..7),
    speedDependentScalingParameters     SEQUENCE {
        t-ReselectionGERAN-SF-Medium        ENUMERATED {oDot25, oDot5, oDot75, lDot0},
        t-ReselectionGERAN-SF-High          ENUMERATED {oDot25, oDot5, oDot75, lDot0}
```

```
    }                                                                   OPTIONAL,   -- need OP
    geran-NeigbourFreqList              GERAN-NeigbourFreqList          OPTIONAL,   -- Need OD
    ...
}

GERAN-NeigbourFreqList ::=          SEQUENCE (SIZE (1..maxGNFG)) OF GERAN-BCCH-Group

GERAN-BCCH-Group ::=                SEQUENCE {
    geran-BCCH-FrequencyGroup           GERAN-CarrierFreqList,
    geran-BCCH-Configuration            SEQUENCE {
        geran-CellReselectionPriority       INTEGER (0..7)              OPTIONAL,   -- Need OP
        ncc-Permitted                       BIT STRING (SIZE (8))       OPTIONAL,   -- Need OP
        q-Rxlevmin                          INTEGER (0..31)             OPTIONAL,   -- Need OP
        threshX-High                        INTEGER (0..31)             OPTIONAL,   -- Need OP
        threshX-Low                         INTEGER (0..31)             OPTIONAL    -- Need OP
    },
    ...
}

-- ASN1STOP
```

Editor's note: The extension mechanisms in this system information block are FFS.

Editor's note RAN2 has agreed not to provide cell specific re-selection parameters for GSM/ GERAN neighbours. To be confirmed by GERAN/ RAN4

***SystemInformationBlockType7* field descriptions**
geran-NeigbourFreqList 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.
geran-BCCH-FrequencyGroup The list of GERAN carrier frequencies organised into one group of GERAN carrier frequencies.
geran-BCCH-Configuration Defines the set of cell reselection parameters for the group of GERAN carrier frequencies. In the first element of the *geran-NeigbourFreqList* field, a complete set of cell reselection parameters shall be provided in the *geran-BCCH-Configuration* field. In subsequent elements of the *geran-NeigbourFreqList* field, value(s) from the presiding element is used as default, if one or more of the cell reselection parameters in the *geran-BCCH-Configuration* field are absent.
geran-CellReselectionPriority Absolute priority of the RAT (0 means: lowest priority)
t-ReselectionGERAN Cell reselection timer value $Treselection_{RAT}$ for GERAN. In seconds
t-ReselectionGERAN-SF-Medium The IE *t-ReselectionGERAN* is multiplied with this factor if the UE is in Medium Mobility state. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5 , oDot75 corresponds to 0.75, 1 corresponds to 1.
t-ReselectionGERAN-SF-High The IE *t-ReselectionGERAN* is multiplied with this factor if the UE is in High Mobility state. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5 , oDot75 corresponds to 0.75 and so on.
ncc-Permitted Field encoded as a bit map, where bit N is set to "0" if a BCCH carrier with NCC = N-1 is not permitted for monitoring and set to "1" if the BCCH carrier with NCC = N-1 is permitted for monitoring; N = 1 to 8; bit 1 of the bitmap is the leading bit of the bit string.
q-Rxlevmin The actual value of *q-Rxlevmin* in dBm = (IE value * 2) – 119.
threshX-High The actual value of *threshX-High* ("$Thresh_{x,high}$", [36.304]) in dBm = (IE value * 2) – 119.
threshX-Low The actual value of *threshX-Low* ("$Thresh_{x,low}$", [36.304]) in dBm = (IE value * 2) – 119.

– 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 {
    cdma2000-SystemTimeInfo             CDMA2000-SystemTimeInfo     OPTIONAL,
    searchWindowSize                    INTEGER (0..15)                 OPTIONAL,
    hrpd-Parameters                     SEQUENCE {
        hrpd-PreRegistrationInfo            HRPD-PreRegistrationInfo,
        hrpd-CellReselectionParameters      SEQUENCE {
            hrpd-BandClassList                  HRPD-BandClassList,
            hrpd-NeighborCellList               HRPD-NeighborCellList
        }       OPTIONAL
    }       OPTIONAL,
    oneXRTT-Parameters                  SEQUENCE {
        oneXRTT-CSFB-RegistrationInfo       OneXRTT-CSFB-RegistrationInfo   OPTIONAL,   -- Need OP
        oneXRTT-LongCodeState               BIT STRING (SIZE (42))  OPTIONAL,       -- Need OP
        oneXRTT-CellReselectionParameters   SEQUENCE {
            oneXRTT-BandClassList               OneXRTT-BandClassList,
            oneXRTT-NeighborCellList            OneXRTT-NeighborCellList
        }       OPTIONAL
    }       OPTIONAL,
    ...
}

HRPD-NeighborCellList ::=               SEQUENCE (SIZE (1..16)) OF SEQUENCE {
    hrpd-NeighborCellInfo                   CDMA2000-NeighbourCellInformation
}

OneXRTT-NeighborCellList ::=            SEQUENCE (SIZE (1..16)) OF SEQUENCE {
    oneXRTT-NeighborCellInfo                CDMA2000-NeighbourCellInformation
}

HRPD-BandClassList ::=              SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF SEQUENCE {
    hrpd-BandClass                      CDMA2000-Bandclass,
    hrpd-CellReselectionPriority        INTEGER (0..7),
    threshX-High                        INTEGER (0..63),
    threshX-Low                         INTEGER (0..63),
    tReselectionHRPD                    INTEGER (0..7),
    ...
}

OneXRTT-BandClassList ::=           SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF SEQUENCE {
    oneXRTT-BandClass                   CDMA2000-Bandclass,
    oneXRTT-CellReselectionPriority     INTEGER (0..7),
    threshX-High                        INTEGER (0..63),
    threshX-Low                         INTEGER (0..63),
    tReselectionOneXRTT                 INTEGER (0..7),
    ...
}

-- ASN1STOP
```

Editor's note: The extension mechanisms in this system information block are FFS.

***SystemInformationBlockType8* field descriptions**
cdma2000-SystemTimeInfo Information on CDMA2000 system time
searchWindowSize The search window size is a CDMA parameter to be used to assist in searching for the neighboring pilots. For values see [25, Table 2.6.6.2.1-1] and [26, Table 8.7.6.2-4].
hrpd-Parameters The cell reselection parameters applicable only to HRPD systems
hrpd-PreRegistrationInfo The HRPD Pre-Registration Information tells the UE if it should pre-register with the HRPD network and identifies the Pre-registration zone to the UE
hrpd-CellReselectionParameters cell reselection parameters applicable only to HRPD system
hrpd-BandClassList List of CDMA2000 frequency bands
hrpd-BandClass Identifies the HRPD Frequency Band in which the HRPD Carrier can be found. Details can be found in [24, Table 1.5]

***SystemInformationBlockType8* field descriptions**
hrpd-CellReselectionPriority Absolute priority of the RAT (0 means: lowest priority)
threshX-High This specifies the high threshold used in reselection towards this CDMA2000 HRPD band class expressed as an unsigned binary number equal to [-2 x 10 x $\log_{10}$ E_c/I_o] in units of 0.5 db, as defined in [25]
ThreshX-Low This specifies the low threshold used in reselection towards this CDMA2000 HRPD band class expressed as an unsigned binary number equal to [-2 x 10 x $\log_{10}$ E_c/I_o] in units of 0.5 db, as defined in [25]
tReselectionHRPD The HRPD cell reselection timer value in seconds
hrpd-NeighborCellList List of HRPD neighbouring cells
hrpd-NeighborCellInfo Describes one HRPD cell
oneX-RTT-Parameters cell reselection parameters applicable only to 1XRTT system
oneXRTT-CSFB-RegistrationInfo The CSFB to 1xRTT Registration Information tells the mobile if it should register with the 1xRTT network and identifies the 1xRTT System ID to the UE
oneXRTT-LongCodeState The state of long code generation registers in 1XRTT system as defined in [C.S0002-A, Section 1.3] at $\lceil t/10 \rceil \times 10 + 320$ ms, where *t* equals to the *cdma-SystemTime*. This information is required by the UE to perform SRVCC handover to 1xRTT.
oneXRTT-CellReselectionParameters Cell reselection parameters applicable only to 1xRTT system
oneXRTT-BandClassList List of CDMA2000 frequency bands
oneXRTT-BandClass Identifies the 1xRTT Frequency Band in which the 1xRTT Carrier can be found. Details can be found in [24, Table 1.5]
oneXRTT-CellReselectionPriority Absolute priority of the RAT (0 means: lowest priority)
threshX-High This specifies the high threshold used in reselection towards CDMA2000 1xRTT band class expressed as an unsigned binary number equal to [-2 x 10 x $\log_{10}$ E_c/I_o] in units of 0.5 db, as defined in [25]
threshX-Low This specifies the low threshold used in reselection towards CDMA2000 1xRTT band class expressed as an unsigned binary number equal to [-2 x 10 x $\log_{10}$ E_c/I_o] in units of 0.5 db, as defined in [25]
tReselectionOneXRTT The 1XRTT cell reselection timer value in seconds
oneXRTT-NeighborCellList List of 1xRTT neighbouring cells
oneXRTT-NeighborCellInfo Describes one 1xRTT cell

– SystemInformationBlockType9

The IE *SystemInformationBlockType9* contains a home eNB identifier (HNBID).

***SystemInformationBlockType9* information element**

```
-- ASN1START

SystemInformationBlockType9 ::=     SEQUENCE {
    hnbid                               OCTET STRING (SIZE(48)),
    ...
}

-- ASN1STOP
```

***SystemInformationBlockType9* field descriptions**
HNBID Carries the identifier 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 {
    etws-PrimaryNotification            OCTET STRING,
    ...
}

-- ASN1STOP
```

***SystemInformationBlockType10* field descriptions**
etws-PrimaryNotification Container for an ETWS primary notification, including security information.

– SystemInformationBlockType11

The IE *SystemInformationBlockType11* contains an ETWS secondary notification.

***SystemInformationBlockType11* information element**

```
-- ASN1START

SystemInformationBlockType11 ::=    SEQUENCE {
    etws-SegmentType                    ENUMERATED {notLastSegment, lastSegment},
    etws-SegmentNumber                  INTEGER (0..63),                        -- Value range FFS
    etws-SecondaryNotification          OCTET STRING,
    ...
}

-- ASN1STOP
```

***SystemInformationBlockType11* field descriptions**
etws-SegmentType Indicates whether the included ETWS secondary notification segment is the last segment or not.
etws-SegmentNumber Segment number of the ETWS secondary notification segment contained in the SIB. A segment number of zero corresponds to the first segment, one corresponds to the second segment, and so on.
etws-SecondaryNotification Container for an ETWS secondary notification segment.

6.3.2 Radio resource control information elements

– AntennaInformation

The IE *AntennaInformation* is used to specify the antenna configuration to be applied by the UE.

***AntennaInformation* information elements**

```
-- ASN1START

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

AntennaInformationDedicated ::= SEQUENCE {
    transmissionMode                    ENUMERATED {
                                            tm1, tm2, tm3, tm4, tm5, tm6,
                                            tm7, spare2, spare1},
    codebookSubsetRestriction           CHOICE {
        n2TxAntenna                         BIT STRING (SIZE (6)),
        n4TxAntenna                         BIT STRING (SIZE (64)),
```

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

-- ASN1STOP
```

***AntennaInformation* field descriptions**
antennaPortsCount
Parameter represents the number of cell specific antenna ports where an1 corresponds to 1, an2 to 2 antenna ports etc. see TS 36.211, 6.2.1. A UE in IDLE mode acquires the information about the number of transmit antenna ports according to TS 36.212, 5.3.1.1.
transmissionMode
Points to one of Transmission modes defined in TS 36.213, 7.1 where tm1 refers to transmission mode 1, tm2 to transmission mode 2 etc.
codebookSubsetRestriction
Reference FFS [TS 36.211; FFS]. For tm1 and tm2, codebook subset restriction is not needed. For tm4 and tm6, codebookSubsetRestriction is mandatory present. For tm3, tm5 and tm7 the need is FFS.

– CQI-Reporting

The IE *CQI-Reporting* is used to specify the CQI reporting configuration.

CQI-Reporting information elements

```
-- ASN1START

CQI-Reporting ::=               SEQUENCE {
    cqi-RepportingModeAperiodic         ENUMERATED {
                                            rm12, rm20, rm22, rm30, rm31,
                                            spare3, spare2, spare1},
    nomPDSCH-RS-EPRE-Offset             INTEGER (0)         OPTIONAL,       -- value range FFS
    cqi-ReportingPeriodic               CQI-ReportingPeriodic   OPTIONAL
}

CQI-ReportingPeriodic ::=           SEQUENCE {
    pucch-Resource                      SEQUENCE {},                        -- size, encoding FFS
    reportingConfigInfo                 SEQUENCE {
        periodicity                         ENUMERATED {
                                                ms2, ms5, ms10, ms20, ms32, ms40, ms64,
                                                ms80, ms128, ms160, ms256, msOff},
        subFrameOffset                      INTEGER (0..255),
        cqi-FormatIndicatorPeriodic         BOOLEAN
    }       OPTIONAL                                                                    -- Need OC
}

-- ASN1STOP
```

***CQI-Reporting* field descriptions**
pucch-Resource
PUCCH resource (frequency and cyclic shift) to use for CQI reporting [RAN1 specification; FFS]
periodicity
Parameter: *Periodicity (N_P),* see TS 36.213 [23, 7.2.2]. Value ms2 corresponds to a periodicity of 2ms, ms5 corresponds to a periodicity of 5ms and msOff corresponds to no periodic CQI reporting.
subFrameOffset
Parameter: *Subframe offset (N_{OFFSET}),* see TS 36.213 [23, 7.2.2]. Offset depends on the configured periodicity. For 2ms periodicity, available offset is 0 and 1ms, for 5 ms available offset values are 0, 1ms, 2ms, 4ms and 4ms etc.
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-ReportingModeAperiodic
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].
nomPDSCH-RS-EPRE-Offset
Parameter: *Nominal PDSCH-to-RS-EPRE-offset* [RAN1 specification; FFS].

– 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),
        prioritizedBitRate                  ENUMERATED {
                                                kB0, kB8, kB16, kB32, kB64, kB128,
                                                kB256, infinity, ...},
        logicalChannelGroup                 INTEGER (0..3)          OPTIONAL
    }       OPTIONAL                                                            -- Cond UL
}

-- ASN1STOP
```

LogicalChannelConfig field descriptions
priority Logical channel priority in [36.321]. Value is an integer.
prioritizedBitRate Parameter: *Prioritized Bit Rate* [36.321]. Value in kilobytes/second. Value kB0 corresponds to 0 kilobytes, kb8 corresponds to 8 kilobytes and so on.
logicalChannelGroup Mapping of logical channel to logical channel group [36.321].

Conditional presence	Explanation
UL	The IE is mandatory present for UL logical channels; otherwise it is not needed.

Editor's note: Are the logical channels unidirectional (UL/DL)? If so, should separate logical channel configuration IEs be defined for UL and DL logical channels?

– MAC-MainConfiguration

The IE *MAC-MainConfiguration* is used to specify the transport channel configuration for data radio bearers.

***MAC-MainConfiguration* information element**

```
-- ASN1START

MAC-MainConfiguration ::=   SEQUENCE {
    dl-SCH-Configuration                SEQUENCE {
        semiPersistSchedIntervalDL          ENUMERATED {
                                                sf10, sf20, sf32, sf40, sf64, sf80,
                                                sf128, sf160, sf320, sf640, spare6,
                                                spare5, spare4, spare3, spare2,
                                                spare1}     OPTIONAL
    }       OPTIONAL,
    ul-SCH-Configuration                SEQUENCE {
        maxHARQ-Tx                          ENUMERATED {
                                                n1, n2, n3, n4, n5, n6, n7, n8,
                                                n10, n12, n16, n20, n24, n28,
                                                spare2, spare1}     OPTIONAL,     -- Cond ConnSU
        semiPersistSchedIntervalUL          ENUMERATED {
                                                sf10, sf20, sf32, sf40, sf64, sf80,
                                                sf128, sf160, sf320, sf640, spare6,
                                                spare5, spare4, spare3, spare2,
                                                spare1}     OPTIONAL,
        periodicBSR-Timer                   ENUMERATED {
                                                sf5, sf10, sf16, sf20, sf32, sf40,
                                                sf64, sf80, sf128, sf160, sf320, sf640,
                                                sf1280, sf2560, infinity, spare1} OPTIONAL,-- need
OC
        ttiBundling                         BOOLEAN
    }       OPTIONAL,
    drx-Configuration                   SEQUENCE {
```

```
        drx-StartOffset                     INTEGER (0),                        -- type,range FFS
        onDurationTimer                     ENUMERATED {
                                                psf1, psf2, psf3, psf4, psf5, psf6,
                                                psf8, psf10, psf20, psf30, psf40,
                                                psf50, psf60, psf80, psf100,
                                                psf200},                            -- default FFS
        drx-InactivityTimer                 ENUMERATED {
                                                psf1, psf2, psf3, psf4, psf5, psf6,
                                                psf8, psf10, psf20, psf30, psf40,
                                                psf50, psf60, psf80, psf100,
                                                psf200},                            -- default FFS
        drx-RetransmissionTimer             ENUMERATED {
                                                sf1, sf2, sf4, sf6, sf8, sf16,
                                                sf24, sf33},                        -- default FFS
        longDRX-Cycle                       ENUMERATED {
                                                sf10, sf20, sf32, sf40, sf64, sf80,
                                                sf128, sf160, sf256, sf320, sf512,
                                                sf640, sf1024, sf1280, sf2048,
                                                sf2560},                            -- default FFS
        shortDRX                            SEQUENCE {
            shortDRX-Cycle                      INTEGER (0),            -- type,range,default FFS
            drxShortCycleTimer                  INTEGER (1..16)         -- type,range,default FFS
        }       OPTIONAL
    }       OPTIONAL,
    timeAlignmentTimer                      ENUMERATED {
                                                sf500, sf1280, sf2560, sf5120, sf10240,
                                                infinity, spare2, spare1}       DEFAULT sf500,
    phr-Configuration                   SEQUENCE {
        periodicPHR-Timer                   ENUMERATED {sf10, sf20, sf50, sf100, sf200,
                                                        sf1000, infinity, spare1},
        prohibitPHR-Timer                   ENUMERATED {sf0, sf100, sf200, sf1000},
        dl-PathlossChange                   ENUMERATED {dB1, dB3, dB6, infinity}
    }       OPTIONAL,  -- need OC
    ...
}

-- ASN1STOP
```

***MAC-MainConfiguration* field descriptions**
maxHARQ-Tx Parameter: *max-HARQ-Tx* [36.321]. If absent in the *RRCConnectionSetup* message, the default value as defined in 9.2.1.1 applies.
semiPersistSchedIntervalDL Semi-persistent scheduling interval in downlink. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. For TDD, this parameter should be round to the nearest integer (of 10 sub-frames) towards zero, e.g. sf10 corresponds to 10 sub-frames, sf32 corresponds to 30 sub-frames, sf128 corresponds to 120 sub-frames.
semiPersistSchedIntervalUL Semi-persistent scheduling interval in uplink. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. For TDD, this parameter should be round to the nearest integer (of 10 sub-frames) towards zero, e.g. sf10 corresponds to 10 sub-frames, sf32 corresponds to 30 sub-frames, sf128 corresponds to 120 sub-frames.
periodicBSR-Timer Parameter: *PERIODIC_BSR_TIMER* [36.321]. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on.
ttiBundling Configures TTI bundling on and off. Can be configured for FDD and for TDD only for configurations 0, 1 and 6.
drx-StartOffset Parameter: *DRX Start Offset* [36.321]. Value in number of sub-frames. In TDD, this can point to a DL or UL sub-frame
onDurationTimer Parameter: *On Duration Timer* [36.321]. Value in number of PDCCH sub-frames. Default value is [FFS]. Value psf1 corresponds to 1 PDCCH subframe, psf2 corresponds to 2 PDCCH sub-frames and so on.
drx-InactivityTimer Parameter: *DRX Inactivity Timer* [36.321]. Value in number of PDCCH sub-frames. Default value is [FFS]. Value psf1 corresponds to 1 PDCCH subframe, psf2 corresponds to 2 PDCCH sub-frames and so on.
drx-RetransmissionTimer Parameter: *DRX Retransmission Timer* [36.321]. Value in number of PDCCH sub-frames. Default value is [FFS].
longDRX-Cycle Long DRX cycle in [36.321]. Value in number of sub-frames. Default value is [FFS]. If shortDRX-Cycle is configured, the value shall be a multiple of the shortDRX-Cycle value. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 subframes and so on.
shortDRX-Cycle Short DRX cycle in [36.321]. Value in [FFS]. Default value is [FFS].
drxShortCycleTimer Parameter: *DRX Short Cycle Timer* [36.321]. Value in multiples of shortDRX-Cycle. Default value is [FFS]. A value of 1 corresponds to shortDRX-Cycle, a value of 2 corresponds to 2 * shortDRX-Cycle and so on.
timeAlignmentTimer Parameter: *Time Alignment Timer* [36.321]. Value in number of sub-frames. Default value is 500. Value sf500 corresponds to 500 sub-frames, sf1280 corresponds to 1280 sub-frames and so on.
periodicPHR-Timer Parameter: *PERIODIC_PHR_TIMER* [36.321]. Value in number of sub-frames. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.
prohibitPHR-Timer Parameter: *PROHIBIT PHR TIMER* [36.321]. Value in number of sub-frames. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.
dl-PathLossChange Parameter: *DL PathlossChange* [36.321]. Value in dB. Value dB1 corresponds to 1 dB, dB3 corresponds to 3 dB and so on.

Conditional presence	Explanation
ConnSU	The IE is mandatory default if the IE is included in *RRCConnectionSetup*; otherwise it is optionally present, continue.

– PDCP-Configuration

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

***PDCP-Configuration* information element**

