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Foreword

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1 Scope

The present document specifies the radio network layer signalling procedures of the control plane between eNBs in E-UTRAN. X2AP supports the functions of X2 interface by signalling procedures defined in this document. X2AP is developed in accordance to the general principles stated in TS 36.401 [2] and TS 36.420 [3].

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.
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- 3GPP TR 21.905: "Vocabulary for 3GPP Specifications". [1] [2] 3GPP TS 36.401: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Architecture Description". [3] 3GPP TS 36.420: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 General Aspects and Principles". [4] 3GPP TS 36.413: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)". ITU-T Recommendation X.691 (2002-07): "Information technology - ASN.1 encoding rules -[5] Specification of Packed Encoding Rules (PER) ". 3GPP TS 32.422: "Telecommunication Management; Subscriber and Equipment Trace; Trace [6] Control and Configuration Management". [7] 3GPP TS 32.421: "Telecommunication Management; Subscriber and Equipment Trace; Trace concepts and requirements". [8] 3GPP TS 36.424: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 data transport". [9] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRAN); Radio Resource Control (RRC) Protocol Specification".
- 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and [10] Modulation".
- 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer [11] procedures ".
- 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal [12] Terrestrial Radio Access Network (E-UTRAN) access".
- [13] 3GPP TS 23.203: "Policy and charging control architecture".
- 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System; Stage 3". [14]
- [15] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA), Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; stage 2".

[16]	3GPP TS 36.104: "Base Station (BS) radio transmission and reception ".
[17]	Void.
[18]	3GPP TS 33.401: "Security architecture".
[19]	3GPP TS 36.414: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 data transport".
[20]	3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC)".
[21]	3GPP TS 36.422: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 signaling transport".
[22]	3GPP TS 36.314: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Layer 2 - Measurements".
[23]	Void.
[24]	3GPP TS 25.413: "UTRAN Iu interface RANAP signalling"
[25]	3GPP TS 37.320: "Universal Terrestrial Radio Access (UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRA); Radio measurement collection for Minimization of Drive Tests (MDT);Overall description; Stage 2".
[26]	3GPP TS 29.281: "General Packet Radio Service (GPRS); Tunnelling Protocol User Plane (GTPv1-U)".
[27]	ITU-T Recommendation X.680 (2002-07): "Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation".
[28]	ITU-T Recommendation X.681 (2002-07): "Information technology – Abstract Syntax Notation One (ASN.1): Information object specification".
[29]	3GPP TS 23.003: "Technical Specification Group Core Network and Terminals; Numbering, addressing and identification".
[30]	3GPP TR 25.921 (version.7.0.0): "Guidelines and principles for protocol description and error handling".

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].

Elementary Procedure: X2AP protocol consists of Elementary Procedures (EPs). An X2AP Elementary Procedure is a unit of interaction between two eNBs. An EP consists of an initiating message and possibly a response message. Two kinds of EPs are used:

- Class 1: Elementary Procedures with response (success or failure),
- Class 2: Elementary Procedures without response.

E-RAB: Defined in TS 36.401 [2].

CSG Cell: as defined in TS 36.300 [15].

Dual Connectivity: as defined in TS 36.300 [15].

Hybrid cell: as defined in TS 36.300 [15].

Master eNB: as defined in TS 36.300 [15].

Secondary Cell Group: as defined in TS 36.300 [15].

Secondary eNB: as defined in TS 36.300 [15].

3.2 Symbols

For the purposes of the present document, the following symbols apply:

<symbol> <Explanation>

3.3 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].

ABS Almost Blank Subframe
BBF Broadband Forum
CCO Cell Change Order
CoMP Coordinated Multi Point
DC Dual Connectivity

DL Downlink

EARFCN E-UTRA Absolute Radio Frequency Channel Number

E-CID Enhanced Cell-ID (positioning method)

eNB E-UTRAN NodeB
EP Elementary Procedure
EPC Evolved Packet Core

E-RAB E-UTRAN Radio Access Bearer

E-UTRAN Evolved UTRAN

GNSS Global Navigation Satellite System
GUMMEI Globally Unique MME Identifier

HFN Hyper Frame Number
IE Information Element
L-GW Local GateWay
MCG Master Cell Group

MDT Minimization of Drive Tests

MeNB Master eNB

MME Mobility Management Entity

NAICS Network-Assisted Interference Cancellation and Suppression

PDCP Packet Data Convergence Protocol PLMN Public Land Mobile Network

ProSe Proximity Service
SCG Secondary Cell Group
S-GW Serving Gateway
SeNB Secondary eNB

SIPTO Selected IP Traffic Offload

SIPTO@LN Selected IP Traffic Offload at the Local Network

SN Sequence Number
TAC Tracking Area Code
UE User Equipment

UL Uplink

4 General

4.1 Procedure specification principles

The principle for specifying the procedure logic is to specify the functional behaviour of the terminating eNB exactly and completely. Any rule that specifies the behaviour of the originating eNB shall be possible to be verified with information that is visible within the system.

The following specification principles have been applied for the procedure text in clause 8:

- The procedure text discriminates between:
 - 1) Functionality which "shall" be executed

The procedure text indicates that the receiving node "shall" perform a certain function Y under a certain condition. If the receiving node supports procedure X but cannot perform functionality Y requested in the initiating message of a Class 1 EP, the receiving node shall respond with the message used to report unsuccessful outcome for this procedure, containing an appropriate cause value.

2) Functionality which "shall, if supported" be executed

The procedure text indicates that the receiving node "shall, if supported," perform a certain function Y under a certain condition. If the receiving node supports procedure X, but does not support functionality Y, the receiving node shall proceed with the execution of the EP, possibly informing the requesting node about the not supported functionality.

- Any required inclusion of an optional IE in a response message is explicitly indicated in the procedure text. If the procedure text does not explicitly indicate that an optional IE shall be included in a response message, the optional IE shall not be included. For requirements on including *Criticality Diagnostics* IE, see section 10.

4.2 Forwards and backwards compatibility

The forwards and backwards compatibility of the protocol is assured by a mechanism where all current and future messages, and IEs or groups of related IEs, include ID and criticality fields that are coded in a standard format that will not be changed in the future. These parts can always be decoded regardless of the standard version.

4.3 Specification notations

For the purposes of the present document, the following notations apply:

Procedure When referring to an elementary procedure in the specification the Procedure Name is written with

the first letters in each word in upper case characters followed by the word "procedure", e.g.

Handover Preparation procedure.

Message When referring to a message in the specification the MESSAGE NAME is written with all letters

in upper case characters followed by the word "message", e.g. HANDOVER REQUEST message.

IE When referring to an information element (IE) in the specification the *Information Element Name*

is written with the first letters in each word in upper case characters and all letters in Italic font

followed by the abbreviation "IE", e.g. E-RAB ID IE.

Value of an IE When referring to the value of an information element (IE) in the specification the "Value" is

written as it is specified in sub clause 9.2 enclosed by quotation marks, e.g. "Value".

5 X2AP services

The present clause describes the services an eNB offers to its neighbours.

5.1 X2AP procedure modules

The X2 interface X2AP procedures are divided into two modules as follows:

- 1. X2AP Basic Mobility Procedures;
- 2. X2AP Global Procedures;

The X2AP Basic Mobility Procedures module contains procedures used to handle the UE mobility within E-UTRAN.

The Global Procedures module contains procedures that are not related to a specific UE. The procedures in this module are in contrast to the above module involving two peer eNBs.

5.2 Parallel transactions

Unless explicitly indicated in the procedure specification, at any instance in time one protocol peer shall have a maximum of one ongoing X2AP procedure related to a certain UE.

6 Services expected from signalling transport

The signalling connection shall provide in sequence delivery of X2AP messages. X2AP shall be notified if the signalling connection breaks.

X2 signalling transport is described in TS 36.422 [21].

7 Functions of X2AP

The X2AP protocol provides the following functions:

- Mobility Management. This function allows the eNB to move the responsibility of a certain UE to another eNB. Forwarding of user plane data, Status Transfer and UE Context Release function are parts of the mobility management.
- Dual Connectivity. This function allows the eNB to request another eNB to provide radio resources for a certain UE while keeping responsibility for that UE.
- Load Management. This function is used by eNBs to indicate resource status, overload and traffic load to each other.
- Reporting of General Error Situations. This function allows reporting of general error situations, for which function specific error messages have not been defined.
- Resetting the X2. This function is used to reset the X2 interface.
- Setting up the X2. This function is used to exchange necessary data for the eNB for setup the X2 interface and implicitly perform an X2 Reset.
- eNB Configuration Update. This function allows updating of application level data needed for two eNBs to interoperate correctly over the X2 interface.
- Mobility Parameters Management. This function allows the eNB to coordinate adaptation of mobility parameter settings with a peer eNB.
- Mobility Robustness Optimisation. This function allows reporting of information related to mobility failure events.
- Energy Saving. This function allows decreasing energy consumption by enabling indication of cell activation/deactivation over the X2 interface.
- X2 Release. This function allows an eNB to be aware that the signalling connection to a peer eNB is unavailable.

- Message Transfer. This function allows indirect transport of X2AP messages to a peer eNB.
- Registration. This function allows registration of eNB in case indirect transport of X2AP messages is supported.
- Removing the X2. This function allows removing the signaling connection between two eNBs in a controlled manner.
- Inter-eNB UE Context Resume. This function allows retrieval of a suspended UE context.

The mapping between the above functions and X2 EPs is shown in the table below.

Table 7-1: Mapping between X2AP functions and X2AP EPs

Function	Elementary Procedure(s)
Mobility Management	a) Handover Preparation
	b) SN Status Transfer
	c) UE Context Release
	d) Handover Cancel
Dual Connectivity	a) SeNB Addition Preparation
	b) SeNB Reconfiguration Completion
	c) MeNB initiated SeNB Modification
	Preparation
	d) SeNB initiated SeNB Modification
	e) MeNB initiated SeNB Release
	f) SeNB initiated SeNB Release
	g) SeNB Counter Check
Load Management	a) Load Indication
	b) Resource Status Reporting Initiation
	c) Resource Status Reporting
Reporting of General Error Situations	Error Indication
Resetting the X2	Reset
Setting up the X2	X2 Setup
eNB Configuration Update	a) eNB Configuration Update
	b) Cell Activation
Mobility Parameters Management	Mobility Settings Change
Mobility Robustness Optimisation	a) Radio Link Failure Indication
	b) Handover Report
Energy Saving	a) eNB Configuration Update
	b) Cell Activation
X2 Release	X2 Release
Message Transfer Registration	X2AP Message Transfer
Removing the X2	X2 Removal
Inter-eNB UE Context Resume	Retrieve UE Context

8 X2AP procedures

8.1 Elementary procedures

In the following tables, all EPs are divided into Class 1 and Class 2 EPs.

Table 8.1-1: Class 1 Elementary Procedures

Elementary	Initiating Message	Successful Outcome	Unsuccessful Outcome
Procedure		Response message	Response message
Handover	HANDOVER	HANDOVER	HANDOVER
Preparation	REQUEST	REQUEST	PREPARATION FAILURE
Reset	RESET REQUEST	ACKNOWLEDGE RESET RESPONSE	
X2 Setup	X2 SETUP REQUEST	X2 SETUP	X2 SETUP FAILURE
72 Setup	AZ SETOT NEQUEST	RESPONSE	AZ SETOT TAILORE
eNB	ENB	ENB	ENB CONFIGURATION
Configuration	CONFIGURATION	CONFIGURATION	UPDATE FAILURE
Update	UPDATE	UPDATE	
Resource Status	DECOLIDEE CTATUE	ACKNOWLEDGE	RESOURCE STATUS
Resource Status Reporting	RESOURCE STATUS REQUEST	RESOURCE STATUS RESPONSE	FAILURE
Initiation	INEQUEST	INESI ONSE	TAILOILE
Mobility Settings	MOBILITY CHANGE	MOBILITY CHANGE	MOBILITY CHANGE
Change	REQUEST	ACKNOWLEDGE	FAILURE
Cell Activation	CELL ACTIVATION	CELL ACTIVATION	CELL ACTIVATION
0.110.4.1.111	REQUEST	RESPONSE	FAILURE
SeNB Addition	SENB ADDITION REQUEST	SENB ADDITION REQUEST	SENB ADDITION REQUEST REJECT
Preparation	REQUEST	ACKNOWLEDGE	REQUEST REJECT
MeNB initiated	SENB MODIFICATION	SENB MODIFICATION	SENB MODIFICATION
SeNB	REQUEST	REQUEST	REQUEST REJECT
Modification		ACKNOWLEDGE	
Preparation			
SeNB initiated	SENB MODIFICATION	SENB MODIFICATION	SENB MODIFICATION
SeNB	REQUIRED	CONFIRM	REFUSE
Modification SeNB initiated	SENB RELEASE	SENB RELEASE	
SeNB Initiated	REQUIRED	CONFIRM	
X2 Removal	X2 REMOVAL	X2 REMOVAL	X2 REMOVAL FAILURE
	REQUEST	RESPONSE	
Retrieve UE	RETRIEVE UE	RETRIEVE UE	RETRIEVE UE CONTEXT
Context	CONTEXT REQUEST	CONTEXT	FAILURE
		RESPONSE	

Table 8.1-2: Class 2 Elementary Procedures

Elementary Procedure	Initiating Message
Load Indication	LOAD INFORMATION
Handover Cancel	HANDOVER CANCEL
SN Status Transfer	SN STATUS TRANSFER
UE Context Release	UE CONTEXT RELEASE
Resource Status Reporting	RESOURCE STATUS UPDATE
Error Indication	ERROR INDICATION
Radio Link Failure Indication	RLF INDICATION
Handover Report	HANDOVER REPORT
X2 Release	X2 RELEASE
X2AP Message Transfer	X2AP MESSAGE TRANSFER
SeNB Reconfiguration Completion	SENB RECONFIGURATION
	COMPLETE
MeNB initiated SeNB Release	SENB RELEASE REQUEST
SeNB Counter Check	SENB COUNTER CHECK REQUEST

8.2 Basic mobility procedures

8.2.1 Handover Preparation

8.2.1.1 General

This procedure is used to establish necessary resources in an eNB for an incoming handover.

The procedure uses UE-associated signalling.

8.2.1.2 Successful Operation

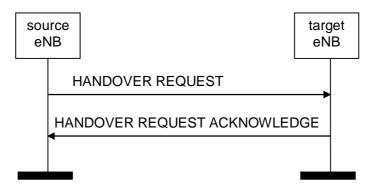


Figure 8.2.1.2-1: Handover Preparation, successful operation

The source eNB initiates the procedure by sending the HANDOVER REQUEST message to the target eNB. When the source eNB sends the HANDOVER REQUEST message, it shall start the timer $T_{RELOCoren}$.

The allocation of resources according to the values of the *Allocation and Retention Priority* IE included in the *E-RAB Level QoS Parameters* IE shall follow the principles described for the E-RAB Setup procedure in TS 36.413 [4].

The source eNB may include in the GUMMEI IE any GUMMEI corresponding to the source MME node.

If at least one of the requested non-GBR E-RABs is admitted to the cell indicated by the *Target Cell ID* IE, the target eNB shall reserve necessary resources, and send the HANDOVER REQUEST ACKNOWLEDGE message back to the source eNB. The target eNB shall include the E-RABs for which resources have been prepared at the target cell in the *E-RABs Admitted List* IE. The target eNB shall include the E-RABs that have not been admitted in the *E-RABs Not Admitted List* IE with an appropriate cause value.

At reception of the HANDOVER REQUEST message the target eNB shall:

- prepare the configuration of the AS security relation between the UE and the target eNB by using the information in the *UE Security Capabilities* IE and the *AS Security Information* IE in the *UE Context Information* IE.

For each E-RAB for which the source eNB proposes to do forwarding of downlink data, the source eNB shall include the *DL Forwarding* IE within the *E-RABs To be Setup Item* IE of the HANDOVER REQUEST message. For each E-RAB that it has decided to admit, the target eNB may include the *DL GTP Tunnel Endpoint* IE within the *E-RABs Admitted Item* IE of the HANDOVER REQUEST ACKNOWLEDGE message to indicate that it accepts the proposed forwarding of downlink data for this bearer. This GTP tunnel endpoint may be different from the corresponding *GTP TEID* IE in the *E-RAB To Be Switched in Downlink List* IE of the PATH SWITCH REQUEST message (see TS 36.413 [4]) depending on implementation choice.

For each bearer in the *E-RABs Admitted List* IE, the target eNB may include the *UL GTP Tunnel Endpoint* IE to indicate that it requests data forwarding of uplink packets to be performed for that bearer.

Upon reception of the HANDOVER REQUEST ACKNOWLEDGE message the source eNB shall stop the timer $T_{RELOC_{prep}}$, start the timer $TX2_{RELOC_{overall}}$ and terminate the Handover Preparation procedure. The source eNB is then defined to have a Prepared Handover for that X2 UE-associated signalling.

If the *Trace Activation* IE is included in the HANDOVER REQUEST message then the target eNB shall, if supported, initiate the requested trace function as described in TS 32.422 [6]. In particular, the target eNB shall, if supported:

- if the *Trace Activation* IE does not include the *MDT Configuration* IE, initiate the requested trace session as described in TS 32.422 [6];
- if the *Trace Activation* IE includes the *MDT Activation* IE, within the *MDT Configuration* IE, set to 'Immediate MDT and Trace' initiate the requested trace session and MDT session as described in TS 32.422 [6];
- if the *Trace Activation* IE includes the *MDT Activation* IE, within the *MDT Configuration* IE, set to 'Immediate MDT Only' initiate the requested MDT session as described in TS 32.422 [6] and the target eNB shall ignore *Interfaces To Trace* IE, and *Trace Depth* IE;
- if the *Trace Activation* IE includes the *MDT Location Information* IE, within the *MDT Configuration* IE, store this information and take it into account in the requested MDT session;
- if the *Trace Activation* IE includes the *Signalling based MDT PLMN List* IE, within the *MDT Configuration* IE, the eNB may use it to propagate the MDT Configuration as described in TS 37.320 [31].

If the *Management Based MDT Allowed* IE only or the *Management Based MDT Allowed* IE and the *Management Based MDT PLMN List* IE is contained in the HANDOVER REQUEST message, the target eNB shall, if supported, store the received information in the UE context, and use this information to allow subsequent selection of the UE for management based MDT defined in TS 32.422 [6].

If the *Masked IMEISV* IE is contained in the HANDOVER REQUEST message the target eNB shall, if supported, use it to determine the characteristics of the UE for subsequent handling.

The source eNB shall, if supported and available in the UE context, include the *Management Based MDT Allowed* IE and the *Management Based MDT PLMN List* IE in the HANDOVER REQUEST message, except if the source eNB selects a serving PLMN in the target eNB which is not included in the Management Based MDT PLMN List. If the *Management Based MDT PLMN List* IE is not present, the source eNB shall, if supported, include the *Management Based MDT Allowed* IE, if this information is available in the UE context, in the HANDOVER REQUEST message, except if the source eNB selects a serving PLMN in the target eNB different from the serving PLMN in the source eNB.