```
-- ASN1START

PDCP-Configuration ::=              SEQUENCE {
    discardTimer                        ENUMERATED {
```

```
                                        ms50, ms100, ms150, ms300, ms500,
                                        ms750, ms1500, infinity
    }                                                   OPTIONAL,  -- Cond Setup, range FFS
    rlc-AM                              SEQUENCE {
        statusReportRequired                BOOLEAN,
        flushTimer                          ENUMERATED {
                                                ms10, ms50, ms100, ms150, ms200,
                                                ms250, ms500, ffs}          -- last value FFS
    }                                                   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
            },
            ...
        }
    },
    ...
}

-- ASN1STOP
```

***PDCP-Configuration* field descriptions**
pdcp-SN-Size Indicates the length of the PDCP Sequence Number as specified in [8].
maxCID Highest context ID number to be used in the uplink by the UE compressor.
profiles Profiles used by both compressor and decompressor in both UE and E-UTRAN. List of indices to ROHC profiles specified in [8]. Profile 0x0000 shall always be supported when the use of ROHC is configured. If two ROHC profile identifiers with the same 8 LSB"s are signalled, only the profile corresponding to the highest value should be applied

Conditional presence	Explanation
Setup	The field is mandatory present in case of radio bearer setup. Otherwise the field is not needed.
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 in case of reconfiguration of a PDCP entity at handover for a radio bearer configured with RLC AM. Otherwise the field is not needed.
Rlc-UM	The field is mandatory present upon setup of a PDCP entity for a radio bearer configured with RLC UM. Otherwise the field is not needed, continue.

– PDSCH-Configuration

The IE *PDSCH-Configuration* is used to specify the PDSCH configuration

***PDSCH-Configuration* information element**

```
-- ASN1START

PDSCH-ConfigCommon::=       SEQUENCE {
    referenceSignalPower                INTEGER (0),                    -- need, value range FFS
    p-b                                 ENUMERATED {pb0, pb1, pb2, pb3}
}
```

```
PDSCH-ConfigDedicated::=        SEQUENCE {
    p-a                                 ENUMERATED {
                                            dB-6, dB-3, dB-2, dB-1,
                                            dB0, dB1, dB2, dB3 }                    DEFAULT dB0
}

-- ASN1STOP
```

***PDSCH-Configuration* field descriptions**
referenceSignalPower Parameter: *Reference-signal power* [RAN1 specification; FFS]
p-a Parameter: P_A provides information about the exact power setting of the PDSCH transmission. dB-6 corresponds to -6 dB, dB-3 corresponds to -3 dB etc. See TS 36.213, 5.2 [x]
p-b Parameter: P_B offset between Type A and Type B PDSCH resource elements. Reference to a value in TS 36.213, 5.2. pb0 corresponds to 0, pb1 to 1 etc where the actual value depends of the number of antennas used.

– PHICH-Configuration

The IE *PHICH-Configuration* is used to specify the PHICH configuration.

***PHICH-Configuration* information element**

```
-- ASN1START

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

-- ASN1STOP
```

***PHICH-Configuration* field descriptions**
phich-Duration Parameter: PHICH-*Duration*, see TS 36.211, 6.9.3. Table 6.9.3-1 provides duration for MBSFN and non-MBSFN subframes.
phich-Resource Parameter: *Ng*, see TS 36.211, 6.9. OneSixth, half, one, two correspond to $N_g \in \{1/6, 1/2, 1, 2\}$

– PhysicalConfigDedicated

The IE *PhysicalConfigDedicated* is used to specify the UE specific physical channel configuration.

***PhysicalConfigDedicated* information element**

```
-- ASN1START

PhysicalConfigDedicated ::=         SEQUENCE {
    pdsch-Configuration                 PDSCH-ConfigDedicated,                          -- need FFS
    pucch-Configuration                 PUCCH-ConfigDedicated           OPTIONAL,       -- need OC
    uplinkPowerControl                  UplinkPowerControlDedicated     OPTIONAL,       -- need OC
    tpc-PDCCH-ConfigPUCCH               TPC-PDCCH-Configuration         OPTIONAL,       -- need OC
    tpc-PDCCH-ConfigPUSCH               TPC-PDCCH-Configuration         OPTIONAL,       -- need OC
    cqi-Reporting                       CQI-Reporting                   OPTIONAL,       -- need OC
    soundingRsUl-Config                 SoundingRsUl-ConfigDedicated    OPTIONAL,       -- need OC
    antennaInformation                  CHOICE {
        explicit                            AntennaInformationDedicated,
        default                             NULL
    }       OPTIONAL,                                                                   -- need OC
    schedulingRequestConfig             SchedulingRequest-Configuration OPTIONAL,       -- need OC
    ...
}

-- ASN1STOP
```

***PhysicalConfigDedicated* field descriptions**
antennaInformation The default antenna configuration is described in section 9.2.3
tpc-PDCCH-ConfigPUCCH PDCCH configuration for power control of PUCCH using format 3/3A, see TS 36.212 [22]. If the IE is not present and no *tpc-PDCCH-ConfigPUCCH* has been configured, then the function remains disabled.
tpc-PDCCH-ConfigPUSCH PDCCH configuration for power control of PUSCH using format 3/3A, see TS 36.212 [22]. If the IE is not present and no *tpc-PDCCH-ConfigPUSCH* has been configured, then the function remains disabled.

– PRACH-Configuration

The IE *PRACH-ConfigurationSIB* and IE *PRACH-Configuration* are used to specify the PRACH configuration in the system information and in the mobility control information, respectively.

***PRACH-Configuration* information elements**

```
-- ASN1START

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

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

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

-- ASN1STOP
```

***PRACH-Configuration* field descriptions**
rootSequenceIndex Parameter: *Root-sequence-index*, see TS 36.211, table 5.7.2-4 and 5.7.2-5
prach-ConfigurationIndex Parameter: *PRACH configuration index*. For FDD, see TS 36.211 [21, 5.7.1: table 5.7.1-1 and 5.7.1-2] (providing mapping of Preamble format and PRACH configuration to PRACH Configuration Index). For TDD, see TS 36.211 [21, table 5.7.1-3]
highSpeedFlag Parameter: FFS, see TS 36.211, 5.7.2.TRUE corresponds to Restricted set and FALSE to Unrestricted set
zeroCorrelationZoneConfig Parameter: N_{CS} configuration, see TS 36.211, [21, 5.7.2: table 5.7.2-2]

– PUCCH-Configuration

The IE *PUCCH-ConfigCommon* and IE *PUCCH-ConfigDedicated* are used to specify the common and the UE specific PUCCH configuration respectively.

***PUCCH-Configuration* information elements**

```
-- ASN1START

PUCCH-ConfigCommon ::=              SEQUENCE {
    pucch-ResourceSize                  ENUMERATED {ffs},               -- need, size, encoding FFS
    deltaShift                          ENUMERATED {ds1, ds2, ds3, spare1},
    deltaOffset                         ENUMERATED {do0, do1, do2, spare1},
    nRB-CQI                             ENUMERATED {ffs},               -- need, size, encoding FFS
    nCS-AN                              INTEGER (0..7),
```

```
    n1Pucch-AN                          ENUMERATED {ffs}                -- need, size, encoding FFS
}

PUCCH-ConfigDedicated ::=           SEQUENCE {
    simultaneousAckNackAndCQI           BOOLEAN,
    dataMcsCodeRateOffset               ENUMERATED {ffs},               -- need, size, encoding FFS
    n1Pucch-AN-Persistent               ENUMERATED {ffs}                -- need, size, encoding FFS
}

-- ASN1STOP
```

***PUCCH-Configuration* field descriptions**
pucch-ResourceSize
Parameter: $N_{RB}^{(2)}$, see TS 36.211, 5.4].
deltaShift
Parameter: Δ_{shift}, see 36.211, 5.4.1, where ds1 corresponds to value 1 ds2 to 2 etc.
deltaOffset
Parameter: $\delta_{offset\ shift}$ see TS 36.211, 5.4.1, where do0 corresponds to value 0, do1 to1 and do2 corresponds to value 2. Maximum deltaOffset = deltaShift
nRB-CQI
Parameter: N^{CQI}_{RB}[RAN1 specification; FFS]
nCS-An
Parameter: $N_{cs}^{(1)}$ see TS 36.211, 5.4, where ncs0 corresponds to value 0; ncs1 corresponds to value 1 etc.
n1Pucch-AN
Parameter: $N_{PUCCH}^{(1)}$ see TS 36.213, 10.1
simultaneousAckNackAndCQI
Parameter: *Simultaneous transmission of Ack/Nack and CQI.* TRUE indicates that simultaneous transmission of ACK/NACK and CQI is allowed. [RAN1 specification; FFS]
dataMcsCodeRateOffset
Parameter: Data_MCS_to_control_code_rate_offset [RAN1 specification; FFS]
n1Pucch-AN-Persistent
Parameter: $n_{PUCCH}^{(1)}$ see TS 36.213, 10.1

– PUSCH-Configuration

The IE *PUSCH-Configuration* is used to specify the PUSCH configuration

***PUSCH-Configuration* information element**

```
-- ASN1START

PUSCH-Configuration ::=             SEQUENCE {
    pusch-ConfigBasic                   SEQUENCE {
        parameterM                          ENUMERATED {pm2, pm3, pm4},
        hoppingMode                         ENUMERATED {interSubFrame, intraSubFrame}
    },
    ul-ReferenceSignalsPUSCH            UL-ReferenceSignalsPUSCH
}

-- ASN1STOP
```

***PUSCH-Configuration* field descriptions**
parameterM
Parameter: N_{sb} see TS 36.211, 5.3.4 where pm2 corresponds to value 2 etc.
hoppingMode
Parameter: *FFS* see TS 36.211, 5.3.4.

– 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 (1..64),
    ra-ResourceIndex                    INTEGER (0..5)          OPTIONAL
}

-- ASN1STOP
```

RACH-ConfigDedicated field descriptions
ra-PreambleIndex
Explicitly signalled Random Access Preamble in [36.321].
ra-ResourceIndex
Explicitly signalled PRACH resource in [36.321]. Frequency resource index in [36.211]. Only applicable to TDD

– RACH-ConfigCommon

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

***RACH-ConfigCommon* information element**

```
-- ASN1START

RACH-ConfigCommon ::=       SEQUENCE {
    preambleInformation                 SEQUENCE {
        numberOfRA-Preambles                ENUMERATED {
                                                n4, n8, n12, n16 ,n20, n24, n28,
                                                n32, n36, n40, n44, n48, n52, n56,
                                                n60, n64}           DEFAULT n64,
        sizeOfRA-PreamblesGroupA            ENUMERATED {
                                                n4, n8, n12, n16 ,n20, n24, n28,
                                                n32, n36, n40, n44, n48, n52, n56,
                                                n60, n64}           OPTIONAL
    },
    powerRampingParameters              SEQUENCE {
        powerRampingStep                    ENUMERATED {dB0, dB2,dB4, dB6},      -- default FFS
        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}     DEFAULT dBm-104
    },
    ra-SupervisionInformation           SEQUENCE {
        preambleTransMax                    ENUMERATED {
                                                n1, n2, n3, n4, n5, n6, n7, n8, n10,
                                                spare7, spare6, spare5, spare4, spare3,
                                                spare2, spare1},                --  default FFS
        ra-ResponseWindowSize               ENUMERATED {
                                                sf2, sf3, sf4, sf5, sf6, sf7,
                                                sf8, sf10},                     -- default FFS
        mac-ContentionResolutionTimer       ENUMERATED {
                                                sf8, sf16, sf24, sf32, sf40, sf48,
                                                sf56, sf64}                     -- default FFS
    },
    maxHARQ-Msg3Tx                      INTEGER (1..8),                         -- default FFS
    partitionPLThreshold                INTEGER (0)         OPTIONAL,           -- range FFS
    ...
}

-- ASN1STOP
```

RACH-ConfigCommon field descriptions
numberOfRA-Preambles Number of non-dedicated random access preambles [36.321]. Value is an integer. Default value is 64. Value n4 corresponds to 4, n8 corresponds to 8 and so on.
sizeOfRA-PreamblesGroupA Size of the random access preambles group A [36.321]. Value is an integer. If the parameter is not signalled, the value is equal to *numberOfRA-Preambles*. Value n4 corresponds to 4, n8 corresponds to 8 and so on.
powerRampingStep Parameter: *POWER_RAMP_STEP* [36.321]. Value in dB. Default value is [FFS]. Value dB0 corresponds to 0 dB, dB2 corresponds to 2 dB and so on.
preambleInitialReceivedTargetPower Parameter: *PREAMBLE_INITIAL_RECEIVED_TARGET_POWER* [36.321]. Value in dBm. Default value is -104 dBm. Value dBm-120 corresponds to -120 dBm, dBm-118 corresponds to -118 dBM and so on.
preambleTransMax Parameter: *PREAMBLE_TRANS_MAX* [36.321]. Value is an integer. Default value is [FFS]. Value n1 corresponds to 1, n2 corresponds to 2 and so on.
ra-ResponseWindowSize Duration of the RA response window [RA_WINDOW_BEGIN — RA_WINDOW_END] [36.321]. Value in subframes. Default value is [FFS]. Value sf2 corresponds to 2 subframes, sf3 corresponds to 3 subframes and so on.
mac-ContentionResolutionTimer Parameter: *Contention Resolution Timer* [36.321]. Value in subframes. Default value is [FFS]. Value sf8 corresponds to 8 subframes, sf16 corresponds to 16 subframes and so on.
maxHARQ-Msg3Tx Parameter: *max-HARQ-Msg3-Tx* [36.321], used for contention based random access. Value is an integer. Default value is [FFS].
partitionPLThreshold Parameter *PARTITION_PATHLOSS_THRESHOLD* [36.321]. Value range and step size are [FFS].

– RadioResource*ConfigCommon*

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-Configuration                  RACH-ConfigCommon,
    bcch-Configuration                  BCCH-Configuration,
    pcch-Configuration                  PCCH-Configuration,
    prach-Configuration                 PRACH-ConfigurationSIB,
    pdsch-Configuration                 PDSCH-ConfigCommon,
    pusch-Configuration                 PUSCH-Configuration,
    pucch-Configuration                 PUCCH-ConfigCommon,
    soundingRsUl-Config                 SoundingRsUl-ConfigCommon,
    uplinkPowerControl                  UplinkPowerControlCommon,
    ...
}

RadioResourceConfigCommon ::=       SEQUENCE {
    rach-Configuration                  RACH-ConfigCommon,
    prach-Configuration                 PRACH-Configuration,
    pdsch-Configuration                 PDSCH-ConfigCommon                  OPTIONAL,   -- Need OC
    pusch-Configuration                 PUSCH-Configuration,
    phich-Configuration                 PHICH-Configuration                 OPTIONAL,   -- Need OC
    pucch-Configuration                 PUCCH-ConfigCommon                  OPTIONAL,   -- Need OC
    soundingRsUl-Config                 SoundingRsUl-ConfigCommon,
    uplinkPowerControl                  UplinkPowerControlCommon            OPTIONAL,   -- Need OC
    antennaInformationCommon            AntennaInformationCommon            OPTIONAL,   -- Need OC
    tdd-Configuration                   TDD-Configuration                   OPTIONAL,   -- need OC
    ...
}

BCCH-Configuration ::=              SEQUENCE {
    modificationPeriodCoeff             ENUMERATED {n1, n2, n4, n8}
}

PCCH-Configuration ::=              SEQUENCE {
```

```
    defaultPagingCycle                  ENUMERATED {
                                            ms320, ms640, ms1280, ms2560},
    nB                                  ENUMERATED {
                                            fourT, twoT, oneT, halfT, quarterT, oneEightT,
                                            onSixteenthT, oneThirtySecondT}
}
-- ASN1STOP
```

***RadioResourceConfigCommon* field descriptions**

BCCH-Configuration
modificationPeriodCoeff Actual modification period, expressed in number of radio frames= modificationPeriodCoeff * defaultPagingCycle DIV 10ms. n1 corresponds to value 1, n2 corresponds to value 2, and so on.

PCCH-Configuration
defaultPagingCycle Default paging cycle, referred to as "T" in TS 36.304 [4]
nB Parameter: *Nb* is used to derive the number of paging groups according to TS 36.304 *[4]*

– RadioResourceConfigDedicated

The IE *RadioResourceConfigDedicated* is used to setup/modify/release RBs, to setup/modifiy transport channel configurations and to setup/modify physical channels

***RadioResourceConfigDedicated* information element**

```
-- ASN1START

RadioResourceConfigDedicated ::=        SEQUENCE {
    srb-ToAddModifyList                 SRB-ToAddModifyList         OPTIONAL,
    drb-ToAddModifyList                 DRB-ToAddModifyList         OPTIONAL,
    drb-ToReleaseList                   DRB-ToReleaseList           OPTIONAL,
    transportChannelConfig              CHOICE {
            explicit                        MAC-MainConfiguration,
            default                         NULL
    }       OPTIONAL,                                                       -- Cond Setup
    physicalConfigDedicated             PhysicalConfigDedicated     OPTIONAL,       -- Cond Misc
    ...
}

DTCH-LogicalChannelIdentity ::=         INTEGER (3..10)

SRB-ToAddModifyList ::=             SEQUENCE (SIZE (1..2)) OF SEQUENCE {
    srb-Identity                        INTEGER (1..2),
    rlc-Configuration                   CHOICE {
        explicit                            RLC-Configuration,
        default                             NULL
    }       OPTIONAL,                                                        -- Cond Setup
    logicalChannelConfig                CHOICE {
        explicit                            LogicalChannelConfig,
        default                             NULL
    }       OPTIONAL,                                                        -- Cond Setup
    ...
}

DRB-ToAddModifyList ::=             SEQUENCE (SIZE (1..maxDRB)) OF SEQUENCE {
    eps-BearerIdentity                  INTEGER (0..15),
    drb-Identity                        INTEGER (1..32),
    pdcp-Configuration                  PDCP-Configuration      OPTIONAL,       -- Cond Setup-HO
    rlc-Configuration                   RLC-Configuration       OPTIONAL,       -- Cond Setup
    rb-MappingInfo                      DTCH-LogicalChannelIdentity OPTIONAL,   -- Cond Setup
    logicalChannelConfig                CHOICE {
        explicit                            LogicalChannelConfig,
        default                             NULL
    }       OPTIONAL,                                                       -- Cond Setup
    ...
```

```
}

DRB-ToReleaseList ::=               SEQUENCE (SIZE (1..maxDRB)) OF SEQUENCE {
    drb-Identity                        INTEGER (1..32)
}

-- ASN1STOP
```

***RadioResourceConfigDedicated* field descriptions**
rlc-Configuration   SRB choice indicates whether the RLC configuration is set to the values signalled explicitly or to the values defined in the default RLC configuration table for SRB1. The default choice is only applicable for SRB1.
MAC-MainConfiguration   The default transport channel configuration is specified in 9.2.1.1 and applies only when the IE is included in the RRCConnectionSetup and RRCConnectionReestablishment messages as well as in the RRCConnectionReconfiguration when only SRB1 is (being) established
logicalChannelConfig   The default logical channel configuration is specified in 9.2.1.1 and applies only when the IE is included in the RRCConnectionSetup and RRCConnectionReestablishment messages as well as in the RRCConnectionReconfiguration when SRB1 or SRB2 is (being) established
DTCH-LogicalChannelIdentity   The logical channel identity for both UL and DL.

Conditional presence	Explanation
Setup	The IE is mandatory present if the corresponding SRB/DRB is being setup; otherwise the IE is optionally present, continue.
Setup-HO	The IE is mandatory present if the corresponding DRB is being setup and optionally present in case of handover, continue; otherwise the IE is not needed and the current configuration is maintained.
Misc	The IE is mandatory present upon connection establishment, handover and connection re-establishment; otherwise the IE is optionally present, continue.

– RLC-Configuration

The IE *RLC-Configuration* is used to specify the RLC configuration of SRBs and DRBs.

RLC-Configuration information element

```
-- ASN1START

RLC-Configuration ::=               CHOICE {
    am                                  SEQUENCE {
        ul-AM-RLC                           UL-AM-RLC,
        dl-AM-RLC                           DL-AM-RLC
    },
    um-Bi-Directional                   SEQUENCE {
        ul-UM-RLC                           UL-UM-RLC,
        dl-UM-RLC                           DL-UM-RLC
    },
    um-Uni-Directional-UL               SEQUENCE {
        ul-UM-RLC                           UL-UM-RLC
    },
    um-Uni-Directional-DL               SEQUENCE {
        dl-UM-RLC                           DL-UM-RLC
    },
    ...
}

UL-AM-RLC ::=                       SEQUENCE {
    t-PollRetransmit                    T-PollRetransmit,
    pollPDU                             PollPDU,
    pollByte                            PollByte,
    maxRetxThreshold                    ENUMERATED {
                                            t1, t2, t3, t4, t6, t8, t16, t32}
}

DL-AM-RLC ::=                       SEQUENCE {
    t-Reordering                        T-Reordering,
```

```
    t-StatusProhibit                    T-StatusProhibit
}

UL-UM-RLC ::=                           SEQUENCE {
    sn-FieldLength                      SN-FieldLength
}

DL-UM-RLC ::=                           SEQUENCE {
    sn-FieldLength                      SN-FieldLength,
    t-Reordering                        T-Reordering
}

SN-FieldLength ::=                      ENUMERATED {size5, size10}

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

PollPDU ::=                             ENUMERATED {
                                        p4, p8, p16, p32, p128, p256, p384, 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, spare7,
                                        spare6, spare5, spare4, spare3, spare2,
                                        spare1}

-- ASN1STOP
```

***RLC-Configuration* field descriptions**
sn-FieldLength Indicates the UM RLC SN field size in bits.
t-PollRetransmit Indicates the value of timer *T_poll_retransmit* [7] in milliseconds, ms5 means 5ms, ms10 means 10ms and so on.
pollPDU Indicates the value of constant *Poll_PDU* [7]. p4 corresponds to 4 PDUs, p8 to 8 PDUs and so on. pInfinity corresponds to infinite PDUs.
pollByte Indicates the value of constant *Poll_Byte* [7]. kb25 corresponds to 25 kBytes, kb50 to 50 kBytes and so on. kbInfinity corresponds to infinite kBytes.
maxRetxThreshold Indicates the value of the parameter Max_Retx_Threshold [7]. t1 corresponds to 1 retransmission, t2 to 2 retransmissions and so on.
t-Reordering Indicates the value of timer *T_reordering* [7] in milliseconds, ms0 means 0ms, ms5 means 5ms and so on.
t-StatusProhibit Indicates the value of timer *T_status_prohibit* [7] in milliseconds, ms0 means 0ms, ms5 means 5ms and so on.

– SchedulingRequest-Configuration

The IE *SchedulingRequest-Configuration* is used to specify the Scheduling Request related parameters

SchedulingRequest-Configuration information element

```
-- ASN1START

SchedulingRequest-Configuration ::= SEQUENCE {
    resource                            ENUMERATED {ffs},               -- need, size, encoding FFS
    periodicity                         ENUMERATED {
                                            ms5, ms10, ms20, ms40, ms80, msOff, spare2, spare1},
    offset                              INTEGER (0..79)
}

-- ASN1STOP
```

***SchedulingRequest-Configuration* field descriptions**
resource Parameter: Resource. [RAN1 specification; FFS]
periodicity Parameter: Periodicity. [RAN1 specification; FFS]. Value ms5 corresponds to 5 milliseconds, ms10 corresponds to 10 milliseconds and so on; msOff means infinite.

– SoundingRsUl-Config

The IE *SoundingRsUl-Config* is used to specify the uplink Sounding RS configuration.

SoundingRsUl-Config information element

```
-- ASN1START

SoundingRsUl-ConfigCommon ::=           SEQUENCE {
    srsBandwidthConfiguration           ENUMERATED {bw0, bw1, bw2, bw3, bw4, bw5, bw6, bw7},
    srsSubframeConfiguration            ENUMERATED {
                                            sc0, sc1, sc2, sc3, sc4, sc5, sc6, sc7,
                                            sc8, sc9, sc10, sc11, sc12, sc13, sc14, sc15},
    ackNackSrsSimultaneousTransmission  BOOLEAN
}

SoundingRsUl-ConfigDedicated ::=    SEQUENCE {
    srsBandwidth                        ENUMERATED {bw0, bw1, bw2, bw3},
    frequencyDomainPosition             ENUMERATED {ffs},                       -- 5-bit field FFS
    frequencyHoppingInformation         ENUMERATED {enabled, disabled},
    duration                            BOOLEAN,                                        -- need FFS
```

```
    periodicity                          ENUMERATED {ms2, ms5, ms10, ms20, ms40, ms80, ms160, ms320},
    subframeOffsetPusch-CQI-Config       ENUMERATED {ffs},                -- need, size, encoding FFS
    transmissionComb                     BOOLEAN,                                          -- need FFS
    cyclicShift                          ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7}

}


-- ASN1STOP
```

***SoundingRsUl-Config* field descriptions**
srsBandwidthConfiguration Parameter: SRS Bandwidth Configuration. See TS 36.211, 5.5.3.2 tables 1– 4. Actual configuration depends on UL bandwidth. bw0 corresponds to value 0, bw1 to value 1 and so on.
srsSubframeConfiguration Parameter: SRS SubframeConfiguration. See TS 36.211, 5.5.3.3. Table 5.5.3.3-1 applies for FDD whereas Table 5.5.3.3-2 applies for TDD. sc0 corresponds to value 0, sc1 to value 1 and so on.
srsAckNackSimultaneousTransmission Parameter: FFS. See TS 36.213, 8.2.
srsBandwidth Parameter: b, see TS 36.211 [21, 5.5.3.2: table 5.5.3.2-1].
frequencyDomainPosition Parameter: Frequency-domain position. [RAN1 specification; FFS]).
frequencyHoppingInformation Parameter: Frequency-hopping. See TS 36.213, 8.2.
duration Parameter: Duration. See TS 36.213, 8.2. FALSE corresponds to 'single' and value TRUE to 'indefinite'.
priodicity Parameter: Periodicity. TS 36.213, 8.2. ms2 corresponds to periodicity of 2ms etc.
subframeOffset Parameter: Subframe offset. [RAN1 specification; FFS]
transmissionComb Parameter: k_0' see TS 36.211 section 5.5.3.2.
cyclicShift Parameter: n_SRS. See TS 36.211, 5.5.3.1 where cs0 corresponds to 0 etc.

– TDD-Configuration

The IE *TDD-Configuration* is used to specify the TDD specific physical channel configuration.

***TDD-Configuration* information element**

```
-- ASN1START

TDD-Configuration ::=                SEQUENCE {
    subframeAssignment                   ENUMERATED {
                                             sa0, sa1, sa2, sa3, sa4, sa5, sa6},
    specialSubframePatterns              ENUMERATED {
                                             ssp0, ssp1, ssp2, ssp3, ssp4,ssp5, ssp6, ssp7,
                                             ssp8}                                    -- need FFS
}

-- ASN1STOP
```

***TDD-Configuration* field descriptions**
subframeAssignment Indicates DL/UL subframe configuration where sa0 point to Configuration 0, sa1 to Configuration 1 etc. as specified in the 36.211, table 4.2.2.
specialSubframePatterns Indicates Configuration as in Ref 36.211, table 4.2.1 where ssp0 point to Configuration 0, ssp1 to Configuration 1 etc

– TPC-Index

The IE *TPC-Index* is used to indicate the index of N or M dependent on the used DCI format, i.e. DCI format 3 or DCI format 3A.

TPC-Index information element

```
-- ASN1START

TPC-Index ::=                           CHOICE {
    indexOfFormat3                          INTEGER (1..15),
    indexOfFormat3A                         INTEGER (1..31)
}

-- ASN1STOP
```

***TPC-Index* field descriptions**
indexOfFormat3
Index of N when DCI format 3 is used. See TS 36.212 [22, 5.3.3.1.6]
IndexOfFormat3A
Index of M when DCI format 3A is used. See TS 36.212 [22, 5.3.3.1.7]

– TPC-PDCCH-Configuration

The IE *TPC-PDCCH-Configuration* 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 disabled or enabled with the IE.

TPC-PDCCH-Configuration information element

```
-- ASN1START

TPC-PDCCH-Configuration::=              CHOICE {
    disable             NULL,
    enable              SEQUENCE {
        tpc-RNTI                            BIT STRING (SIZE (16)),
        tpc-Index                           TPC-Index
    }
}

-- ASN1STOP
```

***TPC-PDCCH-Config* field descriptions**
tpc-RNTI
RNTI for power control using DCI format 3/3A, see TS 36.212 [22].
tpc-Index
Index of N or M, see TS 36.212 [22, 5.3.3.1.6 and 5.3.3.1.7], where N or M is dependent on the used DCI format.

– UL-ReferenceSignalsPUSCH

The IE *UL-ReferenceSignalsPUSCH* is used to specify parameters needed for the transmission on PUSCH (or PUCCH).

UL-ReferenceSignalsPUSCH information element

```
-- ASN1START

UL-ReferenceSignalsPUSCH ::=        SEQUENCE {
    groupHoppingEnabled                 BOOLEAN,
    groupAssignmentPUSCH                INTEGER (0..29),
    sequenceHoppingEnabled              BOOLEAN,
    dynamicCyclicShift                  CHOICE {
        dynamicallyAssigned                 NULL,
        semiStaticallyAssigned              CyclicShift
    }
}
```

```
CyclicShift ::=                     INTEGER (0)                             -- 3 or 4-bit field FFS

-- ASN1STOP
```

***UL-ReferenceSignalsPUSCH* field descriptions**
groupHoppingEnabled Parameter: FFS. See TS 36.211, 5.5.1.3.
groupAssignmentPUSCH Parameter: Δ_{SS} See TS 36.211, 5.5.1.3.
sequenceHoppingEnabled Parameter: FFS. See TS 36.211, 5.5.1.4.
dynamicCyclicShift Parameters: Dynamic-cyclic-shift [RAN1 specification; FFS]
cyclicShift Parameters: Cyclic-shift [RAN1 specification; FFS]

– 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                     SEQUENCE {
        persistentScheduling                INTEGER (-126..24),
        nonPersistentScheduling             INTEGER (-126..24)
    },
    alpha                               ENUMERATED {al0, al04, al05, al06, al07, al08, al09, al1},
    p0-NominalPUCCH                     INTEGER (-127..-96),
    deltaTFList-PUCCH                   DeltaTFList-PUCCH
}

UplinkPowerControlDedicated ::=     SEQUENCE {
    p0-UePUSCH                          SEQUENCE {
        persistentScheduling                INTEGER (-8..7),
        nonPersistentScheduling             INTEGER (-8..7)
    },
    deltaMCS-Enabled                        ENUMERATED {en0, en1},
    accumulationEnabled                     BOOLEAN,
    p0-uePUCCH                              INTEGER (-8..7),
    pSRS-Offset                             INTEGER (0..15)
}

DeltaTFList-PUCCH ::=                   SEQUENCE (SIZE (0..maxMCS-1)) OF            -- size FFS
                                            ENUMERATED {ffs}            -- (N-1) x 2-bit field FFS

-- ASN1STOP
```

***UplinkPowerControl* field descriptions**
p0-NominalPUSCH Parameter: $P_{0,NOMINAL\_PUSCH}$ See TS 36.213, 5.1.1.1, unit dBm step 1
alpha Parameter: α See TS 36.213, 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
p0-NominalPUCCH Parameter: $P_{0,\ NOMINAL;\ PUCCH}$ See TS 36.213, 5.1.2.1, unit dBm
DeltaTF-PUCCH Parameter: FFS See TS 36.211, 5.1.2.1.
p0-UePUSCH Parameter: $P_{0,UE;\ PUSCH}$ See TS 36.213, 5.1.1.1, unit dB
deltaMCS-Enabled Parameter: *Ks* See TS 36.213, 5.1.1.1. en0 corresponds to value 0 corresponding to state 'disabled'. en1 corresponds to value 1.25 corresponding to 'enabled'
accumulationEnabled Parameter: FFS See TS 36.213, 5.1.1.1. TRUE corresponds to 'enabled' whereas FALSE corresponds to 'disabled'
p0-UePUCCH Parameter: $P_{0,UE;\ PUCCH}$ See TS 36.213, 5.1.2.1.
pSRS-Offset Parameter: P_{SRS_OFFSET} See TS 36.213, 5.1.3.1. For Set1, the actual parameter value is pSRS-Offset value – 3. For Set2 the actual parameter value is -10.5 + 1.5*pSRS-Offset value.

6.3.3 Security control information elements

– CipheringAlgorithm

The IE *CipheringAlgorithm* is used %%

***CipheringAlgorithm* information element**

```
-- ASN1START

CipheringAlgorithm ::=              ENUMERATED {
                                        eea0, eea1, eea2, spare5, spare4, spare3,
                                        spare2, spare1, ...}

-- ASN1STOP
```

***CipheringAlgorithm* field descriptions**
%fieldIdentifier%

– IntegrityProtAlgorithm

The IE *IntegrityProtAlgorithm* is used %%

***IntegrityProtAlgorithm* information element**

```
-- ASN1START

IntegrityProtAlgorithm ::=          ENUMERATED {
                                        eia1, eia2, spare6, spare5, spare4, spare3,
                                        spare2, spare1, ...}

-- ASN1STOP
```

***IntegrityProtAlgorithm* field descriptions**
%fieldIdentifier%

– KeyIndicator

The IE *KeyIndicator* is used %%

KeyIndicator information element

```
-- ASN1START

KeyIndicator ::=                    SEQUENCE {
    -- Enter the IEs here.                                                  FFS
}

-- ASN1STOP
```

***KeyIndicator* field descriptions**
%fieldIdentifier%

Editor's note: FFS whether we use a number or a single bit.

– NextHopChainingCount

The IE NextHopChainingCount is used %%

NextHopChainingCount information element

```
-- ASN1START

NextHopChainingCount ::=                    SEQUENCE {
    -- Enter the IEs here.                                                  FFS
}

-- ASN1STOP
```

***NextHopChainingCount* field descriptions**
Parameter NCC: See TS 33.401 [32, 7.2.8.4]

– SecurityConfiguration

The IE *SecurityConfiguration* is used to configure AS integrity protection (CP) and AS ciphering (CP and UP).

SecurityConfiguration information element

```
-- ASN1START

SecurityConfiguration ::=           SEQUENCE {
    integrityProtAlgorithm              IntegrityProtAlgorithm          OPTIONAL,   -- Cond SMC
    cipheringAlgorithm                  CipheringAlgorithm              OPTIONAL,   -- Cond SMC
    keyIndicator                        KeyIndicator                    OPTIONAL,   -- Cond Handover
    nextHopChainingCount                NextHopChainingCount            OPTIONAL,   -- Cond Handover
    ...
}

-- ASN1STOP
```

***SecurityConfiguration* field descriptions**
integrityProtAlgorithm Indicates which integrity protection algorithm to use for SRBs
cipheringAlgorithm The same ciphering algorithm is assumed to be used for SRBs and DRBs
keyIndicator Indicates whether the UE should use the keys associated with latest available Kasme (details FFS).
nextHopChainingCount Parameter NCC: See TS 33.401 [32, 7.2.8.4]

Conditional presence	Explanation
Handover	The IE is mandatory present if the IE *MobilityControlInfo* is present in the *RRCConnectionReconfiguration* message or if the IE *SecurityConfiguration* is present in the *HandoverPreparationInformation* message; otherwise the IE is not needed.
SMC	The IE is mandatory present if the IE *SecurityConfiguration* is included in the *SecurityModeCommand* message; otherwise the IE is optional.

6.3.4 Mobility control information elements

– CDMA2000-Bandclass

The IE *CDMA2000-Bandclass* used to define the CDMA2000 band classes as defined in table 1.5-1 of [24].

***CDMA2000-Bandclass* information element**

```
-- ASN1START

CDMA2000-Bandclass ::=                  ENUMERATED {
                                            bc0, bc1, bc2, bc3, bc4, bc5, bc6, bc7, bc8,
                                            bc9, bc10, bc11, bc12, bc13, bc14, bc15, bc16,
                                            bc17, spare14, spare13, spare12, spare11, spare10,
                                            spare9, spare8, spare7, spare6, spare5, spare4,
                                            spare3, spare2, spare1, ...}

-- ASN1STOP
```

– CDMA2000-CarrierInfo

The IE *CDMA2000-CarrierInfo* used to provide the CDMA2000 carrier information.

***CDMA2000-CarrierInfo* information element**

```
-- ASN1START

CDMA2000-CarrierInfo ::=            SEQUENCE {
    bandClass                           CDMA2000-Bandclass,
    frequency                           INTEGER (0..2047)
}

-- ASN1STOP
```

***CDMA2000-CarrierInfo* field descriptions**
bandClass Identifies the CDMA2000 Frequency Band in which the CDMA2000 Carrier can be found, see [24].
frequency Identifies the carrier frequency within a CDMA2000 Band, see [33].

– CDMA2000-CellIdentity

The IE *CDMA2000-CellIdentity* identifies the PNOffset that represents the "Physical cell identity" in CDMA2000.

CDMA2000-CellIdentity information element

```
-- ASN1START

CDMA2000-CellIdentity ::=           INTEGER (0..maxPNOffset)                                -- FFS

-- ASN1STOP
```

CDMA2000-CellIdentity field descriptions
Void

– CDMA2000-NeighbourCellInformation

The IE *CDMA2000-NeighbourCellInformation* is used to describe a CDMA2000 1xRTT or a CDMA2000 HRPD neighboring cell.

CDMA2000-NeighbourCellInformation information element

```
-- ASN1START

CDMA2000-NeighbourCellInformation ::= SEQUENCE {
    cdma2000-CarrierInfo                CDMA2000-CarrierInfo,
    pnOffset                            CDMA2000-CellIdentity
}

-- ASN1STOP
```

CDMA2000-NeighborCellInformation field descriptions
CDMA2000-CarrierInfo Indicates frequency and band class of the cell.
pnOffset Identifies the CDMA 'Physical cell identity'.

– CDMA2000-SystemTimeInfo

The IE CDMA2000-SystemTimeInfo is %%

NOTE: The UE needs the CDMA system time with a certain level of accuracy for performing measurements as well as for communicating with the CDMA network (HRPD or 1xRTT).

Editor's note: Changes of CDMA system time should neither result in system information change notifications nor in a modification of the value tag in SI-1.

CDMA2000-SystemTimeInfo information element

```
-- ASN1START

CDMA2000-SystemTimeInfo ::=         SEQUENCE {
    cdma-EUTRA-Synchronisation          BOOLEAN,
    cdma-SystemTime                     CHOICE {
        cdma-SynchronousSystemTime          BIT STRING (SIZE (39)),
        cdma-AsynchronousSystemTime         BIT STRING (SIZE (49))
    }
}

-- ASN1STOP
```

***CDMA2000-SystemTimeInfo* field descriptions**
cdma-EUTRA-Synchronisation TRUE indicates that the networks are synchronised i.e. there is no drift in the timing between E-UTRA and CDMA.
cdma-SynchronousSystemTime CDMA system time corresponding to the SFN boundary at or after the ending boundary of the SI-window in which *SystemInformationBlockType8* is transmitted. If synchronized to CDMA system time then the size is 39 bits and the unit is 10 ms based on a 1.2288 Mcps chip rate.
cdma-AsynchronousSystemTime The CDMA system time corresponding to the SFN boundary at or after the ending boundary of the SI-Window in which SystemInformationBlockType8 is transmitted. If not synchronized then the size is 49 bits and the unit is [8 CDMA chips based on 1.2288 Mcps].