If the Handover Restriction List IE is

- contained in the HANDOVER REQUEST message, the target eNB shall
 - store the information received in the *Handover Restriction List* IE in the UE context;
 - use this information to determine a target for the UE during subsequent mobility action for which the eNB provides information about the target of the mobility action towards the UE, except when one of the E-RABs has a particular ARP value (TS 23.401 [12]) in which case the information shall not apply;
 - use this information to select a proper SCG during dual connectivity operation.
- not contained in the HANDOVER REQUEST message, the target eNB shall consider that no roaming and no access restriction apply to the UE.

If the *Location Reporting Information* IE is included in the HANDOVER REQUEST message then the target eNB should initiate the requested location reporting functionality as defined in TS 36.413 [4].

If the *SRVCC Operation Possible* IE is included in the HANDOVER REQUEST message, the target eNB shall store the content of such IE in the UE context and use it as defined in TS 23.216 [20].

• If the *UE Security Capabilities* IE included in the HANDOVER REQUEST message only contains the EIA0 algorithm as defined in TS 33.401 [18] and if this EIA0 algorithm is defined in the configured list of allowed integrity protection algorithms in the eNB (TS 33.401 [18]), the eNB shall take it into use and ignore the keys received in the *AS Security Information* IE.

The HANDOVER REQUEST message shall contain the Subscriber Profile ID for RAT/Frequency priority IE, if available.

If the Subscriber Profile ID for RAT/Frequency priority IE is contained in the HANDOVER REQUEST message, the target eNB shall store this information and the target eNB should use the information as defined in TS 36.300 [15].

Upon reception of *UE History Information* IE in the HANDOVER REQUEST message, the target eNB shall collect the information defined as mandatory in the *UE History Information* IE and shall, if supported, collect the information defined as optional in the *UE History Information* IE, for as long as the UE stays in one of its cells, and store the collected information to be used for future handover preparations.

Upon reception of the *UE History Information from the UE* IE in the HANDOVER REQUEST message, the target eNB shall, if supported, store the collected information to be used for future handover preparations.

If the *Mobility Information* IE is provided in the HANDOVER REQUEST message, the target eNB shall, if supported, store this information and use it as defined in TS 36.300 [15]. The target eNB shall, if supported, store the C-RNTI of the source cell received in the HANDOVER REQUEST message.

If the *Expected UE Behaviour* IE is provided in the HANDOVER REQUEST message, the target eNB shall, if supported, store this information and may use it to determine the RRC connection time.

If the *ProSe Authorized* IE is contained in the HANDOVER REQUEST message and it contains one or more IEs set to "authorized", the eNB shall, if supported, consider that the UE is authorized for the relevant ProSe service(s).

If the *UE Context Reference at the SeNB* IE is contained in the HANDOVER REQUEST message the target eNB may use it as specified in TS 36.300 [15]. In this case, the source eNB may expect the target eNB to include the *UE Context Kept Indicator* IE set to "True" in the HANDOVER REQUEST ACKNOWLEDGE message, which shall use this information as specified in TS 36.300 [15].

If the *Bearer Type* IE is included in the HANDOVER REQUEST message and is set to 'non IP', then the target eNB shall not perform header compression for the concerned E-RAB.

8.2.1.3 Unsuccessful Operation

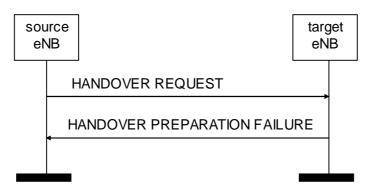


Figure 8.2.1.3-1: Handover Preparation, unsuccessful operation

If the target eNB does not admit at least one non-GBR E-RAB, or a failure occurs during the Handover Preparation, the target eNB shall send the HANDOVER PREPARATION FAILURE message to the source eNB. The message shall contain the *Cause* IE with an appropriate value.

If the target eNB receives a HANDOVER REQUEST message containing *RRC Context* IE that does not include required information as specified in TS 36.331 [9], the target eNB shall send the HANDOVER PREPARATION FAILURE message to the source eNB.

Interactions with Handover Cancel procedure:

If there is no response from the target eNB to the HANDOVER REQUEST message before timer $T_{RELOC_{prep}}$ expires in the source eNB, the source eNB should cancel the Handover Preparation procedure towards the target eNB by initiating the Handover Cancel procedure with the appropriate value for the *Cause* IE. The source eNB shall ignore any HANDOVER REQUEST ACKNOWLEDGE or HANDOVER PREPARATION FAILURE message received after the initiation of the Handover Cancel procedure and remove any reference and release any resources related to the concerned X2 UE-associated signalling.

8.2.1.4 Abnormal Conditions

If the target eNB receives a HANDOVER REQUEST message containing multiple *E-RAB ID* IEs (in the *E-RABs To Be Setup List* IE) set to the same value, the target eNB shall not admit the corresponding E-RABs.

If the target eNB receives a HANDOVER REQUEST message containing a *E-RAB Level QoS Parameters* IE which contains a *QCI* IE indicating a GBR bearer (as defined in TS 23.203 [13]), and which does not contain the *GBR QoS Information* IE, the target eNB shall not admit the corresponding E-RAB.

If the supported algorithms for encryption defined in the *Encryption Algorithms* IE in the *UE Security Capabilities* IE in the *UE Context Information* IE, plus the mandated support of EEA0 in all UEs (TS 33.401 [18]), do not match any algorithms defined in the configured list of allowed encryption algorithms in the target eNB (TS 33.401 [18]), the target eNB shall reject the procedure using the HANDOVER PREPARATION FAILURE message.

If the supported algorithms for integrity defined in the *Integrity Protection Algorithms* IE in the *UE Security Capabilities* IE in the *UE Context Information* IE, plus the mandated support of the EIA0 algorithm in all UEs (TS 33.401 [18]), do not match any algorithms defined in the configured list of allowed integrity protection algorithms in the eNB (TS 33.401 [18]), the eNB shall reject the procedure using the HANDOVER PREPARATION FAILURE message.

If the target eNB receives a HANDOVER REQUEST message which does not contain the *Handover Restriction List* IE, and the PLMN to be used cannot be determined otherwise, the target eNB shall reject the procedure using the HANDOVER PREPARATION FAILURE message.

If the target eNB receives a HANDOVER REQUEST message containing the *Handover Restriction List* IE, and the serving PLMN is not supported by the target cell, the target eNB shall reject the procedure using the HANDOVER PREPARATION FAILURE message.

If the target eNB receives a HANDOVER REQUEST message which does not contain the *CSG Membership Status* IE, and the target cell is a hybrid cell, the target eNB shall reject the procedure using the HANDOVER PREPARATION FAILURE message.

If the target cell is a CSG cell and the target eNB has not received any CSG ID of the source cell, the target eNB shall reject the procedure using the HANDOVER PREPARATION FAILURE message.

If the target cell is a CSG cell with a different CSG from the source cell, the target eNB shall reject the procedure using the HANDOVER PREPARATION FAILURE message.

8.2.2 SN Status Transfer

8.2.2.1 General

The purpose of the SN Status Transfer procedure is to transfer the uplink PDCP SN and HFN receiver status and the downlink PDCP SN and HFN transmitter status either, from the source to the target eNB during an X2 handover, or between the eNBs involved in dual connectivity, for each respective E-RAB for which PDCP SN and HFN status preservation applies.

If the SN Status Transfer procedure is applied in the course of dual connectivity, in the subsequent specification text

- the behaviour of the eNB from which the E-RAB context is transferred, i.e., the eNB involved in dual connectivity from which data forwarding, is specified by the behaviour of the "source eNB",
- the behaviour of the eNB to which the E-RAB context is transferred, i.e., the eNB involved in dual connectivity to which data is forwarded, is specified by the behaviour of the "target eNB".

The procedure uses UE-associated signalling.

8.2.2.2 Successful Operation



Figure 8.2.2.2-1: SN Status Transfer, successful operation

The source eNB initiates the procedure by stop assigning PDCP SNs to downlink SDUs and stop delivering UL SDUs towards the EPC and sending the SN STATUS TRANSFER message to the target eNB at the time point when it considers the transmitter/receiver status to be frozen. The target eNB using Full Configuration for this handover as per TS 36.300 [15] shall ignore the information received in this message.

The *E-RABs Subject To Status Transfer List* IE included in the SN STATUS TRANSFER message contains the E-RAB ID(s) corresponding to the E-RAB(s) for which PDCP SN and HFN status preservation shall be applied.

If the source eNB includes in the SN STATUS TRANSFER message, the information on the missing and received uplink SDUs in the *Receive Status Of UL PDCP SDUs* IE or *Receive Status Of UL PDCP SDUs Extended* IE or *Receive Status Of UL PDCP SDUs for PDCP SN Length 18* IE for each E-RAB for which the source eNB has accepted the request from the target eNB for uplink forwarding, then the target eNB may use it in a Status Report message sent to the UE over the radio.

For each E-RAB for which the *DL COUNT Value* IE is received in the SN STATUS TRANSFER message, the target eNB shall use it to mark with the value contained in the *PDCP-SN* IE of this IE the first downlink packet for which there is no PDCP SN yet assigned. If the *DL COUNT Value Extended* IE or *DL COUNT Value for PDCP SN Length 18* IE is included in the *E-RABs Subject To Status Transfer Item* IE, the target eNB shall, if supported, use the value contained in the *PDCP-SN Extended* IE of the *DL COUNT Value Extended* IE or *PDCP-SN Length 18* IE instead of the value contained in the *PDCP-SN* IE of the *DL COUNT Value* IE.