– 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
```

***CDMA2000-Type* field descriptions**
cdma2000-Type Type of CDMA2000 network: 1xRTT or HRPD.

– 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 SEQUENCE {
    cellIndex                               INTEGER (1..maxCellMeas)
}

-- ASN1STOP
```

– CellReselectionInfoCommon

The IE CellReselectionInfoCommon is used %%

***CellReselectionInfoCommon* information element**

```
-- ASN1START
```

```
CellReselectionInfoCommon ::=       SEQUENCE {
    -- Enter the IEs here.                                                          FFS
}

-- ASN1STOP
```

***CellReselectionInfoCommon* field descriptions**
%fieldIdentifier%

– CellReselectionInfoServingCell

The IE CellReselectionInfoServingCell is used %%

***CellReselectionInfoServingCell* information element**

```
-- ASN1START

CellReselectionInfoServingCell ::=  SEQUENCE {
    -- Enter the IEs here.                                                          FFS
}

-- ASN1STOP
```

***CellReselectionInfoServingCell* field descriptions**
%fieldIdentifier%

– ConnectedModeSpeedDependentScalingParameters

The IE *ConnectedModeSpeedDependentScalingParameters* contains scaling factors according to mobility states in active mode.

***ConnectedModeSpeedDependentScalingParameters* information element**

```
-- ASN1START

ConnectedModeSpeedDependentScalingParameters ::= SEQUENCE {
    timeToTriggerSF-Medium                          ENUMERATED {oDot25, oDot5, oDot75, lDot0},
    timeToTriggerSF-High                            ENUMERATED {oDot25, oDot5, oDot75, lDot0}
}

-- ASN1STOP
```

***ConnectedModeSpeedDependentScalingParameters* field descriptions**
timeToTriggerSF-Medium The IEs *timeToTrigger* in *ReportConfigEUTRA* and *ReportConfigInterRAT* is multiplied with this factor if the UE is in Medium Mobility state. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5 , oDot75 corresponds to 0.75 and so on.
timeToTriggerSF-High The IEs *timeToTrigger* in *ReportConfigEUTRA* and *ReportConfigInterRAT* is multiplied with this factor if the UE is in High Mobility state. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5 , oDot75 corresponds to 0.75 and so on.

– EUTRA-CarrierFreq

The IE *EUTRA-CarrierFreq* is used %%

***EUTRA-CarrierFreq* information element**

```
-- ASN1START
```

```
EUTRA-CarrierFreq ::=               SEQUENCE {
    earfcn-DL                           INTEGER (0..maxEARFCN),
    earfcn-UL                           INTEGER (0..maxEARFCN)              OPTIONAL    -- Cond FDD
}

-- ASN1STOP
```

***EUTRA-CarrierFreq* field descriptions**
earfcn-DL Defined in [36.101]
earfcn-UL Default value determined from TX-RX frequency specification specified in [36.101]

Conditional presence	Explanation
FDD	The IE is mandatory with default value (default duplex distance defined for the concerned band) in case of 'FDD'; otherwise the IE is not needed.

– EUTRA-DL-CarrierFreq

The IE EUTRA-DL-CarrierFreq is used %%

***EUTRA-DL-CarrierFreq* information element**

```
-- ASN1START

EUTRA-DL-CarrierFreq ::=                SEQUENCE {
    earfcn-DL                           INTEGER (0..maxEARFCN)
}

-- ASN1STOP
```

***EUTRA-DL-CarrierFreq* field descriptions**
earfcn-DL Defined in [36.101]

– GERAN-CarrierFreq

The IE *GERAN-CarrierFreq* is used %%

***GERAN-CarrierFreq* information element**

```
-- ASN1START

GERAN-CarrierFreq ::=           SEQUENCE {
    arfcn                       INTEGER (0..1023),
    bandIndicator                       ENUMERATED {dcs1800, pcs1900}
}

-- ASN1STOP
```

***GERAN-CarrierFreq* field descriptions**
arfcn GERAN ARFCN of BCCH carrier
bandIndicator Indicates how to interpret the ARFCN of BCCH carrier

– GERAN-CarrierFreqList

The IE *GERAN-CarrierFreqList* is used to provide a set of GERAN ARFCN values [44.005], which represents a list of GERAN frequencies.

GERAN-CarrierFreqList information element

```
-- ASN1START

GERAN-CarrierFreqList ::=       SEQUENCE {
    startingARFCN                       GERAN-ARFCN-Value,
    bandIndicator                       ENUMERATED {gsm1800, gsm1900},
    followingARFCNs                     CHOICE {
        explicitListOfARFCNs                ExplicitListOfARFCNs,
        equallySpacedARFCNs                 SEQUENCE {
            arfcn-Spacing                       INTEGER (1..8),
            numberOfFollowingARFCNs             INTEGER (0..31)
        },
        variableBitMapOfARFCNs              OCTET STRING (SIZE (1..16))
        -- Other options, e.g., the "Range N formats" in the Frequency List IE [44.018] are FFS
    }
}

ExplicitListOfARFCNs ::=            SEQUENCE (SIZE (0..31)) OF GERAN-ARFCN-Value

GERAN-ARFCN-Value ::=               INTEGER (0..1023)

-- ASN1STOP
```

***GERAN-CarrierFreqList* field descriptions**
startingARFCN The first ARFCN value, s, in the set.
bandIndicator Indicator to distinguish the GERAN frequency band in case of ARFCN values associated with either GSM 1800 or GSM 1900 carriers. For ARFCN values not associated with one of those bands, the indicator has no meaning.
followingARFCNs Field containing a representation of the remaining ARFCN values in the set.
explicitListOfARFCNs The remaining ARFCN values in the set are explicitly listed one by one.
arfcn-Spacing Space, d, between a set of equally spaced ARFCN values.
numberOfFollowingARFCNs The number, n, of the remaining equally spaced ARFCN values in the set. The complete set of (n+1) ARFCN values is defined as: {s, ((s + d) mod 1024), ((s + 2*d) mod 1024) ... ((s + n*d) mod 1024)}.
variableBitMapOfARFCNs Bitmap field representing the remaining ARFCN values in the set. The leading bit of the first octet in the bitmap corresponds to the ARFCN = ((s + 1) mod 1024), the next bit to the ARFCN = ((s + 2) mod 1024), and so on. If the bitmap consist of N octets, the trailing bit of octet N corresponds to ARFCN = ((s + 8*N) mod 1024). The complete set of ARFCN values consists of ARFCN = s and the ARFCN values, where the corresponding bit in the bitmap is set to "1".

– GERAN-CellIdentity

The IE *GERAN-CellIdentity* is used %%

GERAN-CellIdentity information element

```
-- ASN1START

GERAN-CellIdentity ::=              SEQUENCE {
    -- Enter other IEs here.                                                    FFS
}

-- ASN1STOP
```

***GERAN-CellIdentity* field descriptions**
%fieldIdentifier%

– GlobalCellIdentity

The IE *GlobalCellIdentity* specifies the global cell identity of the cell

GlobalCellIdentity information element

```
-- ASN1START

GlobalCellId-EUTRA ::=                  SEQUENCE {
    -- Enter the IEs here.                                                  FFS
}

GlobalCellId-GERAN ::=                  SEQUENCE {
    -- Enter the IEs here.                                                  FFS
}

GlobalCellId-UTRA ::=                   SEQUENCE {
    -- Enter the IEs here.                                                  FFS
}

-- ASN1STOP
```

GlobalCellIdentity field descriptions

– HRPD-PreRegistrationInfo

```
-- ASN1START

HRPD-PreRegistrationInfo ::=            SEQUENCE {
    hrpd-PreRegistrationAllowed             BOOLEAN,
    hrpd-PreRegistrationZoneId              INTEGER (0..255)    OPTIONAL,   -- cond PreRegAllowed
    hrpd-SecondaryPreRegistrationZoneIdList HRPD-SecondaryPreRegistrationZoneIdList     OPTIONAL
}

HRPD-SecondaryPreRegistrationZoneIdList ::= SEQUENCE (SIZE (1..2)) OF SEQUENCE {
    hrpd-SecondaryPreRegistrationZoneId     INTEGER (0..255)
}

-- ASN1STOP
```

***HRPD-PreRegistrationInfo* field descriptions**
HRPD-PreRegistrationAllowed TRUE indicates that a UE shall perform an HRPD pre-registration if the UE does not have a valid / current pre-registration.
HRPD-PreRegistrationZoneID Used to control when the UE should re-register.
HRPD-SecondaryPreRegistrationZoneIdList Used to control when the UE should re-register.

Conditional presence	Explanation
PreRegAllowed	The IE is mandatory in case the *hrpd-PreRegistrationAllowed* is set to "true"

– IdleModeMobilityControlInfo

The IE IdleModeMobilityControlInfo is used %%

IdleModeMobilityControlInfo information element

```
-- ASN1START

IdleModeMobilityControlInfo ::=     SEQUENCE {
    interFreqPriorityList               InterFreqPriorityList           OPTIONAL,
    geran-FreqPriorityList              GERAN-FreqPriorityList          OPTIONAL,
    utra-FDD-FreqPriorityList           UTRA-FDD-FreqPriorityList       OPTIONAL,
```

```
    utra-TDD-FreqPriorityList           UTRA-TDD-FreqPriorityList       OPTIONAL,
    hrpd-BandClassPriorityList          HRPD-BandClassPriorityList          OPTIONAL,
    oneXRTT-BandClassPriorityList       OneXRTT-BandClassPriorityList       OPTIONAL,
    t320                                ENUMERATED {
                                            min5, min10, min20, min30, min60, min120, min180,
                                            spare}                          OPTIONAL,
    ...
}

InterFreqPriorityList ::=           SEQUENCE (SIZE (1..maxFreq)) OF SEQUENCE {
    eutra-CarrierFreq                   EUTRA-DL-CarrierFreq,
    cellReselectionPriority             INTEGER (0..7)                          -- value range FFS
}

GERAN-FreqPriorityList ::=          SEQUENCE (SIZE (1..maxGNFG)) OF SEQUENCE {
    geran-BCCH-FrequencyGroup           GERAN-CarrierFreqList,
    geran-CellReselectionPriority       INTEGER (0..7)
}

UTRA-FDD-FreqPriorityList ::=       SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF SEQUENCE {
    utra-CarrierFreq                    UTRA-DL-CarrierFreq,
    utra-CellReselectionPriority        INTEGER (0..7)                          -- value range FFS
}

UTRA-TDD-FreqPriorityList ::=       SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF SEQUENCE {
    utra-CarrierFreq                    UTRA-DL-CarrierFreq,
    utra-CellReselectionPriority        INTEGER (0..7)                          -- value range FFS
}

HRPD-BandClassPriorityList ::=      SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF SEQUENCE {
    hrpd-bandClass                      CDMA2000-Bandclass,
    hrpd-CellReselectionPriority        INTEGER (0..7)
}

OneXRTT-BandClassPriorityList ::=   SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF SEQUENCE {
    oneXRTT-bandClass                   CDMA2000-Bandclass,
    oneXRTT-CellReselectionPriority     INTEGER (0..7)
}
-- ASN1STOP
```

***IdleModeMobilityControlInfo* field descriptions**
carrierFrequency Field description is FFS. (Could generic descriptions be used to cover multiple cases, i.e.: E-UTRA inter-frequency, GERAN and UTRA?)
cellReselectionPriority Field description is FFS.
t320 Timer T320 as described in section 7.3. Value minN corresponds to N minutes.
geran-BCCH-FrequencyGroup The list of GERAN carrier frequencies organised into one group of GERAN carrier frequencies.

– MobilityControlInformation

The IE *MobilityControlInformation* includes parameters relevant for network controlled mobility to/within E-UTRA.

Editor's note The UE is not aware if the handover involves a change of eNB, i.e. no UE behaviour is defined specific for the intra-eNB and the inter-eNB cases

Editor's note It is FFS if other system information may be provided in the message used to trigger handover, e.g. Semi-static shared channel configuration information, UE timers and constants

MobilityControlInformation information element

```
-- ASN1START

MobilityControlInformation ::=      SEQUENCE {
    targetCellIdentity                  PhysicalCellIdentity,
    eutra-CarrierFreq                   EUTRA-CarrierFreq                   OPTIONAL,   -- Need OC
    eutra-CarrierBandwidth              EUTRA-CarrierBandwitdh              OPTIONAL,   -- Need OC
    additionalSpectrumEmission          INTEGER (0..31)                     OPTIONAL,   -- Need OC
    t304                                ENUMERATED {
```

```
                                        ms50, ms100, ms150, ms200, ms500, ms1000,
                                        ms2000, spare1},
    radioResourceConfigCommon           RadioResourceConfigCommon,
    rach-ConfigDedicated                RACH-ConfigDedicated                OPTIONAL,   -- Need OD
    ...
}

EUTRA-CarrierBandwitdh ::=          SEQUENCE {
    dl-Bandwidth                        ENUMERATED {ffs}    OPTIONAL,   -- Need OC, 4-bit field FFS
    ul-Bandwitdh                        ENUMERATED {ffs}    OPTIONAL    -- Need OC, 4-bit field FFS
}

-- ASN1STOP
```

***MobilityControlInformation* field descriptions**
additionalSpectrumEmission Defined in [36.101]
t304 Timer T304 as described in section 7.3. ms50 corresponds with 50 ms, ms100 corresponds with 100 ms and so on.
dl-Bandwidth Parameter: *Downlink bandwidth* [36.101]
ul-Bandwidth Parameter: *Uplink bandwidth* [36.101]

– MobilityStateParameters

The IE *MobilityStateParameters* contains parameters to determine UE mobility state.

***MobilityStateParameters* information element**

```
-- ASN1START

MobilityStateParameters ::=         SEQUENCE {
    t-Evalulation                       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**
t-Evalulation The duration for evaluating criteria to enter mobility states. Corresponds to TCRmax in TS 36.304 [4]. In seconds, s30 corresponds to 30 s and so on.
t-HystNormal The additional duration for evaluating criteria to enter normal mobility state. Corresponds to $T_{CRmaxHyst}$ in TS 36.304 [4]. In seconds, s30 corresponds to 30 s and so on.
n-CellChangeMedium The number of cell changes to enter medium mobility state. Corresponds to N_{CR_M} in TS 36.304 [4].
n-CellChangeHigh The number of cell changes to enter high mobility state. Corresponds to N_{CR_H} in TS 36.304 [4].

– OneXRTT-CSFB-RegistrationInfo

```
-- ASN1START

OneXRTT-CSFB-RegistrationInfo ::=   SEQUENCE {
    oneXRTT-CSFB-RegistrationAllowed    BOOLEAN,
    oneXRTT-RegistrationParameters      OneXRTT-RegistrationParameters OPTIONAL -- cond CSFB-RegAlw
}
```

```
-- ASN1STOP
```

OneXRTT-CSFB-RegistrationInfo field descriptions
onexrtt-CSFBRegistrationAllowed
TRUE indicates that a UE in LTE_IDLE shall perform an 1xRTT pre-registration if the UE does not have a valid / current pre-registration.
Onexrtt-RegistrationParameters
Contains the parameters the handset will use to determine if it should perform a 1xRTT Registration/Re-Registration.

Conditional presence	Explanation
CSFB-RegAlw	**The IE is mandatory in case the *oneXRTTt-CSFB-RegistrationAllowed* is set to "*TRUE*"**

– OneXRTT-RegistrationParameters

```
-- ASN1START

OneXRTT-RegistrationParameters ::=      SEQUENCE {
    oneXRTT-SID                 BIT STRING (SIZE (15)),
    oneXRTT-NID                 BIT STRING (SIZE (16)),
    oneXRTT-MultipleSID         BOOLEAN,
    oneXRTT-MultipleNID         BOOLEAN,
    oneXRTT-HomeReg             BOOLEAN,
    oneXRTT-ForeignSIDReg       BOOLEAN,
    oneXRTT-ForeignNIDReg       BOOLEAN,
    oneXRTT-ParameterReg        BOOLEAN,
    oneXRTT-RegistrationPeriod  BIT STRING (SIZE (7)),
    oneXRTT-RegistrationZone    BIT STRING (SIZE (12)),
    oneXRTT-TotalZone           BIT STRING (SIZE (3)),
    oneXRTT-ZoneTimer           BIT STRING (SIZE (3))
}

-- ASN1STOP
```

ONEXRTT-RegistrationParameters field descriptions
oneXRTT-SID
Used along with the oneXRTT-NetworkID as a pair to control when the UE should Re-Register with the 1xRTT network.
oneXRTT-NID
Used along with the oneXRTT-SystemID as a pair to control when the UE should Re-Register with the 1xRTT network.
oneXRTT-MultipleSID
The 1xRTT Multiple SID storage indicator.
oneXRTT-MultipleNID
The 1xRTT Multiple NID storage indicator.
oneXRTT-HomeReg
The 1xRTT Home registration indicator.
oneXRTT-ForeignSIDReg
The 1xRTT SID roamer registration indicator.
oneXRTT-ForeignNIDReg
The 1xRTT NID roamer registration indicator.
oneXRTT-ParameterReg
The 1xRTT Parameter-change registration indicator.
oneXRTT-RegistrationPeriod
The 1xRTT Registration period.
oneXRTT-RegistrationZone
The 1xRTT Registration zone.
oneXRTT-TotalZone
The 1xRTT Number of registration zones to be retained.
oneXRTT-ZoneTimer
The 1xRTT Zone timer length.

– PhysicalCellIdentity

The IE PhysicalCellIdentity is used %%

***PhysicalCellIdentity* information element**

```
-- ASN1START

PhysicalCellIdentity ::=            INTEGER (1..504)                    -- range to be confirmed FFS

-- ASN1STOP
```

***PhysicalCellIdentity* field descriptions**
Void

– PLMN-Identity

The IE *PLMN-Identity* identifies a Public Land Mobile Network. Further information regarding how to set the IE are specified in TS 23.003 [27].

***PLMN-Identity* information element**

```
-- ASN1START

PLMN-Identity ::=                   SEQUENCE {
    mcc                                 MCC                 OPTIONAL,                   -- Cond MCC
    mnc                                 MNC
}

MCC ::=                             SEQUENCE (SIZE (3)) OF
                                        MCC-MNC-Digit

MNC ::=                             SEQUENCE (SIZE (2..3)) OF
                                        MCC-MNC-Digit

MCC-MNC-Digit ::=                   INTEGER (0..9)


-- ASN1STOP
```

***PLMN-Identity* field descriptions**
mcc The first element contains the first MCC digit, the second element the second MCC digit and so on
mnc The first element contains the first MNC digit, the second element the second MNC digit and so on

Conditional presence	Explanation
MCC	In the first occurrence of the IE *PLMN-Identity* within the IE *PLMN-IdentityList* this IE is mandatory; otherwise it is optional and if not present it takes the same value as the mcc in the immediately preceding IE *PLMN-Identity*.This IE is mandatory when the IE *PLMN-Identity* is included within the IE *RegisteredMME*.

– RedirectionInformation

The IE *RedirectionInformation* is used to redirect the UE to another E-UTRA or an inter-RAT carrier frequency.

***RedirectionInformation* information element**

```
-- ASN1START


RedirectionInformation ::=          CHOICE {
    eutra-CarrierFreq                   EUTRA-DL-CarrierFreq,           -- anyting more needed FFS
```

```
    interRAT-target                     CHOICE {
        geran                               GERAN-CarrierFreq,
        utra                                UTRA-DL-CarrierFreq,
        cdma2000-HRPD                       CDMA2000-CarrierInfo,
        cdma2000-1xRTT                      CDMA2000-CarrierInfo,
        ...
    }
}

-- ASN1STOP
```

***RedirectionInformation* field descriptions**
GERAN-CarrierFreq Indicates frequency and band indicator of the cell.
UTRA-DL-CarrierFreq Indicates frequency of the cell.
CDMA2000-CarrierInfo Indicates frequency and band class of the cell.

– RegisteredMME

The IE *RegisteredMME* is used to identify the MME where the UE was registered.

RegisteredMME information element

```
-- ASN1START

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

-- ASN1STOP
```

***RegisteredMME* field descriptions**
plmn-Identity Indicates the PLMN identity of the registered MME.
mmegi Provides the Group Identity of the registered MME within the PLMN.
mmec Provides the MME identity within the MME group.

– SelectedPLMN-Identity

The IE *SelectedPLMN-Identity* is used to indicate the UE"s PLMN choice.

SelectedPLMN-Identity information element

```
-- ASN1START

SelectedPLMN-Identity ::=           INTEGER (1..6)

-- ASN1STOP
```

***SelectedPLMN-Identity* field descriptions**
SelectedPLMN-Identity 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

– TrackingAreaCode

The IE TrackingAreaCode is %%

TrackingAreaCode information element

```
-- ASN1START

TrackingAreaCode ::=                SEQUENCE {
    -- Enter other IEs here.                                                    FFS
}

-- ASN1STOP
```

TrackingAreaCode field descriptions
%fieldIdentifier%

– UTRA-CellIdentity

The IE UTRA-CellIdentity is %%

UTRA-CellIdentity information element

```
-- ASN1START

UTRA-FDD-CellIdentity ::=           SEQUENCE {
    primaryScramblingCodeFDD            INTEGER (0..511)
}

UTRA-TDD-CellIdentity ::=           SEQUENCE {
    primaryScramblingCodeTDD                INTEGER (0..127)
}