For each E-RAB for which the *UL COUNT Value* IE is received in the SN STATUS TRANSFER message, the target eNB shall not deliver any uplink packet which has a PDCP SN lower than the value contained in the *PDCP-SN* IE of this IE. If the *UL COUNT Value Extended* IE or *UL COUNT Value for PDCP SN Length 18* IE is included in the *E-RABs Subject To Status Transfer Item* IE, the target eNB shall, if supported, use the value contained in the *PDCP-SN Extended* IE of the *UL COUNT Value Extended* IE or *PDCP-SN Length 18* IE of the *UL COUNT Value for PDCP SN Length 18* IE instead of the value contained in the *PDCP-SN* IE of the *UL COUNT Value* IE.

8.2.2.3 Abnormal Conditions

If the target eNB receives this message for a UE for which no prepared handover exists at the target eNB, the target eNB shall ignore the message.

8.2.3 UE Context Release

8.2.3.1 General

For handover, the UE Context Release procedure is initiated by the target eNB to indicate to the source eNB that radio and control plane resources for the associated UE context are allowed to be released.

For dual connectivity, UE Context Release procedure is initiated by the MeNB to finally release the UE context at the SeNB. For dual connectivity specific mobility scenarios specified in TS 36.300 [15] only resources related to the UE-associated signalling connection between the MeNB and the SeNB are released.

The procedure uses UE-associated signalling.

8.2.3.2 Successful Operation



Figure 8.2.3.2-1: UE Context Release, successful operation for handover



Figure 8.2.3.2-2: UE Context Release, successful operation for dual connectivity

Handover

The UE Context Release procedure is initiated by the target eNB. By sending the UE CONTEXT RELEASE message the target eNB informs the source eNB of Handover success and triggers the release of resources.

Upon reception of the UE CONTEXT RELEASE message, the source eNB may release radio and control plane related resources associated to the UE context. For E-RABs for which data forwarding has been performed, the source eNB should continue forwarding of U-plane data as long as packets are received at the source eNB from the EPC or the source eNB buffer has not been emptied (an implementation dependent mechanism decides that data forwarding can be stopped). When the eNB supporting L-GW function for SIPTO@LN operation releases radio and control plane related resources associated to the UE context, it shall also request using intra-node signalling the collocated L-GW to release the SIPTO@LN PDN connection as defined in TS 23.401 [12].

Dual Connectivity

The UE Context Release procedure is initiated by the MeNB. By sending the UE CONTEXT RELEASE message the MeNB informs the SeNB that the UE Context can be removed.

Upon reception of the UE CONTEXT RELEASE message, the SeNB may release radio and control plane related resources associated to the UE context. For E-RABs for which data forwarding has been performed, the SeNB should continue forwarding of U-plane data as long as packets are received at the SeNB from the EPC or the SeNB buffer has not been emptied (an implementation dependent mechanism decides that data forwarding can be stopped). The SeNB supporting L-GW function for LIPA operation shall also request using intra-node signalling the collocated L-GW to release the LIPA PDN connection as defined in TS 23.401 [12]. If the SIPTO Bearer Deactivation Indication IE is received in the UE CONTEXT RELEASE message, the SeNB supporting L-GW function for SIPTO@LN operation shall also request using intra-node signalling the collocated L-GW to release the SIPTO@LN PDN connection as defined in TS 23.401 [12].

Interaction with the MeNB initiated SeNB Release procedure:

The SeNB may receive the SENB RELEASE REQUEST message including the *UE Context Kept Indicator* IE set to 'True', upon which the SeNB shall, if supported, only release the resources related to the UE-associated signalling connection between the MeNB and the SeNB, as specified in TS 36.300 [15].

8.2.3.3 Unsuccessful Operation

Not applicable.

8.2.3.4 Abnormal Conditions

If the UE Context Release procedure is not initiated towards the source eNB from any prepared eNB before the expiry of the timer $TX2_{REL,OCoverall}$, the source eNB shall request the MME to release the UE context.

If the UE returns to source eNB before the reception of the UE CONTEXT RELEASE message or the expiry of the timer $TX2_{RELOCoverall}$, the source eNB shall stop the $TX2_{RELOCoverall}$ and continue to serve the UE.

8.2.4 Handover Cancel

8.2.4.1 General

The Handover Cancel procedure is used to enable a source eNB to cancel an ongoing handover preparation or an already prepared handover.

The procedure uses UE-associated signalling.

8.2.4.2 Successful Operation



Figure 8.2.4.2-1: Handover Cancel, successful operation

The source eNB initiates the procedure by sending the HANDOVER CANCEL message to the target eNB. The source eNB shall indicate the reason for cancelling the handover by means of an appropriate cause value.

At the reception of the HANDOVER CANCEL message, the target eNB shall remove any reference to, and release any resources previously reserved to the concerned UE context.

The New eNB UE X2AP ID IE and, if available, the New eNB UE X2AP ID Extension IE shall be included if it has been obtained from the target eNB.

8.2.4.3 Unsuccessful Operation

Not applicable.

8.2.4.4 Abnormal Conditions

Should the HANDOVER CANCEL message refer to a context that does not exist, the target eNB shall ignore the message.

8.3 Global Procedures

8.3.1 Load Indication

8.3.1.1 General

The purpose of the Load Indication procedure is to transfer load and interference co-ordination information between eNBs controlling intra-frequency neighboring cells, and additionally between eNBs controlling inter-frequency neighboring cells for TDD.

The procedure uses non UE-associated signalling.

8.3.1.2 Successful Operation

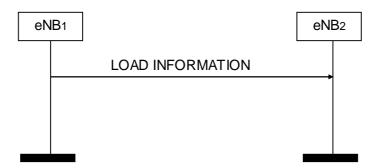


Figure 8.3.1.2-1: Load Indication, successful operation

An eNB₁ initiates the procedure by sending LOAD INFORMATION message to a peer eNB₂.

If the *UL Interference Overload Indication* IE is received in the LOAD INFORMATION message, it indicates the interference level experienced by the indicated cell on all resource blocks, per PRB. If the *Extended UL Interference Overload Info* IE is received in the LOAD INFORMATION message, the *UL Interference Overload Indication* IE indicates the interference level experienced by the indicated cell ignoring the UL subframe(s) represented as value '1' in the *Associated Subframes* IE. The receiving eNB may take such information into account when setting its scheduling policy and shall consider the received *UL Interference Overload Indication* IE value valid until reception of a new LOAD INFORMATION message carrying an update of the same IE.

If the *UL High Interference Indication* IE is received in the LOAD INFORMATION message, it indicates, per PRB, the occurrence of high interference sensitivity, as seen from the sending eNB. The receiving eNB should try to avoid scheduling cell edge UEs in its cells for the concerned PRBs. The *Target Cell ID* IE received within the *UL High Interference Information* IE group in the LOAD INFORMATION message indicates the cell for which the corresponding UL High Interference Indication is meant. The receiving eNB shall consider the value of the *UL High Interference Information* IE group valid until reception of a new LOAD INFORMATION message carrying an update.

If the *Relative Narrowband Tx Power (RNTP)* IE is received in the LOAD INFORMATION message, it indicates, per PRB or per subframe per PRB (Enhanced RNTP), whether downlink transmission power is lower than the value indicated by the *RNTP Threshold* IE. If the *Enhanced RNTP* IE is included in the *Relative Narrowband Tx Power (RNTP)* IE, it additionally indicates whether the downlink transmission power is lower than the value specified by the *RNTP High Power Threshold* IE. The receiving eNB may take such information into account when setting its scheduling policy and shall consider the received *Relative Narrowband Tx Power (RNTP)* IE value valid until reception of a new LOAD INFORMATION message carrying an update. If the *Enhanced RNTP* IE included in the *Relative Narrowband Tx Power (RNTP)* IE is present, the receiving eNB shall consider the received *Enhanced RNTP* IE value valid starting from the subframe indicated by the *Start SFN* IE and *Start Subframe Number* IE, if present.

If the *ABS Information* IE is included in the LOAD INFORMATION message, the *ABS Pattern Info* IE indicates the subframes designated as almost blank subframes by the sending eNB for the purpose of interference coordination. The receiving eNB may take such information into consideration when scheduling UEs.

The receiving eNB may use the *Measurement Subset* IE received in the LOAD INFORMATION message, for the configuration of specific measurements towards the UE.

The receiving eNB shall consider the received information as immediately applicable. The receiving eNB shall consider the value of the *ABS Information* IE valid until reception of a new LOAD INFORMATION message carrying an update.

If an ABS indicated in the ABS pattern info IE coincides with a MBSFN subframe, the receiving eNB shall consider that the subframe is designated as almost blank subframe by the sending eNB.

If the *Invoke Indication* IE is included in the LOAD INFORMATION message, it indicates which type of information the sending eNB would like the receiving eNB to send back. The receiving eNB may take such request into account.

If the *Invoke Indication* IE is set to "ABS Information", it indicates the sending eNB would like the receiving eNB to initiate the Load Indication procedure, with the LOAD INFORMATION message containing the *ABS Information* IE indicating non-zero ABS patterns in the relevant cells. If the *Invoke Indication* IE is set to "Start NAICS Information", it indicates the sending eNB would like the receiving eNB to initiate the Load Indication procedure with the LOAD INFORMATION message containing the *Dynamic DL transmission information* IE. The first time the *Dynamic DL transmission information* IE is signalled after receiving the *Invoke Indication* IE set to "Start NAICS Information", all the NAICS parameters in the *NAICS Information* IE shall be included. If the *Invoke Indication* IE is set to "Stop NAICS Information", it indicates the sending eNB does not need NAICS information and therefore the receiving eNB should stop signalling NAICS parameters for the concerned cell.