-- ASN1STOP
```

UTRA-CellIdentity field descriptions
primaryScramblingCodeFDD Primary scrambling code of the UTRA FDD cell, which corresponding to the Primary scrambling code in TS 25.331 [19].
primaryScramblingCodeTDD Primary scrambling code of the UTRA TDD cell, which corresponding to Cell Parameters ID in TS 25.331 [19].

– UTRA-DL-CarrierFreq

The IE *UTRA-CarrierFreq* is used %%

UTRA-DL-CarrierFreq information element

```
-- ASN1START

UTRA-DL-CarrierFreq ::=             SEQUENCE {
    uarfcn-DL                           INTEGER (0..16383)
}

-- ASN1STOP
```

UTRA-DL-CarrierFreq field descriptions
uarfcn-DL If FDD: the IE contains the downlink frequency (Nd) If TDD: the IE contains the (Nt)

6.3.5 Measurement information elements

– MeasGapConfig

The IE *MeasGapConfig* specifies the measurement gap configuration and controls activation/ deactivation of measurement gaps.

***MeasGapConfig* information element**

```
-- ASN1START

MeasGapConfig ::=                   SEQUENCE {
    gapActivation                       CHOICE {
        activate                            SEQUENCE {
            gapPattern                          ENUMERATED {gp1, gp2, spare2, spare1},
            startSFN                            INTEGER (0..1023),
            startSubframeNumber                 INTEGER (0..9)
        },
        deactivate                          NULL
    }
}

-- ASN1STOP
```

***MeasGapConfig* field descriptions**
gapActivation Used to activate/ deactivate the measurement gap pattern.
gapPattern Reference to a measurement gap pattern defined in TS 36.133 [16]. Value gp1 corresponds to gap pattern 1, gp2 to gap pattern 2 and so on.
startSFN Specifies the SFN when the measurement gap pattern starts.
startSubframeNumber Specifies the subframe number when the measurement gap pattern starts.

– MeasId

The IE *MeasId* is used to identify a measurement configuration, i.e., linking of a measurement object and a reporting configuration.

***MeasId* information element**

```
-- ASN1START

MeasId ::=                          INTEGER (1..maxMeasId)

-- ASN1STOP
```

***MeasId* field descriptions**
Void

– MeasObjectCDMA2000

The IE *MeasObjectCDMA2000* specifies information applicable for inter-RAT CDMA2000 neighbouring cells.

Editor"s note: Use of cell individual offset is FFS.

***MeasObjectCDMA2000* information element**

```
-- ASN1START

MeasObjectCDMA2000 ::=              SEQUENCE {
```

```
    cdma2000-Type                       CDMA2000-Type,
    cdma2000-CarrierInfo                CDMA2000-CarrierInfo,
    cdma2000-SearchWindowSize           INTEGER (0..15)                     OPTIONAL,   -- Need OC
    offsetFreq                          INTEGER (-15..15)                   DEFAULT 0,  -- range FFS
    cellsToRemoveList                   CellIndexList                       OPTIONAL,   -- Need OC
    cellsToAddModifyList                CDMA2000-CellsToAddModifyList       OPTIONAL,   -- Need OP
    cellForWhichToReportCGI             CDMA2000-CellIdentity               OPTIONAL,
    ...
}

CDMA2000-CellsToAddModifyList ::=   SEQUENCE (SIZE (1..maxCellMeas)) OF SEQUENCE {
    cellIndex                           INTEGER (1..maxCellMeas),                       -- FFS
    cellIdentity                        CDMA2000-CellIdentity
}

-- ASN1STOP
```

***MeasObjectCDMA2000* field descriptions**
cdma2000-Type The type of CDMA2000 network.
cdma2000-CarrierInfo Identifies CDMA2000 carrier frequency for which this configuration is valid.
cdma2000-SearchWindowSize Provides the search window size to be used by the UE for the neighbouring pilot, see [25].
offsetFreq Offset value applicable to the carrier frequency. Value in dB.
cellsToRemoveList List of cells to remove from the neighbouring cell list.
cellsToAddModifyList List of cells to add/ modify in the neighbouring cell list.
cellIndex Entry index in the neighbouring cell list.
cellIdentity CDMA2000 Physical cell identity of a cell in neighbouring cell list expressed as PNOffset.

– MeasObjectEUTRA

The IE *MeasObjectEUTRA* specifies information applicable for intra-frequency or inter-frequency E-UTRA neighbouring cells.

MeasObjectEUTRA information element

```
-- ASN1START

MeasObjectEUTRA ::=                 SEQUENCE {
    eutra-CarrierInfo                   EUTRA-DL-CarrierFreq,
    measurementBandwidth                MeasurementBandwidth            OPTIONAL,   -- Need FFS
    offsetFreq                          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, spare}    DEFAULT dB0,
    -- Neighbour cell list
    cellsToRemoveList                   CellIndexList               OPTIONAL,       -- Need OC
    cellsToAddModifyList                NeighCellsToAddModifyList   OPTIONAL,       -- Need OC
    -- Black list
    blackListedCellsToRemoveList        CellIndexList   OPTIONAL,                   -- Need OC
    blackListedCellsToAddModifyList     BlackListedCellsToAddModifyList OPTIONAL,   -- Need OC
    cellForWhichToReportCGI             PhysicalCellIdentity            OPTIONAL,
    ...
}

NeighCellsToAddModifyList ::=       SEQUENCE (SIZE (1..maxCellMeas)) OF SEQUENCE {
    cellIndex                           INTEGER (1..maxCellMeas),
    cellIdentity                        PhysicalCellIdentity,
    cellIndividualOffset                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, spare}
}

BlackListedCellsToAddModifyList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF SEQUENCE {
    cellIndex                           INTEGER (1..maxCellMeas),               -- value range FFS
    cellIdentity                        PhysicalCellIdentity
}

-- ASN1STOP
```

***MeasObjectEUTRA* field descriptions**
eutra-CarrierInfo Identifies E-UTRA carrier frequency for which this configuration is valid.
measurementBandwidth Measurement bandwidth common for all neighbouring cells on the frequency. The need for this IE is FFS (the original intention was that the IE would be mandatory for frequencies other than the serving one and optional for the serving frequency with absence indicating a default value)
offsetFreq Offset value applicable to the carrier frequency. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.
cellsToRemoveList List of cells to remove from the neighbouring cell list.
cellsToAddModifyList List of cells to add/ modify in the neighbouring cell list. If *eutra-CarrierInfo* identifies the E-UTRA carrier frequency of the serving cell and measurement event A3 is configured the list shall include the serving cell.
cellIndex Entry index in the neighbouring cell list.
physicalCellIdentity Physical cell identity of a cell in neighbouring cell list.
cellIndividualOffset Cell individual offset applicable to a specific neighbouring cell. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.
blackListedCellsToRemoveList List of cells to remove from the black list of cells.
blackListedCellsToAddModifyList List of cells to add/ modify in the black list of cells.
blackListedCellIndex Entry index in the black list of cells.
blackListedPhysicalCellIdentity Physical cell identity of a cell in the black list.

– MeasObjectGERAN

The IE *MeasObjectGERAN* specifies information applicable for inter-RAT GERAN neighbouring frequencies.

***MeasObjectGERAN* information element**

```
-- ASN1START

MeasObjectGERAN ::=                 SEQUENCE {
    geran-MeasFrequencyList             GERAN-MeasFrequencyList,
    offsetFreq                          INTEGER (-15..15)           DEFAULT 0,  -- value range FFS
    ncc-Permitted                       BIT STRING(SIZE (8))        OPTIONAL,
    cellForWhichToReportCGI             GERAN-CellIdentity          OPTIONAL,
    ...
}

GERAN-MeasFrequencyList ::=         SEQUENCE (SIZE (1..maxGNFG)) OF GERAN-CarrierFreqList

-- ASN1STOP
```

***MeasObjectGERAN* field descriptions**
geran-MeasFrequencyList Provides a list of neighbouring GERAN carrier frequencies defining the measurement object.
offsetFreq Offset value applicable to the GERAN carrier frequencies. Value in dB.
ncc-Permitted Field encoded as a bit map, where bit N is set to "0" if a BCCH carrier with NCC = N-1 is not permitted for monitoring and set to "1" if a BCCH carrier with NCC = N-1 is permitted for monitoring; N = 1 to 8; bit 1 of the bitmap is the leading bit of the bit string.

– MeasObjectId

The IE *MeasObjectId* used to identify a measurement object configuration.

MeasObjectId information element

```
-- ASN1START

MeasObjectId ::=                    INTEGER (1..maxObjectId)

-- ASN1STOP
```

***MeasObjectId* field descriptions**
Void

– MeasObjectUTRA

The IE *MeasObjectUTRA* specifies information applicable for inter-RAT UTRA neighbouring cells.

Editor's note: Use of cell individual offset and how FDD/ TDD and the UTRAN cell identity (primary scrambling code) are specified are FFS.

MeasObjectUTRA information element

```
-- ASN1START

MeasObjectUTRA ::=                  SEQUENCE {
    utra-CarrierFreq                    UTRA-DL-CarrierFreq,                                    -- FFS
    offsetFreq                          INTEGER (-15..15)           DEFAULT 0,  -- value range FFS
    cellsToRemoveList                   CellIndexList               OPTIONAL,           -- Need OC
    cellsToAddModifyList                CHOICE {
        cellsToAddModifyListUTRA-FDD        UTRA-FDD-CellsToAddModifyList,
        cellsToAddModifyListUTRA-TDD        UTRA-TDD-CellsToAddModifyList
    }                                                               OPTIONAL,           -- Need OC
    cellForWhichToReportCGI             CHOICE {
        utra-FDD                            UTRA-FDD-CellIdentity,
        utra-TDD                            UTRA-TDD-CellIdentity
    }                                                               OPTIONAL,
    ...
}

UTRA-FDD-CellsToAddModifyList ::=   SEQUENCE (SIZE (1..maxCellMeas)) OF SEQUENCE {
    cellIndex                           INTEGER (1..maxCellMeas),                               -- FFS
    cellIdentity                        UTRA-FDD-CellIdentity                                   -- FFS
}

UTRA-TDD-CellsToAddModifyList ::=   SEQUENCE (SIZE (1..maxCellMeas)) OF SEQUENCE {
    cellIndex                           INTEGER (1..maxCellMeas),                               -- FFS
    utra-TDD-CellIdentity               UTRA-TDD-CellIdentity                                   -- FFS
}

-- ASN1STOP
```

***MeasObjectUTRA* field descriptions**
utra-CarrierFreq Identifies UTRA carrier frequency for which this configuration is valid.
offsetFreq Offset value applicable to the UTRA carrier frequency. Value in dB.
cellsToRemoveList List of cells to remove from the neighbouring cell list.
cellsToAddModifyList List of cells to add/ modify in the neighbouring cell list.
cellIndex Entry index in the neighbouring cell list.
cellIdentity UTRA cell identity of a cell in neighbouring cell list.

– MeasuredResults

The IE *MeasuredResults* covers measured results for intra-frequency, inter-frequency and inter- RAT mobility.

Editor's note: It has been agreed to identify intra- and inter-frequency neighbours by their physical layer identity

***MeasuredResults* information element**

```
-- ASN1START

MeasuredResults ::=                 SEQUENCE {
    measId                              MeasId,
    measResultServing                   SEQUENCE {}                         OPTIONAL,   -- Need OP
                                                                                        -- FFS if MP
    mobilityMeasResults                 CHOICE {
        measResultListEUTRA                 MeasResultListEUTRA,
        measResultListUTRA                  MeasResultListUTRA,
        measResultListGERAN                 MeasResultListGERAN,
        measResultsCDMA2000                 MeasResultsCDMA2000,
        ...
    },
    ...
}

MeasResultListEUTRA ::=             SEQUENCE (SIZE (1..maxCellReport)) OF SEQUENCE {
    physicalCellIdentity                PhysicalCellIdentity,
    globalCellIdentity                  GlobalCellId-EUTRA                  OPTIONAL,   -- Need OP
    measResultEUTRA                     SEQUENCE {
        rsrpResult                          INTEGER (0..97)                 OPTIONAL,
        rsrqResult                          INTEGER (0..33)                 OPTIONAL,
        ...
    }
}

MeasResultListUTRA ::=              SEQUENCE (SIZE (1..maxCellReport)) OF SEQUENCE {
    utra-CellIdentity                   CHOICE {
        cellIentityFDD                      UTRA-FDD-CellIdentity,
        cellIentityTDD                      UTRA-TDD-CellIdentity
    },
    globalCellIdentity                  GlobalCellId-UTRA                   OPTIONAL,   -- Need OP
    measResultUTRA                      SEQUENCE {
        mode                                CHOICE {
            fdd                                 SEQUENCE {
                cpich-RSCP                          INTEGER (0..91)         OPTIONAL,
                cpich-EcN0                          INTEGER (0..49)         OPTIONAL,
                ...
            },
            tdd                                 SEQUENCE {
                pccpch-RSCP                         INTEGER (0..91),
                ...
            }                                   -- FFS
        }
    }
}

MeasResultListGERAN ::=             SEQUENCE (SIZE (1..maxCellReport)) OF SEQUENCE {
    geran-CarrierInfo                   SEQUENCE {},                                    -- FFS
    geran-CellIdentity                  GERAN-CellIdentity,
```

```
    globalCellIdentity                  GlobalCellId-GERAN                  OPTIONAL,   -- Need OP
    measResultGERAN                     SEQUENCE {
        rssi                                BIT STRING (SIZE (6)),
        ...
    }
}

MeasResultsCDMA2000 ::=             SEQUENCE {
    preRegistrationStatus               BOOLEAN,
    measResultListCDMA2000              MeasResultListCDMA2000
}

MeasResultListCDMA2000 ::=          SEQUENCE (SIZE (1..maxCellReport)) OF SEQUENCE {
    cdma2000-CellIdentity               CDMA2000-CellIdentity,
    measResultCDMA2000                  SEQUENCE {
        pilotStrenght                       INTEGER (0..63),
        ...
    }
}

-- ASN1STOP
```

***MeasuredResults* field descriptions**
measId Identifies the measurement identity for which the reporting is being performed.
measResultServing Measured result of the serving cell. FFS if mandatory or optional.
measResultListEUTRA List of measured results for the maximum number of reported best cells for an E-UTRA measurement identity.
measResultEUTRA Measured result of an E-UTRA cell.
RSRPResult Measured RSRP result of an E-UTRA cell. Integer value according to mapping table in [16], 30 spare values needed. The RSRPResult is only reported if configured by the eNB.
RSRQResult Measured RSRQ result of an E-UTRA cell Integer value according to mapping table in [16], 30 spare values needed. The RSRQResult is only reported if configured by the eNB.
measResultListUTRA List of measured results for the maximum number of reported best cells for a UTRA measurement identity.
measResultUTRA Measured result of a UTRA cell.
measResultListGERAN List of measured results for the maximum number of reported best cells or frequencies for a GERAN measurement identity.
measResultGERAN Measured result of a GERAN cell or frequency.
measResultsCDMA2000 *Contains the HRPD pre-registration status and the list of CDMA2000 measurements.*
preRegistrationStatus Set to TRUE if the UE is currently pre-registered with CDMA2000 HRPD
measResultListCDMA2000 List of measured results for the maximum number of reported best cells for a CDMA2000 measurement identity.
cdma2000-CellIdentity Identity of the CDMA2000 cell the results are for.
measResultCDMA2000 Measured result of a CDMA2000 cell. This is the CDMA Pilot Strength, the ratio of pilot power to total power in the signal bandwidth of a CDMA Forward or Reverse Channel. The UE CDMA Upper layers shall set this field to min (max (| -2 × 10 log10 PS |, 0), 64) where PS is the strength of the CDMA2000 pilot channel for the identified cell, see [34].
cpich-RSCP According to CPICH_RSCP in [27]. Thirty-six spare values.
cpich-EcN0 According to CPICH_Ec/No in [27]. Fourteen spare values.
pccpch-RSCP According to P-CCPCH_RSCP_LEV in [29]. Thirty-six spare values.
rssi GERAN Carrier RSSI. RXLEV is mapped to a value between 0 and 63, [28]. When mapping the RXLEV value to the RSSI bit string, the first/leftmost bit of the bit string contains the most significant bit.

– MeasurementBandwidth

The IE *MeasurementBandwidth* used to indicate measurement bandwidth defined by the parameter Transmission Bandwidth Configuration "N_{RB}" [36.104]. The values mbw6, mbw15, mbw25, mbw50, mbw75, mbw100 indicate 6, 15, 25, 50, 75 and 100 resource blocks respectively.

***MeasurementBandwidth* information element**

```
-- ASN1START

MeasurementBandwidth ::=                ENUMERATED {mbw6, mbw15, mbw25, mbw50, mbw75, mbw100}

-- ASN1STOP
```

***MeasurementBandwidth* field descriptions**
Void

– MeasurementConfiguration

The IE *MeasurementConfiguration* 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.

Editor's note: It has been agreed that the signalling shall support the addition, modification and removal (i.e. delta configuration) of individual measurement objects, reporting configurations and measurement identities.

Editor's note: It has been agreed to introduce a mechanism by which E-UTRAN can request the UE to report the CGI corresponding to an E-UTRA L1 identity (FFS for inter RAT) reported by the UE. The UE is only required to report the CGI if it is provided with sufficient 'inactive time'. Further details are FFS.

***MeasurementConfiguration* information element**

```
-- ASN1START

MeasurementConfiguration ::=        SEQUENCE {
    -- Measurement objects
    measObjectToRemoveList              MeasObjectToRemoveList              OPTIONAL,   -- Need OC
    measObjectToAddModifyList           MeasObjectToAddModifyList           OPTIONAL,   -- Need OC
    -- Reporting configurations
    reportConfigToRemoveList            ReportConfigToRemoveList            OPTIONAL,   -- Need OC
    reportConfigToAddModifyList         ReportConfigToAddModifyList         OPTIONAL,   -- Need OC
    -- Measurement identities
    measIdToRemoveList                  MeasIdToRemoveList                  OPTIONAL,   -- Need OC
    measIdToAddModifyList               MeasIdToAddModifyList               OPTIONAL,   -- Need OC
    -- Other parameters
    quantityConfig                      QuantityConfig                      OPTIONAL,   -- Need OC
    measGapConfig                       MeasGapConfig                       OPTIONAL,   -- Need OC
    s-Measure                           INTEGER (0)                         OPTIONAL, -- Need OC;FFS
    hrpd-PreRegistrationInfo            HRPD-PreRegistrationInfo            OPTIONAL,   -- Need OP
    mbsfn-NeighbourCellConfig           SEQUENCE {}                    OPTIONAL, -- 2-bit field FFS
    speedDependentParameters            SEQUENCE {
        mobilityStateParameters             MobilityStateParameters,
        speedDependentScalingParameters     ConnectedModeSpeedDependentScalingParameters
    }                                                                       OPTIONAL,   -- Need OC
    ...
}

MeasIdToRemoveList ::=              SEQUENCE (SIZE (1..maxMeasId)) OF SEQUENCE {
    measId                              MeasId
}

MeasIdToAddModifyList ::=           SEQUENCE (SIZE (1..maxMeasId)) OF SEQUENCE {
    measId                              MeasId,
    measObjectId                        MeasObjectId,
    reportConfigId                      ReportConfigId
}

MeasObjectToRemoveList ::=          SEQUENCE (SIZE (1..maxObjectId)) OF SEQUENCE {
```

```
    measObjectId                        MeasObjectId
}

MeasObjectToAddModifyList ::=       SEQUENCE (SIZE (1..maxObjectId)) OF SEQUENCE {
    measObjectId                        MeasObjectId,
    measObject                          CHOICE {
        measObjectEUTRA                     MeasObjectEUTRA,
        measObjectUTRA                      MeasObjectUTRA,
        measObjectGERAN                     MeasObjectGERAN,
        measObjectCDMA2000                  MeasObjectCDMA2000,
        ...
    }
}

ReportConfigToRemoveList ::=        SEQUENCE (SIZE (1..maxReportConfigId)) OF SEQUENCE {
    reportConfigId                      ReportConfigId
}

ReportConfigToAddModifyList ::=     SEQUENCE (SIZE (1..maxReportConfigId)) OF SEQUENCE {
    reportConfigId                      ReportConfigId,
    reportConfig                        CHOICE {
        reportConfigEUTRA                   ReportConfigEUTRA,
        reportConfigInterRAT                ReportConfigInterRAT
    }
}