If the *NAICS Information* IE is set to "NAICS Active", the receiving eNB may use it for the configuration of DL interference mitigation assistance information towards the UE. Information included in the *NAICS Information* IE shall replace corresponding NAICS information existing at the receiver. If the *NAICS Information* IE is set to "NAICS Inactive", the receiving eNB shall consider the existing NAICS information as invalid.

If the *Intended UL-DL Configuration* IE is included in the LOAD INFORMATION message, it indicates the UL-DL configuration intended to be used by the indicated cell. The receiving eNB may take such information into account when setting its scheduling policy and shall consider the received *Intended UL-DL Configuration* IE value valid until reception of a new LOAD INFORMATION message carrying an update of the same IE.

If the Extended UL Interference Overload Info IE is received in the LOAD INFORMATION message, the Extended UL Interference Overload Indication IE indicates the interference level experienced by the indicated cell on all resource blocks, per PRB, in the UL subframe(s) which is represented as value '1' in the Associated Subframes IE. The receiving eNB may take such information into account when setting its scheduling policy and shall consider the received Extended UL Interference Overload Info IE value valid until reception of a new LOAD INFORMATION message carrying an update of the same IE.

If the *CoMP Information* IE is received in the LOAD INFORMATION message, the receiving eNB may take the IE into account for RRM. The receiving eNB shall consider the *CoMP Information* IE valid starting in the subframe indicated by the *Start SFN* IE and *Start Subframe Number* IE, if present. If the *Start SFN* IE and *Start Subframe Number* IE are not present, then the receiving eNB shall consider the *CoMP Information* IE as immediately valid. The receiving eNB shall consider the *CoMP Information* IE valid until an update of the same IE, received in a new LOAD INFORMATION message, is considered valid.

8.3.1.3 Unsuccessful Operation

Not applicable.

8.3.1.4 Abnormal Conditions

Void.

8.3.2 Error Indication

8.3.2.1 General

The Error Indication procedure is initiated by an eNB to report detected errors in one incoming message, provided they cannot be reported by an appropriate failure message.

If the error situation arises due to reception of a message utilising UE associated signalling, then the Error Indication procedure uses UE-associated signalling. Otherwise the procedure uses non UE-associated signalling.

8.3.2.2 Successful Operation



Figure 8.3.2.2-1: Error Indication, successful operation.

When the conditions defined in clause 10 are fulfilled, the Error Indication procedure is initiated by an ERROR INDICATION message sent from the node detecting the error situation.

The ERROR INDICATION message shall contain at least either the Cause IE or the Criticality Diagnostics IE.

In case the Error Indication procedure is triggered by UE associated signalling, in the course of handover signalling and signalling for dual connectivity, the *Old eNB UE X2AP ID* IE and the *New eNB UE X2AP ID* IE shall be included in the ERROR INDICATION message. If one or both of *Old eNB UE X2AP ID* IE and *New eNB UE X2AP ID* IE are not correct, the cause shall be set to appropriate value e.g. "unknown Old eNB UE X2AP ID", "unknown New eNB UE X2AP ID" or "unknown pair of UE X2AP ID".

If the UE-associated signalling connection is identified by extended eNB UE X2AP IDs the specification text above is applicable for the UE X2AP ID Extension accordingly.

8.3.2.3 Unsuccessful Operation

Not applicable.

8.3.2.4 Abnormal Conditions

Not applicable.

8.3.3 X2 Setup

8.3.3.1 General

The purpose of the X2 Setup procedure is to exchange application level configuration data needed for two eNBs to interoperate correctly over the X2 interface. This procedure erases any existing application level configuration data in the two nodes and replaces it by the one received. This procedure also resets the X2 interface like a Reset procedure would do.

The procedure uses non UE-associated signalling.

8.3.3.2 Successful Operation

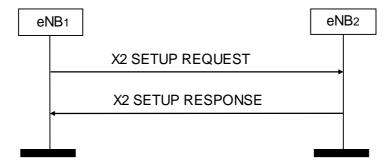


Figure 8.3.3.2-1: X2 Setup, successful operation

An eNB_1 initiates the procedure by sending the X2 SETUP REQUEST message to a candidate eNB_2 . The candidate eNB_2 replies with the X2 SETUP RESPONSE message. The initiating eNB_1 shall transfer the complete list of its served cells and, if available, a list of supported GU Group Ids to the candidate eNB_2 . The candidate eNB_2 shall reply with the complete list of its served cells and shall include, if available, a list of supported GU Group Ids in the reply.

If a cell is switched off for energy savings reasons, it should be activated before initiating or responding to the X2 Setup procedure and shall still be included in the list of served cells.

The initiating eNB₁ may include the *Neighbour Information* IE in the X2 SETUP REQUEST message. The candidate eNB₂ may also include the *Neighbour Information* IE in the X2 SETUP RESPONSE message. The *Neighbour Information* IE shall only include E-UTRAN cells that are direct neighbours of cells in the reporting eNB. A direct neighbour of one cell of a given eNB may be any cell belonging to an eNB that is a neighbour of that given eNB cell e.g. even if the cell has not been reported by a UE. The initiating eNB₁ may include the *TAC* IE with the *Neighbour Information* IE in the X2 SETUP REQUEST message. The candidate eNB₂ may also include the *TAC* IE with the *Neighbour Information* IE in the X2 SETUP RESPONSE message. The eNB receiving the IE may use it according to TS 36.300 [15].

The initiating eNB₁ may include the *Number of Antenna Ports* IE in the X2 SETUP REQUEST message. The candidate eNB₂ may also include the *Number of Antenna Ports* IE in the X2 SETUP RESPONSE message. The eNB receiving the IE may use it according to TS 36.331 [9].

The initiating eNB_1 may include the *PRACH Configuration* IE in the X2 SETUP REQUEST message. The candidate eNB_2 may also include the *PRACH Configuration* IE in the X2 SETUP RESPONSE message. The eNB receiving the IE may use this information for RACH optimisation.

The initiating eNB₁ may include the *MBSFN Subframe Info* IE in the X2 SETUP REQUEST message. The candidate eNB₂ may also include the *MBSFN Subframe Info* IE in the X2 SETUP RESPONSE message. The eNB receiving the IE may use it according to TS 36.331 [9].

For each CSG cell or hybrid cell served by the initiating eNB₁ the X2 SETUP REQUEST message shall contain the *CSG ID* IE. For each CSG cell or hybrid cell served by the candidate eNB₂ the X2 SETUP RESPONSE message shall contain the *CSG ID* IE. The eNB receiving the IE shall take this information into account when further deciding whether X2 handover between the source cell and the target cell may be performed.

The initiating eNB₁ may include the *MBMS Service Area Identity List* IE in the X2 SETUP REQUEST message. The candidate eNB₂ may also include the *MBMS Service Area Identity List* IE in the X2 SETUP RESPONSE message. The eNB receiving the IE may use it according to TS 36.300 [15].

For each cell served by the initiating eNB₁ the X2 SETUP REQUEST message may contain the *MultibandInfoList* IE and may also contain the *FreqBandIndicatorPriority* IE. For each cell served by the candidate eNB₂ the X2 SETUP RESPONSE message may contain the *MultibandInfoList* IE and may also contain the *FreqBandIndicatorPriority* IE. The eNB receiving the *MultibandInfoList* IE shall, if supported, take this information into account when further deciding whether subsequent mobility actions between the source cell and the target cell may be performed, and use this IE and the *FreqBandIndicatorPriority* IE, if received, as specified in TS 36.331 [9].

The initiating eNB₁ may include the *LHN ID* IE in the X2 SETUP REQUEST message. The candidate eNB₂ may also include *LHN ID* IE in the X2 SETUP RESPONSE message. The eNB receiving the IE may use it according to TS 36.300 [15].

8.3.3.3 Unsuccessful Operation

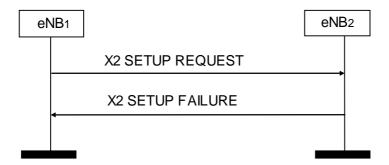


Figure 8.3.3.3-1: X2 Setup, unsuccessful operation

If the candidate eNB_2 cannot accept the setup it shall respond with an X2 SETUP FAILURE message with appropriate cause value.

If the X2 SETUP FAILURE message includes the *Time To Wait* IE the initiating eNB₁ shall wait at least for the indicated time before reinitiating the X2 Setup procedure towards the same eNB₂.

8.3.3.4 Abnormal Conditions

If the first message received for a specific TNL association is not an X2 SETUP REQUEST, X2 SETUP RESPONSE, or X2 SETUP FAILURE message then this shall be treated as a logical error.

If the initiating eNB₁ does not receive either X2 SETUP RESPONSE message or X2 SETUP FAILURE message, the eNB₁ may reinitiate the X2 Setup procedure towards the same eNB, provided that the content of the new X2 SETUP REQUEST message is identical to the content of the previously unacknowledged X2 SETUP REQUEST message.

If the initiating eNB₁ receives an X2 SETUP REQUEST message from the peer entity on the same X2 interface:

- In case the eNB₁ answers with an X2 SETUP RESPONSE message and receives a subsequent X2 SETUP FAILURE message, the eNB₁ shall consider the X2 interface as non operational and the procedure as unsuccessfully terminated according to sub clause 8.3.3.3.
- In case the eNB₁ answers with an X2 SETUP FAILURE message and receives a subsequent X2 SETUP RESPONSE message, the eNB₁ shall ignore the X2 SETUP RESPONSE message and consider the X2 interface as non operational.

8.3.4 Reset

8.3.4.1 General

The purpose of the Reset procedure is to align the resources in eNB_1 and eNB_2 in the event of an abnormal failure. The procedure resets the X2 interface. This procedure doesn"t affect the application level configuration data exchanged during, e.g., the X2 Setup procedure.