-- ASN1STOP
```

***MeasurementConfiguration* field descriptions**
measObjectToRemoveList List of measurement objects to remove.
measObjectToAddModifyList List of measurement objects to add/ modify.
measObjectId Used to identify a measurement object configuration.
measObject Specifies measurement object configurations for E-UTRA, UTRA, GERAN, or CDMA2000 measurements.
reportConfigToRemoveList List of measurement reporting configurations to remove.
reportConfigToAddModifyList List of measurement reporting configurations to add/ modify.
reportConfigId Used to identify a measurement reporting configuration.
reportConfig Specifies measurement reporting configurations for E-UTRA, UTRA, GERAN, or CDMA2000 measurements.
measIdToRemoveList List of measurement identities to remove.
measIdToAddModifyList List of measurement identities to add/ modify.
measId Used to link a measurement object to a reporting configuration.
quantityConfig Specifies measurement quantities for UTRA, GERAN, or CDMA2000 and L3 filtering coefficients for E-UTRA, UTRA or GERAN measurements.
measGapConfig Used to configure measurement gap pattern and control activation/ deactivation of measurement gaps.
s-Measure Serving cell quality threshold controlling whether or not the UE is required to perform measurements of intra-frequency, inter-frequency and inter-RAT neighbouring cells. Value in dBm.
hrpd-PreRegistrationInfo The HRPD Pre-Registration Information tells the UE if it should pre-register with the HRPD network and identifies the Pre-registration zone to the UE.
mbsfn-NeighbourCellConfig Parameter: *Neighbour-cell configuration* [RAN1 spec; cf. RAN2-59: R2-073598; FFS]

– QuantityConfig

The IE *QuantityConfig* specifies the measurement quantities and filtering coefficients.

QuantityConfig information element

```
-- ASN1START

QuantityConfig ::=                  SEQUENCE {
    quantityConfigEUTRA                 QuantityConfigEUTRA                 OPTIONAL,   -- Need OC
    quantityConfigUTRA                  QuantityConfigUTRA                  OPTIONAL,   -- Need OC
    quantityConfigGERAN                 QuantityConfigGERAN                 OPTIONAL,   -- Need OC
    quantityConfigCDMA2000              QuantityConfigCDMA2000              OPTIONAL,   -- Need OC
    ...
}

QuantityConfigEUTRA ::=             SEQUENCE {
    filterCoefficientRSRP               FilterCoefficient                   OPTIONAL,       -- FFS
    filterCoefficientRSRQ               FilterCoefficient                   OPTIONAL        -- FFS
}

QuantityConfigUTRA ::=              SEQUENCE {
    measQuantityUTRA                    SEQUENCE {
        mode                                CHOICE {
            fdd                                 SEQUENCE {
                measQuantityUTRA-FDD                ENUMERATED {cpich-RSCP, cpich-EcN0}
            },
            tdd                                 SEQUENCE {
                measQuantityUTRA-TDD                ENUMERATED {pccpch-RSCP}
            }
        }
    },
    filterCoefficient                   FilterCoefficient
}

QuantityConfigGERAN ::=             SEQUENCE {
    measQuantityGERAN                   ENUMERATED {rssi},
    filterCoefficient                   FilterCoefficient
}

QuantityConfigCDMA2000 ::=          SEQUENCE {
    measQuantityCDMA2000                ENUMERATED {pilotStrength}
}

FilterCoefficient ::=                   ENUMERATED {
                                            fc0, fc1, fc2, fc3, fc4, fc5,
                                            fc6, fc7, fc8, fc9, fc11, fc13,
                                            fc15, fc17, fc19, spare1, ...}

-- ASN1STOP
```

***QuantityConfig* field descriptions**
quantityConfigEUTRA Specifies filter configurations for E-UTRA measurements.
quantityConfigUTRA Specifies quantity configurations for UTRA measurements.
measQuantityUTRA Measurement quantity used for UTRA measurements.
quantityConfigGERAN Specifies quantity configurations for GERAN measurements.
measQuantityGERAN Measurement quantity used for GERAN measurements.
quantityConfigCDMA2000 Specifies quantity configurations for CDMA2000 measurements.
measQuantityCDMA2000 Measurement quantity used for CDMA2000 measurements.
filterCoefficient Specifies the filtering coefficient.
filterCoefficientRSRP Specifies the filtering coefficient used for RSRP.
filterCoefficientRSRQ Specifies the filtering coefficient used for RSRQ.

– ReportConfigEUTRA

The IE *ReportConfigEUTRA* specifies criteria for triggering of an E-UTRA measurement reporting event. The E-UTRA measurement reporting events are labelled A*N* with *N* equal to 1, 2 and so on.

Event A1: Serving becomes better than absolute threshold;

Event A2: Serving becomes worse than absolute threshold;

Event A3: Neighbour becomes amount of offset better than serving;

Event A4: Neighbour becomes better than absolute threshold;

Event A5: Serving becomes worse than absolute threshold1 AND Neighbour becomes better than another absolute threshold2.

ReportConfigEUTRA information element

```
-- ASN1START

ReportConfigEUTRA ::=               SEQUENCE {
    triggerType                         CHOICE {
        event                               SEQUENCE {
            eventId                             CHOICE {
                eventA1                             SEQUENCE {
                    a1-Threshold                        INTEGER (0)             -- value range FFS
                },
                eventA2                             SEQUENCE {
                    a2-Threshold                        INTEGER (0)             -- value range FFS
                },
                eventA3                             SEQUENCE {
                    a3-Offset                           INTEGER (0)
                                                -- value range FFS but will include positive and negative values
                },
                eventA4                             SEQUENCE {
                    a4-Threshold                        INTEGER (0)             -- value range FFS
                },
                eventA5                             SEQUENCE {
                    a5-Threshold1                       INTEGER (0),            -- value range FFS
                    a5-Threshold2                       INTEGER (0)             -- value range FFS
                },
                ...
            },
            hysteresis                          INTEGER (0),                    -- value range FFS
            timeToTrigger                       INTEGER (0)                     -- value range FFS
        },
        periodical                              SEQUENCE {
            reportCGI                               BOOLEAN
        }
    },
    triggerQuantity                 ENUMERATED {rsrp, rsrq},
    reportQuantity                  ENUMERATED {sameAsTriggerQuantity, both},
    maxReportCells                  INTEGER (1..maxCellReport),
    reportInterval                  SEQUENCE {}                     OPTIONAL,   -- Cond Periodic
    reportAmount                    SEQUENCE {}                     OPTIONAL,   -- Need OP
    ...
}

-- ASN1STOP
```

***ReportConfigEUTRA* field descriptions**
eventId Choice of E-UTRA event triggered reporting criteria. ***aN-ThresholdM*** Threshold to be used in EUTRA measurement report triggering condition for event number aN. If multiple thresholds are defined for event number aN, the thresholds are differentiated by M. Value in dBm or dB, each corresponding to the case triggerQuantity is rsrp or rsrq, respectively
triggerQuantity The quantities used to evaluate the triggering condition for the event**.** The values rsrp and rsrq correspond to Reference Signal Received Power (RSRP) and Reference Signal Received Quality (RSRQ) [36.214].
hysteresis Hysteresis parameter for entering/ leaving measurement report triggering condition. Value in dB.
timeToTrigger Time during which specific criteria for the event needs to be met in order to trigger a measurement report. Value in seconds.
reportQuantity The quantities to be included in the measurement report**.** The value both means that both the rsrp and rsrq quantities are to be included in the measurement report
maxReportCells Max number of cells to include in the measurement report.
reportInterval If included, the UE performs periodical reporting with the indicated interval. Applicable for *triggerType* "*event*" as well as for *triggerType* "*periodical*". Value in seconds.
reportAmount Number of measurement reports in case of periodical reporting (if limited). Applicable for *triggerType* "*event*" as well as for *triggerType* "*periodical*". In case reportCGI is set to "TRUE" only value 1 applies. In case of the reporting configuration concerns a SON report of the strongest cells on the carrier, only value 1 applies. For the latter case, use of other values is FFS.

Conditional presence	Explanation
Periodic	This IE is mandatory in case *type* is set to "*periodical*"; otherwise it is optional

– ReportConfigId

The IE *ReportConfigId* is used to identify a measurement reporting configuration.

***ReportConfigId* information element**

```
-- ASN1START

ReportConfigId ::=                  INTEGER (1..maxReportConfigId)

-- ASN1STOP
```

***ReportConfigId* field descriptions**
Void

– 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: Serving becomes worse than absolute threshold1 AND Neighbour becomes better than another absolute threshold2.

The b1 and b2 event thresholds for CDMA are the CDMA 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 [25] for details.

ReportConfigInterRAT information element

```
-- ASN1START

ReportConfigInterRAT ::=            SEQUENCE {
    triggerType                         CHOICE {
        event                               SEQUENCE {
            eventId                             CHOICE {
                eventB1                             SEQUENCE {
                    b1-Threshold                        CHOICE {
                        b1-Threshold-CDMA2000               INTEGER (0..63),
                        b1-Threshold-UTRA                   INTEGER (0),        -- value range FFS
                        b1-Threshold-GERAN                  INTEGER (0)         -- value range FFS
                    }
                },
                eventB2                             SEQUENCE {
                    b2-Threshold1                       INTEGER (0),            -- value range FFS
                    b2-Threshold2                       CHOICE {
                        b2-Threshold2-CDMA2000              INTEGER (0..63),
                        b2-Threshold2-UTRA                  INTEGER (0),        -- value range FFS
                        b2-Threshold2-GERAN                 INTEGER (0)         -- value range FFS
                    }
                },
                ...
            },
            timeToTrigger                   INTEGER (0)                         -- value range FFS
        },
        periodical                              SEQUENCE {
            purpose                                 CHOICE {
                reportStrongestCells                    NULL,
                reportStrongestCellsForSON              NULL,
                reportCGI                               NULL
            }
        }
    },
    maxReportCells                      INTEGER (1..maxCellReport),
    reportInterval                      SEQUENCE {}                     OPTIONAL,   -- Cond Periodic
    reportAmount                        SEQUENCE {}                     OPTIONAL,   -- Need OP
    ...
}

-- ASN1STOP
```

ReportConfigInterRAT field descriptions
eventId Choice of inter-RAT event triggered reporting criteria.

bN-ThresholdM
Threshold to be used in inter RAT measurement report triggering condition for event number bN. If multiple thresholds are defined for event number bN, the thresholds are differentiated by M. Value in dBm or dB, depending on the measurement quantity of the inter RAT cell.

timeToTrigger Time during which specific criteria for the event needs to be met in order to trigger a measurement report.
purpose reportStrongestCellsForSON applies only in case *reportConfig* is linked to a *measObject* set to "*measObjectUTRA*" or "*measObjectCDMA2000*"
maxReportCells Max number of cells to include in the measurement report.
reportInterval If included, the UE performs periodical reporting with the indicated interval. Applicable for *triggerType* "*event*" as well as for *triggerType* "*periodical*". Value in seconds.
reportAmount Number of measurement reports in case of periodical reporting (if limited). Applicable for *triggerType* "*event*" as well as for *triggerType* "*periodical*". In case purpose is set to "reportCGI" or "reportStrongestCellsForSON" only value 1 applies. For the last case, use of other values is FFS.

Conditional presence	Explanation
Periodic	This IE is mandatory in case *type* is set to "*periodical*"; otherwise it is optional

6.3.6 Other information elements

– 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
```

C-RNTI field descriptions
Void

– EstablishmentCause

The IE *EstablishmentCause* is used %%

***EstablishmentCause* information element**

```
-- ASN1START

EstablishmentCause ::=              ENUMERATED {
                                        emergency, highPriorityAccess, mt-Access, mo-Signalling,
                                        mo-Data, spare3, spare2, spare1}

-- ASN1STOP
```

***EstablishmentCause* field descriptions**
EstablishmentCause
W.r.t. the cause value names: highPriorityAcces concerns AC11..AC15, "mt" stands for "Mobile Terminating" and "mo" for "Mobile Originating"

– IMSI

The IE *IMSI* contains an International Mobile Subscriber Identity. Further information regarding how to set the IE are specified in TS 23.003 [27].

IMSI information element

```
-- ASN1START

IMSI ::=                            SEQUENCE (SIZE (6..21)) OF IMSI-Digit

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

-- ASN1STOP
```

***IMSI* field descriptions**
IMSI
The first element contains the first IMSI digit, the second element the second IMSI digit and so on.

– InitialUE-Identity

The IE *InitialUE-Identity* is used to identify the UE in the contention based access at RRC connection establishment.

InitialUE-Identity information element

```
-- ASN1START

InitialUE-Identity ::=              CHOICE {
    s-TMSI                              S-TMSI,
    randomValue                         BIT STRING (SIZE (40))
}

-- ASN1STOP
```

***InitialUE-Identity* field descriptions**
s-TMSI
The temporary UE identity provided by the MME which uniquely identifies the UE within the tracking area, see TS 23.003 [27].
randomValue
Integer value in the range 0 to 2**40 – 1.

– MMEC

The IE *MMEC* identifies an MME within the scope of an MME Group within a PLMN.

MMEC information element

```
-- ASN1START

MMEC ::=                            BIT STRING (SIZE (8))

-- ASN1STOP
```

MMEC field descriptions
Void

– NAS-DedicatedInformation

The IE *NAS-DedicatedInformation* is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for this information.

***NAS-DedicatedInformation* information element**

```
-- ASN1START

NAS-DedicatedInformation ::=        OCTET STRING

-- ASN1STOP
```

NAS-DedicatedInformation field descriptions
NAS-DedicatedInformation
The first octet contains octet 1 of the NAS message, the second octet contains octet 2 of the NAS message and so on.

– PagingCause

The IE *PagingCause* is used %%

***PagingCause* information element**

```
-- ASN1START

PagingCause ::=                     ENUMERATED {
                                        -- Enter paging cause values here.                   FFS
                                        causeValue, ...}

-- ASN1STOP
```

PagingCause field descriptions
pagingCause
Field description is FFS.

– PagingUE-Identity

The IE *PagingUE-Identity* is used %%

***PagingUE-Identity* information element**

```
-- ASN1START

PagingUE-Identity ::=               CHOICE {
    s-TMSI                              S-TMSI,
    imsi                                IMSI,
    ...
    -- SA2 indicated that support of IMEI and TMSI, possibly with LAC/LAI, is FFS
}

-- ASN1STOP
```

***PagingUE-Identity* field descriptions**
s-TMSI The temporary UE identity provided by the MME which uniquely identifies the UE within the tracking area, see TS 23.003 [27].
imsi The globally unique permanent subscriber identity, see TS 23.003 [27].

– RAT-Type

The IE *RAT-Type* is used to indicate the type of radio access technology (RAT), including E-UTRA.

RAT-Type information element

```
-- ASN1START

RAT-Type ::=                        ENUMERATED {
                                        eutra, utran, geran, spare1, ...}

-- ASN1STOP
```

***RAT-Type* field descriptions**
Void

– ReestablishmentCause

The IE Ree*stablishmentCause* is used to indicate the reason for an attempt at connection reestablishment.

ReestablishmentCause information element

```
-- ASN1START

ReestablishmentCause ::=            ENUMERATED {
                                        reconfigurationFailure, handoverFailure,
                                        otherFailure, spare}

-- ASN1STOP
```

***ReestablishmentCause* field descriptions**
ReestablishmentCause Indicates the failure cause that triggered the re-establishment procedure.

– ReestabUE-Identity

The IE *ReestabUE-Identity* is used to identify the UE in the contention based access at RRC connection re-establishment.

ReestabUE-Identity information element

```
-- ASN1START

ReestabUE-Identity ::=              SEQUENCE {
    c-RNTI                              C-RNTI,
    physCellIdentity                    PhysicalCellIdentity,
    shortMAC-I                          BIT STRING (SIZE (16))
}

-- ASN1STOP
```

ReestabUE-Identity field descriptions
shortMAC-I Field description is FFS.
physCellIdentity The Physical Cell Identity of the cell the UE was connected to prior to the failure.

– ReleaseCause

The IE *ReleaseCause* is used to indicate the reason for releasing the RRC Connection.

***ReleaseCause* information element**

```
-- ASN1START

ReleaseCause ::=                ENUMERATED {loadBalancingTAUrequired,
                                            other,spare2, spare1 }

-- ASN1STOP
```

RRC-ReleaseCause field descriptions
RRC-ReleaseCause This IE indicates the reason for releasing the RRC connection to the UE so it can act if needed.

– 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
```

RRC-TransactionIdentifier field descriptions
Void

– S-TMSI

The IE *S-TMSI* contains an S-Temporary Mobile Subscriber Identity.

***S-TMSI* information element**

```
-- ASN1START

S-TMSI ::=                          SEQUENCE {
    mmec                                MMEC,
    m-TMSI                              BIT STRING (SIZE (32))
}

-- ASN1STOP
```

S-TMSI field descriptions
m-TMSI The first/leftmost bit of the bit string contains the most significant bit of the M-TMSI.

– UE-EUTRA-Capability

The IE UE-EUTRA-Capability is used %%

UE-EUTRA-Capability information element

```
-- ASN1START

UE-EUTRA-Capability ::=             SEQUENCE {
    accessStratumRelease                AccessStratumRelease,
    ue-Category                         INTEGER (1..16),                        -- value range FFS
    pdcp-Parameters                     PDCP-Parameters,
    phyLayerParameters                  PhyLayerParameters,
    rf-Parameters                       RF-Parameters,
    measurementParameters               MeasurementParameters,
    interRAT-Parameters                 SEQUENCE {
        utraFDD                             IRAT-UTRA-FDD-Parameters                OPTIONAL,
        utraTDD128                          IRAT-UTRA-TDD128-Parameters             OPTIONAL,
        utraTDD384                          IRAT-UTRA-TDD384-Parameters             OPTIONAL,
        utraTDD768                          IRAT-UTRA-TDD768-Parameters             OPTIONAL,
        geran                               IRAT-GERAN-Parameters                   OPTIONAL,
        cdma2000-HRPD                       IRAT-CDMA2000-HRPD-Parameters           OPTIONAL,
        cdma2000-1xRTT                      IRAT-CDMA2000-1xRTT-Parameters          OPTIONAL
    },
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

AccessStratumRelease ::=            ENUMERATED {
                                        rel8, spare7, spare6, spare5, spare4, spare3,
                                        spare2, spare1, ...}

PDCP-Parameters ::=                 SEQUENCE {
    supportedROHCprofiles               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}             DEFAULT cs16,
    ...
}

PhyLayerParameters ::=              SEQUENCE {
    ul-TxDiversitySupported             BOOLEAN,
    ue-SpecificRefSigsSupported         BOOLEAN
}

RF-Parameters ::=                   SEQUENCE {
    supportedEUTRA-BandList             SupportedEUTRA-BandList
}

SupportedEUTRA-BandList ::=         SEQUENCE (SIZE (1..maxBands)) OF SEQUENCE {
    eutra-Band                          INTEGER (1..64),
    halfDuplex                          BOOLEAN
}

MeasurementParameters ::=           SEQUENCE {
    eutra-BandList                      EUTRA-BandList
}

EUTRA-BandList ::=                  SEQUENCE (SIZE (1..maxBands)) OF SEQUENCE {
    interFreqEUTRA-BandList             InterFreqEUTRA-BandList,
    interRAT-BandList                   InterRAT-BandList       OPTIONAL
}

InterFreqEUTRA-BandList ::=         SEQUENCE (SIZE (1..maxBands)) OF SEQUENCE {
    interFreqNeedForGaps                BOOLEAN
}
```

```
InterRAT-BandList ::=               SEQUENCE (SIZE (1..maxBands)) OF SEQUENCE {
    interRAT-NeedForGaps                BOOLEAN
}

IRAT-UTRA-FDD-Parameters ::=        SEQUENCE {
    supportedUTRA-FDD-BandList          SupportedUTRA-FDD-BandList
}

SupportedUTRA-FDD-BandList ::=      SEQUENCE (SIZE (1..maxBands)) OF SEQUENCE {
    utra-FDD-Band                       ENUMERATED {
                                            bandI, bandII, bandIII, bandIV, bandV, bandVI,
                                            bandVII, bandVIII, bandIX, bandX, bandXI,
                                            bandXII, bandXIII, bandXIV, bandXV, bandXVI, ...}
}

IRAT-UTRA-TDD128-Parameters ::=     SEQUENCE {
    supportedUTRA-TDD128BandList        SupportedUTRA-TDD128BandList
}

SupportedUTRA-TDD128BandList ::=    SEQUENCE (SIZE (1..maxBands)) OF SEQUENCE {
    utra-TDD128Band                     ENUMERATED {
                                            a, b, c, d, e, f, g, h, i, j, k, l, m, n,
                                            o, p, ...}
}

IRAT-UTRA-TDD384-Parameters ::=     SEQUENCE {
    supportedUTRA-TDD384BandList        SupportedUTRA-TDD384BandList
}

SupportedUTRA-TDD384BandList ::=        SEQUENCE (SIZE (1..maxBands)) OF SEQUENCE {
    utra-TDD384Band                     ENUMERATED {
                                            a, b, c, d, e, f, g, h, i, j, k, l, m, n,
                                            o, p, ...}
}

IRAT-UTRA-TDD768-Parameters ::=     SEQUENCE {
    supportedUTRA-TDD768BandList        SupportedUTRA-TDD768BandList
}

SupportedUTRA-TDD768BandList ::=    SEQUENCE (SIZE (1..maxBands)) OF SEQUENCE {
    utra-TDD768Band                     ENUMERATED {
                                            a, b, c, d, e, f, g, h, i, j, k, l, m, n,
                                            o, p, ...}
}

IRAT-GERAN-Parameters ::=           SEQUENCE {
    supportedGERAN-BandList             SupportedGERAN-BandList,
    interRAT-PS-HO-ToGERAN              BOOLEAN
}

SupportedGERAN-BandList ::=         SEQUENCE (SIZE (1..maxBands)) OF SEQUENCE {
    geran-Band                          ENUMERATED {
                                            gsm450, gsm480, gsm850, gsm900P, gsm900E, gsm1800,
                                            gsm1900, spare1, ...}
}

IRAT-CDMA2000-HRPD-Parameters ::=   SEQUENCE {
    supportedHRPD-BandList              SupportedHRPD-BandList,
    cdma2000-HRPD-TxConfig              ENUMERATED {single, dual},
    cdma2000-HRPD-RxConfig              ENUMERATED {single, dual}
}

SupportedHRPD-BandList ::=          SEQUENCE (SIZE (0..maxCDMA-BandClass)) OF SEQUENCE {
    cdma2000-HRPD-Band                  CDMA2000-Bandclass
}

IRAT-CDMA2000-1xRTT-Parameters ::=  SEQUENCE {
    supported1xRTT-BandList             Supported1xRTT-BandList,
    cdma2000-1xRTT-TxConfig             ENUMERATED {single, dual},
    cdma2000-1xRTT-RxConfig             ENUMERATED {single, dual}
}

Supported1xRTT-BandList ::=         SEQUENCE (SIZE (0..maxCDMA-BandClass)) OF SEQUENCE {
    cdma2000-1xRTT-Band                 CDMA2000-Bandclass
}

-- ASN1STOP
```

Editor's note: The extension mechanisms for this IE need to be considered.

Editor's note: The following GSM band seem to be missing: GSM 710, GSM 750, GSM 810, GSM 900R.

***UE-EUTRA-Capability* field descriptions**
accessStratumRelease Set to rel8 in this version of the specification.
maxNumberROHC-ContextSessions cs2 corresponds with 2 (context sessions), cs4 corresponds with 4 and so on.
ue-Category UE category as defined in [5]. Set to values 1 to 5 in this version of the specification.
eutra-Band E-UTRA band as defined in [36.101].
halfDuplex If *halfDuplex* is set to true, only half duplex operation is supported for the band, otherwise full duplex operation is supported.

eutra-BandList
One entry corresponding to each supported E-UTRA band listed in the same order as in *supportedEUTRA-BandList*.
interFreqEUTRA-BandList
One entry corresponding to each supported E-UTRA band listed in the same order as in *supportedEUTRA-BandList*.
interFreqNeedForGaps
Indicates need for measurement gaps when operating on the E-UTRA band given by the entry in *eutraBandList* and measuring on the E-UTRA band given by the entry in *interFreqEUTRA-BandList*.
interRAT-BandList
One entry corresponding to each supported band of another RAT listed in the same order as in the *interRAT-Parameters*.
interRATNeedForGaps
Indicates need for DL measurement gaps when operating on the E-UTRA band given by the entry in *eutraBandList* and measuring on the inter-RAT band given by the entry in the *interRAT-Parameters*.
utra-FDD-Band
E-UTRA band as defined in TS 25.101 [17].
utra-TDD128Band
E-UTRA band as defined in TS 25.102 [18].
utra-TDD384Band
E-UTRA band as defined in TS 25.102 [18].
utra-TDD768Band
E-UTRA band as defined in TS 25.102 [18].
geran-Band
GERAN band as defined in TS 45.005 [20].
cdma2000-HRPD-Band
CDMA2000 HRPD band class.
cdma2000-1xRTT-Band
CDMA2000 1xRTT band class.

Editor's note: The IE *UE-EUTRA-Capability* does not include AS security capability information, since these are assumed to be the same as the NAS-security capabilities. Consequently it is also assumed that AS need not provide "man-in-the-middle" protection for the security capabilities, i.e., it is assumed that NAS provides this functionality.

– UE-RadioAccessCapRequest

The IE *UE-RadioAccessCapRequest* lists the RATs for which the UE is requested to transfer the UE radio access capabilities i.e. E-UTRA and/or other RATs, e.g., UTRA, GERAN or CDMA2000.

***UE-RadioAccessCapRequest* information element**

```
-- ASN1START

UE-RadioAccessCapRequest ::=        SEQUENCE (SIZE (1..maxRAT-Capabilities)) OF RAT-Type

-- ASN1STOP
```

UE-RadioAccessCapRequest field descriptions
%fieldIdentifier%

– UE-RelatedInformation

The IE *UE-RelatedInformation* is used to convey miscellaneous UE related information.

UE-RelatedInformation information element

```
-- ASN1START

UE-RelatedInformation ::=           SEQUENCE {
    newUE-Identity                      C-RNTI                          OPTIONAL,   -- Cond Handover
    ...
}

-- ASN1STOP
```

UE-RelatedInforamtion field descriptions
newUE-Identity Field description and need is FFS.

Conditional presence	Explanation
Handover	This IE should be mandatory present in case of handover, i.e., if the IE *MobilityControlInformation* is included, otherwise it is optional, continue (FFS).

– 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, ms400, ms600, ms1000, ms1500,
                                            ms2000, spare1},
    t301                                ENUMERATED {
                                            ms100, ms200, ms400, ms600, ms1000, ms1500,
                                            ms2000, spare1},                -- FFS, see eNote below
    t310                                ENUMERATED {
                                            ms0, ms50, ms100, ms200, ms500, ms1000, ms2000,
                                            spare},
    t311                                ENUMERATED {
                                            ms1000, ms3000, ms5000, ms10000, spare4,
                                            spare3, spare2, spare1},
    t312                                ENUMERATED {
                                            ms0, ms50, ms100, ms200, ms500, ms1000, ms2000,
                                            spare1},
    ...
}

-- ASN1STOP
```

Editor's note: It is FFS if t-301 is signalled separately or e.g. always uses the same value as t300.

Editor's note: The value range of t310 may be revisited when DRX impacts on physical layer problem monitoring are known.

UE-TimersAndConstants field descriptions
t3xy Timers are described in section 7.3. 0ms corresponds with 0 ms, 50ms corresponds with 50 ms and so on

6.4 RRC multiplicity and type constraints values

– Multiplicity and type constraints definitions

Editor"s note: A brief descriptive text to be added here (FFS).

```
-- ASN1START

maxAC                       INTEGER ::= 5    --
maxBands                    INTEGER ::= 1    -- Maximum number of bands listed in EUTRA UE caps  FFS
maxCDMA-BandClass           INTEGER ::= 31   -- Maximum value of the CDMA band classes
maxCellBlack                INTEGER ::= 16   -- Maximum number of blacklisted cells
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
maxCellMeas                 INTEGER ::= 1    -- Maximum number of neighbouring cells within a
                                             -- measurement object                                FFS
maxCellReport               INTEGER ::= 8    -- Maximum number of reported cells
maxCellUTRA                 INTEGER ::= 1    -- Maximum number of neighbouring UTRA cells        FFS
maxDRB                      INTEGER ::= 11   -- Maximum number of Data Radio Bearers
maxEARFCN                   INTEGER ::= 32767   -- Maximum value of EUTRA carrier fequency
maxFreq                     INTEGER ::= 8    -- Maximum number of EUTRA carrier frequencies
maxGERAN-Carrier            INTEGER ::= 32   -- Maximum number of GERAN carrier fequencies
maxGNFG                     INTEGER ::= 16   -- Maximum number of GERAN neighbour freq groups    FFS
maxMBSFN-Allocations        INTEGER ::= 8    -- Maximum number of MBSFN frame allocations with
                                             -- different offset
maxMCS-1                    INTEGER ::= 16   -- Maximim number of PUCCH formats (MCS)
maxMeasId                   INTEGER ::= 1    --                                                  FFS
maxObjectId                 INTEGER ::= 1    --                                                  FFS
maxPageRec                  INTEGER ::= 16   --
maxPNOffset                 INTEGER ::= 511  -- Maximum number of CDMA2000 PNOffsets
maxRAT-Capabilities         INTEGER ::= 8    -- Maximum number of interworking RATs (incl EUTRA)
maxReportConfigId           INTEGER ::= 1    --                                                  FFS
maxSIB                      INTEGER ::= 32   -- Maximum number of SIBs
maxSI-Message               INTEGER ::= 32   -- Maximum number of SI messages
maxUTRA-FDD-Carrier         INTEGER ::= 16   -- Maximum number of UTRA FDD carrier fequencies    FFS
maxUTRA-TDD-Carrier         INTEGER ::= 16   -- Maximum number of UTRA TDD carrier fequencies    FFS

-- ASN1STOP
```

Editor"s note: The value of maxDRB was selected to align with SA2.

Editor's note: A table with parameter descriptions should be considered as an alternative to the inline comments above. If there are more than a few words of comment, the code above gets rather messy.

– End of EUTRA-RRC-Definitions

```
-- ASN1START

END

-- ASN1STOP
```

7 Variables and constants

7.1 UE variables

Editor's note: To facilitate the specification of the UE behavioural requirements, UE variables are represented using ASN.1. Nevertheless, it is up to UE implementation how to store the variables.

– 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
    ConnectedModeSpeedDependentScalingParameters,
    CDMA2000-SystemTimeInfo,
    MeasId,
    MeasIdToAddModifyList,
    MeasObjectToAddModifyList,
    MobilityStateParameters,
    PhysicalCellIdentity,
    QuantityConfig,
    ReportConfigToAddModifyList,
    maxCellReport,
    maxMeasId
FROM EUTRA-RRC-Definitions;

-- ASN1STOP
```

– VarMeasurementConfiguration

The UE variable *VarMeasurementConfiguration* includes the accumulated configuration of the measurements to be performed by the UE, covering intra-frequency, inter-frequency and inter-RAT mobility related measurements as well as the measurement gap configuration.

VarMeasurementConfiguration UE variable

```
-- ASN1START

VarMeasurementConfiguration ::=     SEQUENCE {
    -- Measurement identities
    measIdList                          MeasIdToAddModifyList               OPTIONAL,
    -- Measurement objects
    measObjectList                      MeasObjectToAddModifyList           OPTIONAL,
    -- Reporting configurations
    reportConfigList                    ReportConfigToAddModifyList         OPTIONAL,
    -- Other parameters
    quantityConfig                      QuantityConfig                      OPTIONAL,
    s-Measure                           INTEGER (0)                         OPTIONAL,
    cdma2000-SystemTimeInfo             CDMA2000-SystemTimeInfo             OPTIONAL,
    mbsfn-NeighbourCellConfig           SEQUENCE {}                    OPTIONAL, -- 2-bit field FFS
    speedDependentParameters            SEQUENCE {
        mobilityStateParameters             MobilityStateParameters,
        speedDependentScalingParameters     ConnectedModeSpeedDependentScalingParameters
    }
}

-- ASN1STOP
```

– VarMeasurementReports

The UE variable *VarMeasurementReports* includes information about the measurements for which the triggering conditions have been met.

VarMeasurementReports UE variable

```
-- ASN1START

VarMeasurementReports ::=               SEQUENCE (SIZE (1..maxMeasId)) OF SEQUENCE {
    -- List of measurement that have been triggered
    measId                              MeasId,
    cellsToReportList                   CellsToReportList,
    numberOfReportsSent                 INTEGER
```

```
}

CellsToReportList ::=               SEQUENCE (SIZE (1..maxCellReport)) OF SEQUENCE {
    cellIdentity                        PhysicalCellIdentity
}

-- ASN1STOP
```

– Multiplicity and type constraints definitions

This section includes multiplicity and type constraints applicable (only) for UE variables.

```
-- ASN1START


-- ASN1STOP
```

– End of EUTRA-UE-Variables

```
-- ASN1START

END

-- ASN1STOP
```

7.2 Counters

Counter	Reset	Incremented	When reaching max value

7.3 Timers

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	Go to RRC_IDLE
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 *MobilityControlInformation* or reception of *MobilityFromEUTRACommand* message	Criterion for successful completion of handover or cell change order is met (the criterion is specified in the target RAT in case of inter-RAT)	Initiate the RRC connection re-establishment procedure
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
T310	Upon detecting physical layer problems	Upon recovery from physical layer problems, upon triggering the handover procedure and upon initiating the connection re-establishment procedure	If security is not activated: go to RRC_IDLE else: stop T312, if running, and initiate the connection re-establishment procedure
T311	Upon initiating the RRC connection re-establishment procedure	Selection of an E-UTRA cell or a cell using another RAT.	Enter RRC_IDLE
T312	Upon receiving a Random Access problem indication from MAC	Upon receiving an indication from MAC about Random Access problem recovery, upon triggering the handover procedure and upon initiating the connection re-establishment procedure	If security is not activated: go to RRC_IDLE else: stop T310, if running, and initiate the connection re-establishment procedure
T320	Upon receiving IE *t320*	Upon entering RRC_CONNECTED	Discard the cell reselection priority information provided by dedicated signalling.
T321	Upon receiving IE *measurementConfiguration* including a *reportConfig* including *reportCGI* set to "*TRUE*"	Upon receiving IE *measurementConfiguration* that includes removal of the *reportConfig* including *reportCGI* set to "*TRUE*"	Stop performing the related measurements

7.4 Constants

Constant	Usage

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.

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 and an extension (FFS).

RRC PDUs shall be mapped to and from PDCP SDUs (in case of DCCH) or RLC SDUs (in case of PCCH, BCCH or CCCH) upon transmission and reception as follows:

- when delivering an RRC PDU as an PDCP SDU to the PDCP layer for transmission, the first bit of the RRC PDU shall be represented as the first bit in the PDCP SDU and onwards; and

- when delivering an RRC PDU as an RLC SDU to the RLC layer for transmission, the first bit of the RRC PDU shall be represented as the first bit in the RLC SDU and onwards; and

- upon reception of an PDCP SDU from the PDCP layer, the first bit of the PDCP SDU shall represent the first bit of the RRC PDU and onwards; and

- upon reception of an RLC SDU from the RLC layer, the first bit of the RLC SDU shall represent the first bit of the RRC PDU and onwards.

8.3 Basic production

The 'basic production' is obtained by applying UNALIGNED PER to the abstract syntax value (the ASN.1 description) as specified in X.691. It always contains a multiple of 8 bits.

8.4 Extension

The following rules apply with respect to the use of protocol extensions:

- A transmitter compliant with this version of the specification shall, unless explicitly indicated otherwise on a PDU type basis, set the extension part empty. Transmitters compliant with a later version may send non-empty extensions;

- The receiver shall accept a message with any bit string in the extension part;
- A transmitter compliant with this version of the specification shall set spare bits to zero;

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

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	
prioritizedBitRate	Infinity		
logicalChannelGroup	0		

NOTE: Integrity protection is not used for the *RRCConnectionReestablishment* message

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

9.1.2 SRB configurations

9.1.2.1 SRB1

Parameters

Name	Value	Semantics description	Ver
RLC configuration			
rb-MappingInfo	1	These are specified values i.e. default values concern parameters for which a value may be signalled	

9.1.2.2 SRB2

Parameters

Name	Value	Semantics description	Ver
RLC configuration			
rb-MappingInfo	2	These are specified values i.e. default values concern parameters for which a value may be signalled	

9.2 Default radio configurations

9.2.1 SRB configurations

9.2.1.1 SRB1

Parameters

Name	Value	Semantics description	Ver
RLC configuration CHOICE	am		
ul-RLC-Config *>t-PollRetransmit* *>pollPDU* *>pollByte* *>maxRetxThreshold*	 45 Infinity Infinity 4		
dl-RLC-Config *>t-Reordering* *>t-StatusProhibit*	 35 0		
Logical channel configuration			
priority	1	Highest priority	
prioritizedBitRate	Infinity		
logicalChannelGroup	0		

9.2.1.2 SRB2

Parameters

Name	Value	Semantics description	Ver
RLC configuration CHOICE	am		
ul-RLC-Config *>t-PollRetransmit* *>pollPDU* *>pollByte* *>maxRetxThreshold*	 45 Infinity Infinity 4		
dl-RLC-Config *>t-Reordering* *>t-StatusProhibit*	 35 0		

Name	Value	Semantics description	Ver
Logical channel configuration			
priority	3		
prioritizedBitRate	Infinity		
logicalChannelGroup	0		

9.2.2 Default transport channel configuration

Parameters

Name	Value	Semantics description	Ver
MAC main configuration			
maxHARQ-tx	5	Fast loss detection	
semiPersistSchedIntervalDL	N/A (Absent)		
semiPersistSchedIntervalUL	N/A (Absent)		
periodicBSR-Timer	Infinity		
drx-Configuration	N/A (Absent)		

9.2.3 Default physical channel configuration

Parameters

Name	Value	Semantics description	Ver
Antenna Information Dedicated			
transmissionMode	tm1, tm2	For 1 antenna, single antenna transmission mode 1 is used as default. For 2 and 4 antennas transmission mode 2, corresponding to transmit diversity, is used as default.	
codebookSubsetRestriction	N/A		

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.

Editor's note: The use of extension markers is FFS.

10.2 RRC messages transferred across network nodes

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
    CellIdentity,
    MasterInformationBlock,
    MeasurementConfiguration,
    NextHopChainingCount,
    PhysicalCellIdentity,
    RadioResourceConfigDedicated,
    RRCConnectionReconfiguration,
    SecurityConfiguration,
    SystemInformationBlockType2,
    TDD-Configuration,
    UECapabilityInformation,
    UE-RelatedInformation
FROM EUTRA-RRC-Definitions;

-- ASN1STOP
```

– InterNode-Message

The *InterNode-Message* class is the set of RRC messages that may be sent across the X2 or the S1 interface.

```
-- ASN1START

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

InterNode-MessageType ::= CHOICE {
    c1                      CHOICE {
        interRAT-Message                        InterRAT-Message,
        handoverCommand                         HandoverCommand,
        handoverPreparationInformation          HandoverPreparationInformation,
        ueRadioAccessCapabilityInformation      UERadioAccessCapabilityInformation
    },
    messageClassExtension   SEQUENCE {}
}

-- ASN1STOP
```

10.2.1 INTER RAT MESSAGE

Inter-RAT message, e.g. a handover command

Transfer characteristics: tbs

***InterRAT-Message* message**

```
-- ASN1START

InterRAT-Message ::=                SEQUENCE {
    criticalExtensions                  CHOICE {
        c1                                  CHOICE{
            interRAT-Message-r8                 InterRAT-Message-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensions                  SEQUENCE {}
    }
}

InterRAT-Message-r8-IEs ::=         SEQUENCE {
    interRAT-Message                    OCTET STRING,
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

***InterRAT-Message* field descriptions**
interRAT-Message
E.g., the source eNB sends the handover command generated by the target RAN generates the entire RRC to the UE.

10.2.2 HANDOVER COMMAND

E-UTRA RRC handover command

Transfer characteristics: tbs

***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
        },
        criticalExtensions                  SEQUENCE {}
    }
}

HandoverCommand-r8-IEs ::=          SEQUENCE {
    handoverCommandMessage              OCTET STRING (CONTAINING RRCConnectionReconfiguration),
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

***HandoverCommand* field descriptions**
handoverCommandMessage
Target eNB generates the entire *RRCConnectionReconfiguration* message as signalled to the UE.

10.2.3 HANDOVER PREPARATION INFORMATION

E-UTRA RRC information used by the target eNB during handover preparation, including UE capability information

Transfer characteristics: tbs

***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
        },
        criticalExtensions                  SEQUENCE {}
    }
}

HandoverPreparationInformation-r8-IEs ::= SEQUENCE {
    as-Configuration                    AS-Configuration                    OPTIONAL,
    rrm-Configuration                   RRM-Configuration                   OPTIONAL,
    as-Context                          AS-Context,
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}
```

```
-- ASN1STOP
```

***HandoverPreparationInformation* field descriptions**
as-Configuration Radio resource configuration excluding physical layer information. Applicable in case of intra-E-UTRA handover.
rrm-Configuration Local E-UTRAN context used depending on the target node"s implementation, which is mainly used for the RRM purpose. FFS if applicable for Inter-RAT HO
as-Context Local E-UTRAN context required by the target node.