The procedure uses non UE-associated signalling.

8.3.4.2 Successful Operation

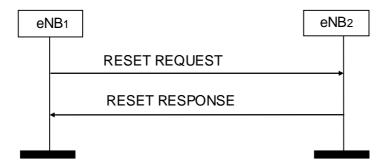


Figure 8.3.4.2-1: Reset, successful operation

The procedure is initiated with a RESET REQUEST message sent from the eNB_1 to the eNB_2 . Upon receipt of this message, eNB_2 shall abort any other ongoing procedures over X2 between eNB_1 and eNB_2 . The eNB_2 shall delete all the context information related to the eNB_1 , except the application level configuration data exchanged during the X2 Setup or eNB Configuration Update procedures, and release the corresponding resources. After completion of release of the resources, the eNB_2 shall respond with a RESET RESPONSE message.

8.3.4.3 Unsuccessful Operation

Void.

8.3.4.4 Abnormal Conditions

If the RESET REQUEST message is received, any other ongoing procedure (except another Reset procedure) on the same X2 interface shall be aborted.

If Reset procedure is ongoing and the eNB_2 receives the RESET REQUEST message from the peer entity on the same X2 interface, the eNB_2 shall respond with the RESET RESPONSE message as described in 8.3.4.2.

If the initiating eNB does not receive RESET RESPONSE message, the eNB₁ may reinitiate the Reset procedure towards the same eNB, provided that the content of the new RESET REQUEST message is identical to the content of the previously unacknowledged RESET REQUEST message.

8.3.5 eNB Configuration Update

8.3.5.1 General

The purpose of the eNB Configuration Update procedure is to update application level configuration data needed for two eNBs to interoperate correctly over the X2 interface.

The procedure uses non UE-associated signalling.

8.3.5.2 Successful Operation

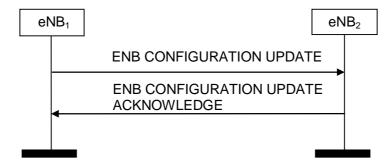


Figure 8.3.5.2-1: eNB Configuration Update, successful operation

An eNB_1 initiates the procedure by sending an ENB CONFIGURATION UPDATE message to a peer eNB_2 . Such message shall include an appropriate set of up-to-date configuration data, including, but not limited to, the complete lists of added, modified and deleted served cells, that eNB_1 has just taken into operational use.

Upon reception of an ENB CONFIGURATION UPDATE message, eNB_2 shall update the information for eNB_1 as follows:

Update of Served Cell Information:

- If Served Cells To Add IE is contained in the ENB CONFIGURATION UPDATE message, eNB₂ shall add cell information according to the information in the Served Cell Information IE.
- If *Number of Antenna Ports* IE is contained in the *Served Cell Information* IE in the ENB CONFIGURATION UPDATE message, eNB₂ may use this information according to TS 36.331 [9].
- If the *PRACH Configuration* IE is contained in the *Served Cell Information* IE in the ENB CONFIGURATION UPDATE message, the eNB receiving the IE may use this information for RACH optimisation.
- If Served Cells To Modify IE is contained in the ENB CONFIGURATION UPDATE message, eNB₂ shall modify information of cell indicated by Old ECGI IE according to the information in the Served Cell Information IE.
- If MBSFN Subframe Info IE is contained in the Served Cell Information IE in the ENB CONFIGURATION UPDATE message, eNB₂ may use this information according to TS 36.331 [9]. If a MBSFN subframe indicated in the MBSFN Subframe Info IE coincides with an ABS, the eNB₂ shall consider that the subframe is designated as ABS by the sending eNB.

When either served cell information or neighbour information of an existing served cell in eNB_1 need to be updated, the whole list of neighbouring cells, if any, shall be contained in the *Neighbour Information* IE.

If the *Deactivation Indication* IE is contained in *Served Cells To Modify* IE, it indicates that the concerned cell was switched off to lower energy consumption.

The eNB_2 shall overwrite the served cell information and the whole list of neighbour cell information for the affected served cell.

- If *Served Cells To Delete* IE is contained in the ENB CONFIGURATION UPDATE message, eNB₂ shall delete information of cell indicated by *Old ECGI* IE.
- If *MBMS Service Area Identity List* IE is contained in the *Served Cell Information* IE in the ENB CONFIGURATION UPDATE message, the eNB receiving the IE may use it according to TS 36.300 [15].

When the MBMS Service Area Identities of a cell in eNB_1 need to be updated, the whole list of MBMS Service Area Identities of the affected cell shall be contained in the Served Cell Information IE.

Update of GU Group Id List:

- If GU Group Id To Add List IE is contained in the ENB CONFIGURATION UPDATE message, eNB₂ shall add the GU Group Id to its GU Group Id List.
- If *GU Group Id To Delete List* IE is contained in the ENB CONFIGURATION UPDATE message, eNB₂ shall remove the GU Group Id from its GU Group Id List.

If *Neighbour Information* IE is contained in the ENB CONFIGURATION UPDATE message, eNB₂ may use this information to update its neighbour cell relations, or use it for other functions, like PCI selection. The *Neighbour Information* IE shall only include E-UTRAN cells that are direct neighbours of cells in the reporting eNB. A direct neighbour of one cell of a given eNB may be any cell belonging to an eNB that is a neighbour of that given eNB cell e.g. even if that cell has not been reported by a UE. The *Neighbour Information* IE may contain the *TAC* IE of the included cells. The receiving eNB may use *TAC* IE, as described in TS 36.300 [15].

After successful update of requested information, eNB₂ shall reply with the ENB CONFIGURATION UPDATE ACKNOWLEDGE message to inform the initiating eNB₁ that the requested update of application data was performed successfully. In case the peer eNB₂ receives an ENB CONFIGURATION UPDATE without any IE except for *Message Type* IE it shall reply with ENB CONFIGURATION UPDATE ACKNOWLEDGE message without performing any updates to the existing configuration.

The eNB₁ may initiate a further eNB Configuration Update procedure only after a previous eNB Configuration Update procedure has been completed.

For each cell served by the initiating eNB_1 the ENB CONFIGURATION UPDATE message may contain the *MultibandInfoList* IE and may also contain the *FreqBandIndicatorPriority* IE. The eNB receiving the *MultibandInfoList* IE shall, if supported, take this information into account when further deciding whether subsequent mobility actions between the source cell and the target cell may be performed, and use this IE and the *FreqBandIndicatorPriority* IE, if received, as specified in TS 36.331 [9].

If the Coverage Modification List IE is present, eNB₂ may use the information in the Cell Coverage State IE to identify the cell deployment configuration enabled by eNB₁ and for configuring the mobility towards the cell(s) indicated by the ECGI IE, as described in TS 36.300 [15]. If the Cell Deployment Status Indicator IE is present in the Coverage Modification List IE, the eNB₂ shall consider the cell deployment configuration of the cell to be modified as the next planned configuration and shall remove any planned configuration stored for this cell. If the Cell Deployment Status Indicator IE is present and the Cell Replacing Info IE contains non-empty cell list, the eNB₂ may use this list to avoid connection or re-establishment failures during the reconfiguration, e.g. consider the cells in the list as possible alternative handover targets. If the Cell Deployment Status Indicator IE is not present, the eNB₂ shall consider the cell deployment configuration of cell to be modified as activated and replace any previous configuration for the cells indicated in the Coverage Modification List IE.

Interaction with the eNB Configuration Update procedure:

If an eNB₂ which has not stored a *FreqBandIndicatorPriority* IE received from eNB₁, but has signaled a *FreqBandIndicatorPriority* IE to eNB₁ after the TNL association has become available, receives an ENB CONFIGURATION UPDATE message from eNB₁ containing the *FreqBandIndicatorPriority* IE, the eNB₂ shall initiate the eNB Configuration Update procedure towards eNB₁ including the *FreqBandIndicatorPriority* IE.

8.3.5.3 Unsuccessful Operation

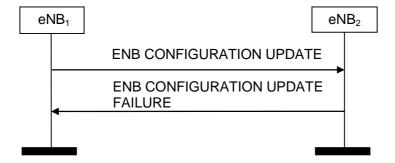


Figure 8.3.5.3-1: eNB Configuration Update, unsuccessful operation

If the eNB_2 can not accept the update it shall respond with an ENB CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the ENB CONFIGURATION UPDATE FAILURE message includes the *Time To Wait* IE the eNB₁ shall wait at least for the indicated time before reinitiating the eNB Configuration Update procedure towards the same eNB₂. Both nodes shall continue to operate the X2 with their existing configuration data.

8.3.5.4 Abnormal Conditions

If the eNB₁ after initiating eNB Configuration Update procedure receives neither ENB CONFIGURATION UPDATE ACKNOWLEDGE message nor ENB CONFIGURATION UPDATE FAILURE message, the eNB₁ may reinitiate the eNB Configuration Update procedure towards the same eNB₂, provided that the content of the new ENB CONFIGURATION UPDATE message is identical to the content of the previously unacknowledged ENB CONFIGURATION UPDATE message.

8.3.6 Resource Status Reporting Initiation

8.3.6.1 General

This procedure is used by an eNB to request the reporting of load measurements to another eNB.

The procedure uses non UE-associated signalling.

8.3.6.2 Successful Operation

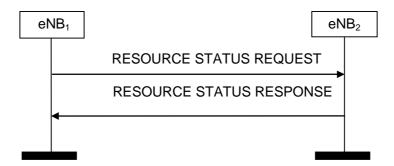


Figure 8.3.6.2-1: Resource Status Reporting Initiation, successful operation

The procedure is initiated with a RESOURCE STATUS REQUEST message sent from eNB₁ to eNB₂. Upon receipt, eNB₂:

- shall initiate the requested measurement according to the parameters given in the request in case the *Registration Request* IE set to "start"; or
- shall stop all cells measurements and terminate the reporting in case the *Registration Request* IE is set to 'stop"; or
- if supported, stop cell measurements and terminate the reporting for cells indicated in the *Cell To Report* IE list, in case the *Registration Request* IE is set to "partial stop"; or
- if supported, add cells indicated in the *Cell To Report* IE list to the measurements initiated before for the given measurement IDs, in case the *Registration Request* IE is set to "add".

If the eNB₂ received a RESOURCE STATUS REQUEST message, which includes the *Registration Request* IE set to "stop", the *Cell To Report* IE list shall be ignored.

If the *Registration Request* IE is set to "start" then the *Report Characteristics* IE shall be included in RESOURCE STATUS REQUEST message. The eNB₂ shall ignore the *Report Characteristics* IE, if the *Registration Request* IE is not set to "start".

The *Report Characteristics* IE indicates the type of objects eNB₂ shall perform measurements on. For each cell, the eNB₂ shall include in the RESOURCE STATUS UPDATE message:

- the *Radio Resource Status* IE, if the first bit, 'PRB Periodic' of the *Report Characteristics* IE included in the RESOURCE STATUS REQUEST message is set to 1;
- the *S1 TNL Load Indicator* IE, if the second bit, 'TNL Load Ind Periodic' of the *Report Characteristics* IE included in the RESOURCE STATUS REQUEST message is set to 1;

- the *Hardware Load Indicator* IE, if the third bit, 'HW Load Ind Periodic' of the *Report Characteristics* IE included in the RESOURCE STATUS REQUEST message is set to 1;
- the *Composite Available Capacity Group* IE, if the fourth bit, 'Composite Available Capacity Periodic' of the *Report Characteristics* IE included in the RESOURCE STATUS REQUEST message is set to 1. If *Cell Capacity Class Value* IE is included within the *Composite Available Capacity Group* IE, this IE is used to assign weights to the available capacity indicated in the *Capacity Value* IE;
- the ABS Status IE, if the fifth bit, 'ABS Status Periodic' of the Report Characteristics IE included in the RESOURCE STATUS REQUEST message is set to 1 and eNB₁ had indicated the ABS pattern to eNB₂;
- the RSRP Measurement Report List IE, if the sixth bit, 'RSRP Measurement Report Periodic' of the Report Characteristics IE included in the RESOURCE STATUS REQUEST message is set to 1;
- the *CSI Report* IE, if the seventh bit, 'CSI Report Periodic' of the *Report Characteristics* IE included in the RESOURCE STATUS REQUEST message is set to 1.

If the *Reporting Periodicity* IE is included in the RESOURCE STATUS REQUEST message, eNB₂ shall use its value as the time interval between two subsequent RESOURCE STATUS UPDATE messages that include the *Radio Resource Status* IE, *S1 TNL Load Indicator* IE, *Hardware Load Indicator* IE, *Composite Available Capacity Group* IE, or *ABS Status* IE.

If the *Reporting Periodicity of RSRP Measurement Report* IE is included in the RESOURCE STATUS REQUEST message, eNB₂ shall use its value as the minimum time interval between two subsequent RESOURCE STATUS UPDATE messages that include the *RSRP Measurement Report List* IE.

If the *Reporting Periodicity of CSI Report* IE is included in the RESOURCE STATUS REQUEST message, eNB₂ shall use its value as the minimum time interval between two subsequent RESOURCE STATUS UPDATE messages that include the *CSI Report* IE.

If eNB₂ is capable to provide all requested resource status information, it shall initiate the measurement as requested by eNB₁, and respond with the RESOURCE STATUS RESPONSE message.

If eNB₂ is capable to provide some but not all of the requested resource status information and the *Partial Success Indicator* IE is present in the RESOURCE STATUS REQUEST message, it shall initiate the measurement for the admitted measurement objects and include the *Measurement Initiation Result* IE in the RESOURCE STATUS RESPONSE message.

8.3.6.3 Unsuccessful Operation

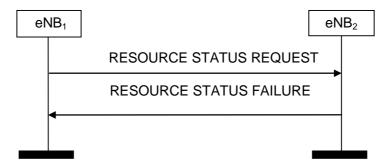


Figure 8.3.6.3-1: Resource Status Reporting Initiation, unsuccessful operation

If none of the requested measurements can be initiated, eNB_2 shall send a RESOURCE STATUS FAILURE message. The *Cause* IE shall be set to an appropriate value e.g. "Measurement Temporarily not Available" or "Measurement not Supported For The Object" for each requested measurement object. The eNB may use the *Complete Failure Cause Information* IE to enhance the failure cause information per measurement in the RESOURCE STATUS FAILURE message.

8.3.6.4 Abnormal Conditions

If the initiating eNB₁ does not receive either RESOURCE STATUS RESPONSE message or RESOURCE STATUS FAILURE message, the eNB₁ may reinitiate the Resource Status Reporting Initiation procedure towards the same eNB,

provided that the content of the new RESOURCE STATUS REQUEST message is identical to the content of the previously unacknowledged RESOURCE STATUS REQUEST message.

If the initiating eNB₁ receives the RESOURCE STATUS RESPONSE message including the *Measurement Initiation Result* IE containing no admitted measurements, the eNB₁ shall consider the procedure as failed.

If the *Report Characteristics* IE bitmap is set to "0" (all bits are set to "0") in the RESOURCE STATUS REQUEST message then eNB₂ shall initiate a RESOURCE STATUS FAILURE message, the cause shall be set to appropriate value e.g. "ReportCharacteristicsEmpty".

If the *Reporting Periodicity* IE value is not specified when at least one of the bits of the *Report Characteristics* IE, for which semantics is specified, other than the sixth or seventh bit, is set to 1 then eNB₂ shall initiate a RESOURCE STATUS FAILURE message, the cause shall be set to appropriate value e.g. "NoReportPeriodicity".

If the *Reporting Periodicity of RSRP Measurement Report* IE value is not specified when the sixth bit of the *Report Characteristics* IE is set to 1, then eNB₂ shall initiate the RESOURCE STATUS FAILURE message and the cause shall be set to appropriate value e.g. "NoReportPeriodicity".

If the *Reporting Periodicity of CSI Report* IE value is not specified when the seventh bit of the *Report Characteristics* IE is set to 1, then eNB₂ shall initiate the RESOURCE STATUS FAILURE message and the cause shall be set to appropriate value e.g. "NoReportPeriodicity".

If the eNB₂ received a RESOURCE STATUS REQUEST message which includes the *Registration Request* IE set to "start" and the *eNB1Measurement ID* IE corresponding to an existing on-going load measurement reporting, then eNB₂ shall initiate a RESOURCE STATUS FAILURE message, the cause shall be set to appropriate value e.g. "ExistingMeasurementID".

If the *Registration Request* IE is set to "stop", "partial stop" or "add" and the RESOURCE STATUS REQUEST message does not contain *eNB2 Measurement ID* IE, eNB₂ shall consider the procedure as failed and respond with the RESOURCE STATUS FAILURE message, the cause shall be set to appropriate value e.g. "Unknown eNB Measurement ID".

If the *Registration Request* IE is set to "partial stop" and the *Cell To Report* IE contains cells that have not been initiated for the reporting before, eNB₂ shall consider the procedure as failed and respond with the RESOURCE STATUS FAILURE message, the cause shall be set to appropriate value e.g. "Cell not Available". If the *Registration Request* IE is set to "add" and the *Cell To Report* IE contains cells that have been initiated for the reporting before, eNB₂ shall consider the procedure as failed and respond with the RESOURCE STATUS FAILURE message, the cause shall be set to appropriate value e.g. "Cell not Available".

8.3.7 Resource Status Reporting

8.3.7.1 General

This procedure is initiated by eNB₂ to report the result of measurements admitted by eNB₂ following a successful Resource Status Reporting Initiation procedure.

The procedure uses non UE-associated signalling.

8.3.7.2 Successful Operation



Figure 8.3.7.2-1: Resource Status Reporting, successful operation

The eNB₂ shall report the results of the admitted measurements in RESOURCE STATUS UPDATE message. The admitted measurements are the measurements that were successfully initiated during the preceding Resource Status Reporting Initiation procedure, and thus not reported in the *Measurement Failed Report Characteristics* IE for the concerned cell in the RESOURCE STATUS RESPONSE message.

If the eNB₁ receives the RESOURCE STATUS UPDATE message which includes the *UE ID* IE in the *RSRP Measurement Report List* IE, the eNB₁ may use the *UE ID* IE to link the associated RSRP measurement report with other measurement results (e.g. CSI reports, RSRP measurement reports) of the same UE.

If the *CSI Report* IE including the *CSI Process Configuration Index* IE is received, eNB₁ shall interpret this IE as an index identifying one of the *CSI* process configurations that can be configured for all UEs within the cell where the *CSI* measurements were collected. For all UEs within the cell, the maximum number of *CSI* process configurations is given by the maximum value of the *CSI Process Configuration Index* IE.

If the eNB₁ receives the RESOURCE STATUS UPDATE message, which includes the *Cell Reporting Indicator* IE set to "stop request" in one or more items of the *Cell Measurement Result* IE, the eNB₁ should initialise the Resource Status Reporting Initiation procedure to remove all or some of the corresponding cells from the measurement.

8.3.7.3 Unsuccessful Operation

Not applicable.