10.2.4 UE RADIO ACCESS CAPABILITY INFORMATION

UE radio access capability transfer, covering both upload & download

Transfer characteristics: tbs

***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
        },
        criticalExtensions                  SEQUENCE {}
    }
}

UERadioAccessCapabilityInformation-r8-IEs ::= SEQUENCE {
    ue-RadioAccessCapabilityInfo        OCTET STRING (CONTAINING UECapabilityInformation),
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

***UERadioAccessCapabilityInformation* field descriptions**
ue-RadioAccessCapabilityInfo Including E-UTRA, GERAN and UTRA radio access capabilities (separated).

10.3 IE definition

– AS-Configuration

The *AS-Configuration* IE contains information about RRC configuration information in the source cell which can be utilized by target cell after the handover is successfully performed or during the RRC connection re-establishment.

***AS-Configuration* information element**

```
-- ASN1START

AS-Configuration ::=                SEQUENCE {
    sourceMeasurementConfiguration      MeasurementConfiguration,
    sourceRadioResourceConfiguration    RadioResourceConfigDedicated,
    sourceSecurityConfiguration         SecurityConfiguration,
    sourceUE-RelatedInformation         UE-RelatedInformation,
    sourceMasterInformationBlock        MasterInformationBlock,
    sourceTDD-Configuration             TDD-Configuration,
    sourceSystemInformationBlockType2   SystemInformationBlockType2,
```

```
    ...
}

-- ASN1STOP
```

NOTE The AS-Configuration re-uses information elements primarily created to cover the 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-Configuration* field descriptions**
sourceMeasurementConfiguration Measurement configuration in the source cell. The measurement configuration for all measurements existing in the source cell when handover is triggered shall be included.
sourceRadioResourceConfiguation Radio configuration in the source cell. The radio resource configuration for all radio bearers existing in the source cell when handover is triggered shall be included.
sourceSecurityConfiguration xxx
sourceUE-RelatedInformation xxx
sourceMasterInformationBlock xxx
sourceTDD-Configuration xxx
sourceSystemInformationBlockType2 xxx

– AS-Context

The IE *AS-Context* is used to transfer local E-UTRAN context required by the target node.

AS-Context information element

```
-- ASN1START

AS-Context ::=                          SEQUENCE {
    ue-RadioAccessCapabilityInfo            OCTET STRING (CONTAINING UECapabilityInformation),
    ue-SecurityCapabilityInfo               OCTET STRING,
    reestablishmentInfo                     ReestablishmentInfo,
    securityContextInfo                     SecurityContextInfo
}

-- ASN1STOP
```

***AS-Context* field descriptions**
ue-RadioAccessCapabilityInfo Including E-UTRA, GERAN and UTRA radio access capabilities (separated)
ue-SecurityCapabilityInfo UE security capability information as specified in TS 36.401 [31].
reestablishmentInfo Including information needed for the RRC connection re-establishment
securityContextInfo including information needed for the target eNB to make KeNB, which is not included in the IE *SecurityConfiguration*.

– Key-eNodeB-Star

The IE *Key-eNodeB-Star* is used %%

Key-eNodeB-Star information element

```
-- ASN1START

Key-eNodeB-Star ::=                 SEQUENCE {
```

```
    -- Enter the IEs here.                                                    FFS
}

-- ASN1STOP
```

***Key-eNodeB-Star* field descriptions**
Parameter KeNB*: See TS 33.401 [32, 7.2.8.4]

– ReestablishmentInfo

The *ReestablishmentInfo* IE contains information needed for the RRC connection re-establishment.

ReestablishmentInfo information element

```
-- ASN1START

ReestablishmentInfo ::=             SEQUENCE {
    sourcePhysicalCellIdentity          PhysicalCellIdentity,
    sourceShortMAC-I                    BIT STRING (SIZE (16)),                 -- field size FFS
    ...
}

-- ASN1STOP
```

ReestablishmentInfo field descriptions
sourcePhysicalCellIdentity
Contains the physical cell identity of the source cell.
sourceShortMAC-I
XXX

– RRM-Configuration

The *RRM-Configuration* IE contains information about UE specific RRM information before the handover which can be utilized by target eNB after the handover is successfully performed.

RRM-Configuration information element

```
-- ASN1START

RRM-Configuration ::=       SEQUENCE {
    ue-InactiveTime             ENUMERATED {
                                    v1sec, v2sec, v3sec, v5sec, v7sec, v10sec, v15sec, v20sec,
                                    v25sec, v30sec, v40sec, v50sec, v1min, v1min20sec, v1min40sec,
                                    v2min, v2min30sec, v3min, v3min30sec, v4min, v5min, v6min,
                                    v7min, v8min, v9min, v10min, v12min, v14min, v17min, v20min,
                                    v24min, v28min, v33min, v38min, v44min, v50min, v1hr,
                                    v1hr30min, v2hr, v2hr30min, v3hr, v3hr30min, v4hr, v5hr, v6hr,
                                    v8hr, v10hr, v13hr, v16hr, v20hr, v1day, v1day12hr, v2day,
                                    v2day12hr, v3day, v4day, v5day, v7day, v10day, v14day, v19day,
                                    v24day, v30day, morethan30day}      OPTIONAL,
    ue-HistoryInformation       UE-HistoryInformation               OPTIONAL,
    ...
}

-- ASN1STOP
```

***RRM-Configuration* field descriptions**
ue-InactiveTimer
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.
ue-HistoryInformation
The list of cells where UE recently visited before the handover

– SecurityContextInfo

The IE *SecurityContextInfo* is used to transfer the needed information for the target eNB to make KeNB, which is not included in the IE *SecurityConfiguration*.

***SecurityContextInfo* information element**

```
-- ASN1START

SecurityContextInfo ::=                         SEQUENCE {
    key-eNodeB-Star                                 Key-eNodeB-Star,
    indexIncreaseIndicator                          BOOLEAN,
    nextHopChainingCount                            NextHopChainingCount
}

-- ASN1STOP
```

***SecurityContextInfo* field descriptions**
key-eNodeB-Star Parameter KeNB*: See TS 33.401 [32, 7.2.8.4]
indexIncreaseIndicator Parameter index increase indicator: See TS 33.401 [32, 7.2.8.4]
nextHopChainingCount Parameter NCC: See TS 33.401 [32, 7.2.8.4]

– UE-HistoryInformation

The *UE-HistoryInformation* IE contains information about the cells where UE has been visited before the handover performs

***UE-HistoryInformation* information element**

```
-- ASN1START

UE-HistoryInformation ::=           SEQUENCE (SIZE (1..maxVisitedCells)) OF SEQUENCE {
    lastVistedCellID                    CellIdentity,
    cellType                            ENUMERATED {pico, micro, macro, spare1, ...},
    timeUE-StayedInCell                 INTEGER (0..4095),
    ...
}

-- ASN1STOP
```

***UE-HistoryInformation* field descriptions**
lastVisitedCellID Cell Identity
cellType The type of the cells where UE recently visited before the handover
timeUE-StayedInCell The duration while the UE stayed in the cell in second. If the UE stays in a cell more than 4095s, the time UE stays in cell is set to 4095s.

10.4 RRC multiplicity and type constraints values

– Multiplicity and type constraints definitions

This section includes multiplicity and type constraints applicable (only) to interactions between network nodes

```
-- ASN1START

maxVisitedCells             INTEGER ::= 10  -- Maximum number of UTRA carrier fequencies        FFS

-- ASN1STOP
```

– End of EUTRA-InterNodeDefinitions

```
-- ASN1START

END

-- ASN1STOP
```

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 of categories 1- 5 shall support	8
#RLC-AM	The number of RLC AM entities that a UE of categories 1- 5 shall support (depends on the RLC mode of SRB2)	9 or 10
#Events	The number of instances of a measurement that the UE is required to support	FFS

Editor's note: It has been agreed to define a limitation, the details are FFS

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).

Procedure title:	E-UTRAN -> UE	UE -> E-UTRAN	N	Notes
RRC Connection Control Procedures				
RRC connection establishment	*RRCConnectionSetup*	*RRCConnectionSetupComplete*	[3-10 FFS]	
RRC connection release	*RRCConnectionSetupRelease*		NA	
RRC connection re-configuration (radio resource configuration)	*RRCConnectionReconfiguration*	*RRCConnectionReconfigurationComplete*	[3-10 FFS]	
RRC connection re-configuration (measurement configuration)	*RRCConnectionReconfiguration*	*RRCConnectionReconfigurationComplete*	[3-10 FFS]	
RRC connection re-configuration (intra-LTE mobility)	*RRCConnectionReconfiguration*	*RRCConnectionReconfigurationComplete*	[3-10 FFS]	
RRC connection re-establishment	*RRCConnectionReestablishment*	*RRCConnectionReestablishmentComplete*	[3-10 FFS]	
Initial security activation	*SecurityModeCommand*	*SecurityModeCommandComplete/SecurityModeCommandFailure*	[3-10 FFS]	
Initial security activation + RRC connection re-configuration (RB establishment)	*SecurityModeCommand, RRCConnectionReconfiguration*	*RRCConnectionReconfigurationComplete*	[FFS]	The two DL messages are transmitted in the same TTI
Paging	*Paging*		NA	
Inter RAT mobilty				
Handover to E-UTRA	*RRCConnectionReconfiguration (sent by other RAT)*	*RRCConnectionReconfigurationComplete*	NA	
Handover from E-UTRA	*MobilityFromEUTRACommand*		NA	
Handover from E-UTRA to CDMA2000	*HandoverFromEUTRAPreparationRequest (CDMA 2000)*		NA	Used to trigger the handover preparation procedure with a CDMA2000 RAT.
Measurement procedures				
Measurement Reporting		*MeasurementReport*	NA	FFS
Other procedures				
UE capability transfer	*UECapabilityEnquiry*	*UECapabilityInformation*	[3-10 FFS]	

Editor's note: For the initial RRC connection establishment when the UE does not have any ongoing data transmissions, a very tight requirement on N shall be defined.

Editor's note: It is FFS if this section should include performance requirements for the acquisition of system information.

Editor's note: There may be a need to define the assumption regarding the RACH procedure as well as the exact point when the UL message is considered as ready for transmission

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 Principles to ensure compatibility

It shall be possible to inter-work different versions of the RRC protocol.

The protocol shall specify mechanisms such that new PDU types can be introduced without causing unexpected behaviour or damage.

The protocol shall specify mechanisms such that PDU extensions are allowed in a compatible way. Those may include:

- Mechanisms that allow the encoder to selectively include PDU extensions, which are known and can be decoded in the decoder;
- Mechanisms that allow the decoder to skip unknown PDU extensions and complete the decoding of the known parts of the PDU.

In case the protocol allows the transfer of spare values or extension of the value set, the behaviour of the receiving entity not comprehending these values shall be specified.

A.3 PDU specification

A.3.1 General principles

A.3.1.1 ASN.1 sections

The RRC PDU contents shall be formally and completely described using abstract syntax notation (ASN.1) [X.680, X.681 (02/2002)].

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 shall begin 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 shall end 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 shall 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 *MeasuredSFN-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. Abbreviations may be used. Examples of typical abbreviations are given in table A.3.1.2.1-1 below.

- *For future extension:* where versions of an ASN.1 field or type need to be distinguished by release, a suffix of the form "-rX" is used, *e.g.*, *Foo-r9* for the Rel-9 version of the ASN.1 type *Foo*. If an ASN.1 field or type provides only the extension of a corresponding earlier field or type (cf., sub-clause A.ffs), a suffix of the form "-vXYZext" is used, e.g., *AnElement-v10b0ext* for the extension of the ASN.1 type *AnElement* introduced in the version 10.11.0 of the specification. Digits *0...9, 10, 11, etc.* are used to represent the first digit of the version number. Lower case letters *a, b, c, etc.* are used to represent the second (and third) digit of the version number if they are greater than 9.

Table A.3.1.2-1: Examples of typical abbreviations used in ASN.1 identifiers

Abbreviation	Abbreviated word
Conf	Confirmation
Config	Configuration
DL	Downlink
Freq	Frequency
Id	Identity
Ind	Indication
Info	Information
Meas	Measurement
Param(s)	Parameter(s)
Persist	Persistent
Reestab	Reestablishment
Req	Request
Sched	Scheduling
Thresh	Threshold
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 *prioritizedBitRate* field in the example below.

```
-- /example/ ASN1START

LogicalChannelConfig ::=            SEQUENCE {
    ul-SpecificParameters               SEQUENCE {
        priority                            Priority,
        prioritizedBitRate                  PrioritizedBitRate,
        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.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
        },
        criticalExtensions                  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 *criticalExtensions* 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,
        criticalExtensions                  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 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.

The ASN.1 section specifying the contents of a PDU type shall be followed by a *field description* table where a further description of, e.g., the semantic properties of the information elements may be included. The general format of this table is shown in the example below.

***%PDU-TypeIdentifier%* field descriptions**
%field identifier% Field description.
%field identifier% Field description.

The field description table has one column. The header row shall contain the ASN.1 type identifier of the PDU type.

The following rows are used to provide field descriptions. Each row shall include a first paragraph with a *field identifier* (in ***bold and italic*** font style) referring to the part of the PDU to which it applies. The following paragraphs at the same row may include (in regular font style), e.g., semantic description, references to other specifications and/or specification of value units, which are relevant for the particular part of the PDU.

The parts of the PDU contents that do not require a field description shall be omitted from the field description table.

If the field description table is empty, the header row shall be followed by a single row with the word "Void" (in ***bold and italic*** font style) in a single paragraph replacing the field identifier.

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-ConfigurationSIB ::=          SEQUENCE {
    rootSequenceIndex                   INTEGER (0..1023),
    prach-ConfigInfo                    PRACH-ConfigInfo
}

PRACH-Configuration ::=             SEQUENCE {
    rootSequenceIndex                   INTEGER (0..1023),
    prach-ConfigInfo                    PRACH-ConfigInfo                    OPTIONAL    -- Need OC
}

PRACH-ConfigInfo ::=                SEQUENCE {
    prach-ConfigurationIndex            ENUMERATED {ffs},
    highSpeedFlag                       ENUMERATED {ffs},
    zeroCorrelationZoneConfig           ENUMERATED {ffs}
}

-- ASN1STOP
```

A group of closely related IE type definitions, like the IEs *PRACH-ConfigurationSIB* and *PRACH-Configuration* in this example, can preferably be 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-Configuration*" 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 (cf. 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-ConfigurationSIB* and *PRACH-Configuration* in the example above).

NOTE: Referring to an IE type, which 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, shall be followed by a *field description* table, where a further description of, e.g., the semantic properties of the information fields may be included. 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 Information fields with optional presence

An information 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

PreambleInformation ::=             SEQUENCE {
    numberOfRA-Preambles                INTEGER (1..64)                     DEFAULT 1,
    ...
}

-- ASN1STOP
```

Alternatively, an information 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-Configuration ::=             SEQUENCE {
    rootSequenceIndex                   INTEGER (0..1023),
    prach-ConfigInfo                    PRACH-ConfigInfo                    OPTIONAL    -- Need OC
}

-- 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 shall include the keyword "Need", followed by one of the predefined semantics tags (OP, OC or OD) defined in sub-clause 6.1. If the semantics tag OP is used, the semantics of the absent field may be further specified either in the field description table following the ASN.1 section, or in procedure text.

A.3.6 Information fields with conditional presence

An information 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 shall include 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 information fields with conditional presence in the particular ASN.1 section.

Conditional presence	Explanation
UL	**Specification of the conditions for including the information 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 information 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.

If the ASN.1 section does not include information fields with conditional presence, the conditional presence table shall not be included.

A.4 Extension of the PDU specifications

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.

Annex B (informative): Change history

Editor's note: The last digit of the version is stepped for intermediate versions not yet endorsed by RAN WG2, i.e. the changes compared to a previous version could be significant. The middle digit in the version is stepped only after RAN2 endorsement.

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
28 June 2007	CC-2 RAN2#58 bis	TD-02 R2-072616			Included/ changes: ▪ RRC CC-2 TD-02 TP on RRC messages and procedures-CC1upd ▪ E-UTRA RRC TP on High level parameters for some RRC functional areas (R2-072616) ▪ Consistent use of terminology (E-UTRA, RRC connection)	0.0.1	0.0.2
2 July 2007	RAN2#58 bis	R2-072975			Same as version0.0.2, that was agreed during RAN2#58bis, but now without change marks	0.0.2	0.1.0
2 July 2007		R2-072977 R2-072978			Included/ changes: ▪ E-UTRA RRC TP on System information procedure ▪ E-UTRA RRC TP on System Information Blocks	0.1.0	0.1.1
2 July 2007					Included/ changes: ▪ RAN2#58bis agreements on System information scheduling ▪ RAN2#58bis agreements on System information change notification ▪ RAN2#58bis agreements on Cell barring info ▪ Editorial corrections e.g. additional abbreviations	0.1.1	0.1.2
8 August 2007					Included/ changes: ▪ RAN2#58bis agreements on integrity protection allocation ▪ Editorial corrections e.g. additional references, renaming of RRC CONNECTION CHANGE message	0.1.2	0.1.3
13 August 2007					Included/ changes: ▪ RAN2#58bis agreements on RRC connection establishment according to text proposal agreed during e-mail review	0.1.3	0.1.4
24 August 2007					Included/ changes: ▪ Note clarifying that the use of pre-configuration upon RRC connection establishment is not precluded	0.1.4	0.2.0
24 August 2007					Included/ changes: ▪ RAN2#59 agreements to support Cell change order to GERAN including NACC ▪ RAN2#59 agreements on message parameters e.g. on handover, radio link failure, broadcast (some resulting from RAN1 liaisons), DRX	0.2.0	0.2.1
5 September 2007					Included/ changes: ▪ Editorial corrections (references)	0.2.1	0.3.0
16 October 2007		R2-074012 R2-074014 R2-074015 R2-074016 R2-074508			Included/ changes ▪ TP Capturing current status on measurements ▪ TP Capturing current status on mobility ▪ TP Capturing current status on security ▪ TP Progressing the PDUs ▪ TP Capturing current status on inter RAT mobility	0.3.0	0.3.1
22 October 2007					Included/ change (agreements RAN2#59bis) ▪ RRC concatenation of system information ▪ BCCH change notification using paging for UEs in idle and using periodic BCCH monitoring for UEs in connected ▪ Three intra-frequency measurement events and associated parameters ▪ Only dedicated measurement control for UEs in connected, using the RRC connection reconfiguration message ▪ Clarification regarding the measurement configuration upon handover ▪ Security activation upon transition from idle to connected ▪ Removal of FFS on synchronous handover ▪ No individual GSM/ GERAN neighbours will be indicated. All individual UTRAN neighbours will be indicated ▪ A message for inter RAT mobility from E-UTRA	0.3.1	0.3.2

					▪ NAS transfer is performed after connection establishment ▪ Clarification regarding the use of the three SRBs ▪ Introduction of UE capability transfer (removal of FFS)		
29 October 2007					Main changes (based on comments e-mail review) ▪ Clarification is added that for detected cells, UTRAN indicates the carrier frequency ▪ Additional clarification regarding handling of timers and indication to upper layers in a number of failure cases ▪ RRC connection reconfiguration request is re-named to RRC connection re-establishment request ▪ FFS added for the handling of the inter frequency measurements upon inter frequency handover ▪ Upon connection failure, upper layers are informed prior to moving to idle ▪ FFS added regarding which message is used to request & transfer UE radio access capabilities	0.3.2	0.3.3
9 November 2007	RAN2#60	R2-074969			Same as version 0.3.3, but now without change marks	0.3.3	0.4.0
13 November 2007					▪ Main changes (agreements from RAN2#60)Access class barring (persistence value common for AC0-9, originating only option) ▪ Handover complete message e.g. contention resolution, security ▪ Radio link failure messages and their contents ▪ System information change notification ▪ Configuration and activation of measurement gaps ▪ Inter-frequency and inter-RAT measurement events ▪ Handling of inter-frequency measurements upon inter-frequency handover ▪ Procedure interactions, general model and initial security activation	0.4.0	0.4.1
19 November 2007					Main changes (based on comments received during e-mail review) ▪ Descriptive section on RRC connection control ▪ Correction regarding Handling of inter-frequency measurements upon inter-frequency handover ▪ Retry of connection (re-)establishment upon detecting contention ▪ Correction regarding initial ciphering activation ▪ Removal of redundant security parameters	0.4.1	0.4.2
21 November 2007					Main changes (based on comments received during e-mail review) ▪ An FFS was added regarding the need to specify the UE behaviour for 3 failure cases (i.e. in 5.2.4.4, 5.2.5.3 and 5.3.2.2)	0.4.2	0.5.0
22 November 2007					Same as 0.5.0	0.5.0	1.0.0

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

History

Document history		
V8.2.0	November 2008	Publication
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