8.3.7.4 Abnormal Conditions

If the eNB₁ receives a RESOURCE STATUS UPDATE message which includes the *ABS Status* IE, and all bits in the *Usable ABS Pattern Info* IE are set to '0', the eNB1 shall ignore the *DL ABS Status* IE.

8.3.8 Mobility Settings Change

8.3.8.1 General

This procedure enables an eNB to negotiate the handover trigger settings with a peer eNB controlling neighbouring cells.

The procedure uses non UE-associated signalling.

8.3.8.2 Successful Operation

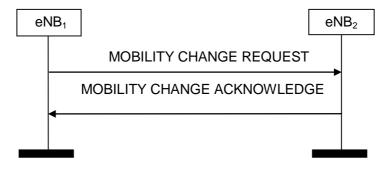


Figure 8.3.8.2-1: Mobility Settings Change, successful operation

The procedure is initiated with a MOBILITY CHANGE REQUEST message sent from eNB₁ to eNB₂.

Upon receipt, eNB₂ shall evaluate if the proposed eNB₂ handover trigger modification may be accepted. If eNB₂ is able to successfully complete the request it shall reply with MOBILITY CHANGE ACKNOWLEDGE.

8.3.8.3 Unsuccessful Operation

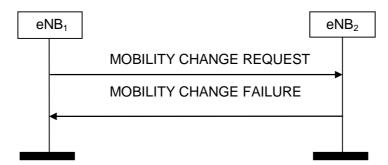


Figure 8.3.8.3-1: Mobility Settings Change, unsuccessful operation

If the requested parameter modification is refused by the eNB₂, or if the eNB₂ is not able to complete the procedure, the eNB₂ shall send a MOBILITY CHANGE FAILURE message with the *Cause* IE set to an appropriate value. The eNB₂ may include *eNB2 Mobility Parameters Modification Range* IE in MOBILITY CHANGE FAILURE message, for example in cases when the proposed change is out of permitted range.

8.3.8.4 Abnormal Conditions

Void.

8.3.9 Radio Link Failure Indication

8.3.9.1 General

The purpose of the Radio Link Failure Indication procedure is to transfer information regarding RRC re-establishment attempts, or received RLF Reports, between eNBs. The signalling takes place from the eNB at which a re-establishment attempt is made, or an RLF Report is received, to an eNB to which the UE concerned may have previously been attached prior to the connection failure. This may aid the detection of radio link failure and handover failure cases (TS 36.300 [15]).

The procedure uses non UE-associated signalling.

8.3.9.2 Successful Operation

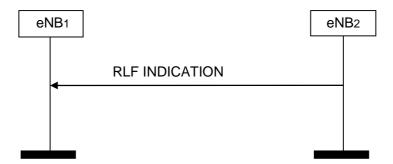


Figure 8.3.9.2-1: Radio Link Failure Indication, successful operation

 eNB_2 initiates the procedure by sending the RLF INDICATION message to eNB_1 following a re-establishment attempt or an RLF Report reception from a UE at eNB_2 , when eNB_2 considers that the UE may have previously suffered a connection failure at a cell controlled by eNB_1 .

 eNB_2 may include the *ShortMAC-I* IE in the RLF INDICATION message, e.g., in order to aid the eNB_1 to resolve a potential PCI confusion situation or to aid the eNB_1 to identify the UE.

eNB₂ may include the *UE RLF Report Container* IE and optionally also the *UE RLF Report Container for extended bands* IE in the RLF INDICATION message, which may be used by the eNB₁ to determine the nature of the failure. If the *UE RLF Report Container* IE is included in the RLF INDICATION message sent after successful re-establishment,

the eNB₂ shall use the *Re-establishment Cell ECGI* IE in the RLF INDICATION message to indicate the ECGI of the cell where the re-establishment was successful.

eNB₂ may include the *RRC Conn Setup Indicator* IE in the RLF INDICATION message, which indicates that the RLF Report is retrieved after an RRC connection setup or an incoming successful handover.

If the *RRC Conn Setup Indicator* IE is present in the RLF INDICATION message, the eNB₁ shall ignore the values in the *Failure cell PCI* IE, *Re-establishment cell ECGI* IE, *C-RNTI* IE and *ShortMAC-I* IE.

eNB₂ may include the *RRC Conn Reestab Indicator* IE in the RLF INDICATION message, which may be used by the eNB₁ to determine where the failure occurred.

8.3.9.3 Unsuccessful Operation

Not applicable.

8.3.9.4 Abnormal Conditions

Void.

8.3.10 Handover Report

8.3.10.1 General

The purpose of the Handover Report procedure is to transfer mobility related information between eNBs.

The procedure uses non UE-associated signalling.

8.3.10.2 Successful Operation



Figure 8.3.10.2-1: Handover Report, successful operation

An eNB initiates the procedure by sending an HANDOVER REPORT message to another eNB. By sending the message eNB₁ indicates to eNB₂ that a mobility-related problem was detected.

If the $Handover\ Report\ Type\ IE$ is set to "HO too early" or "HO to wrong cell", then the eNB_1 indicates to eNB_2 that, following a successful handover from a cell of eNB_2 to a cell of eNB_1 , a radio link failure occurred and the UE attempted RRC Re-establishment either at the original cell of eNB_2 (Handover Too Early), or at another cell (Handover to Wrong Cell). The detection of Handover Too Early and Handover to Wrong Cell events is made according to TS 36.300 [15].

If the UE-related information is available in eNB₁, the eNB₁ should include in HANDOVER REPORT message:

- the Mobility Information IE, if the Mobility Information IE was sent for this handover from eNB₂;
- the Source cell C-RNTI IE.

If received, the eNB₂ uses the above information according to TS 36.300 [15].

If the UE RLF Report received from the eNB sending the RLF INDICATION message, as described in TS 36.300 [15], is available, the eNB₁ may also include it in the HANDOVER REPORT as *UE RLF Report Container* IE and optionally also *UE RLF Report Container for extended bands* IE.

If the *Handover Report Type* IE is set to "InterRAT ping-pong", then the eNB₁ indicates to eNB₂ that a completed handover from a cell of eNB₂ to a cell in other RAT might have resulted in an inter-RAT ping-pong and the UE was successfully handed over to a cell of eNB₁ (indicated with *Failure cell ECGI* IE).

The report contains the source and target cells, and cause of the handover. If the *Handover Report Type* IE is set to "HO to wrong cell", then the *Re-establishment cell ECGI* IE shall be included in the HANDOVER REPORT message. If the *Handover Report Type* IE is set to "InterRAT ping-pong", then the *Target cell in UTRAN* IE shall be included in the HANDOVER REPORT message.

8.3.10.3 Unsuccessful Operation

Not applicable.

8.3.10.4 Abnormal Conditions

Void.

8.3.11 Cell Activation

8.3.11.1 General

The purpose of the Cell Activation procedure is to request to a neighbouring eNB to switch on one or more cells, previously reported as inactive due to energy saving reasons.

The procedure uses non UE-associated signalling.

8.3.11.2 Successful Operation

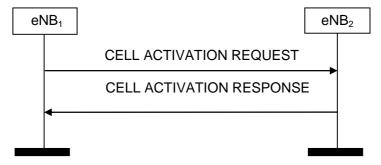


Figure 8.3.11.2-1: Cell Activation, successful operation

An eNB₁ initiates the procedure by sending a CELL ACTIVATION REQUEST message to a peer eNB₂.

Upon receipt of this message, eNB_2 should activate the cell/s indicated in the CELL ACTIVATION REQUEST message and shall indicate in the CELL ACTIVATION RESPONSE message for which cells the request was fulfilled.

Interactions with eNB Configuration Update procedure:

 eNB_2 shall not send an ENB CONFIGURATION UPDATE message to eNB_1 just for the reason of the cell/s indicated in the CELL ACTIVATION REQUEST message changing state, as the receipt of the CELL ACTIVATION RESPONSE message by eNB_1 is used to update the information about cell activation state of eNB_2 cells in eNB_1 .

8.3.11.3 Unsuccessful Operation

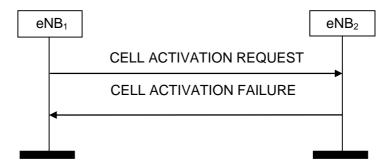


Figure 8.3.11.3-1: Cell Activation, unsuccessful operation

If the eNB_2 cannot activate any of the cells indicated in the CELL ACTIVATION REQUEST message, it shall respond with a CELL ACTIVATION FAILURE message with an appropriate cause value.

8.3.11.4 Abnormal Conditions

Not applicable.

8.3.12 X2 Removal

8.3.12.1 General

The purpose of the X2 Removal procedure is to remove the signaling connection between two eNBs in a controlled manner. If successful, this procedure erases any existing application level configuration data in the two nodes.

The procedure uses non UE-associated signaling.

8.3.12.2 Successful Operation

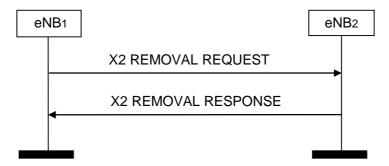


Figure 8.3.12.2-1: X2 Removal, successful operation

An eNB $_1$ initiates the procedure by sending the X2 REMOVAL REQUEST message to a candidate eNB $_2$. Upon reception of the X2 REMOVAL REQUEST message the candidate eNB $_2$ shall reply with the X2 REMOVAL RESPONSE message. After receiving the X2 REMOVAL RESPONSE message, the initiating eNB $_1$ shall initiate removal of the TNL association towards eNB $_2$ and may remove all resources associated with that signaling connection. The candidate eNB $_2$ may then remove all resources associated with that signaling connection.

If the X2 Removal Threshold IE is included in the X2 REMOVAL REQUEST message, the candidate eNB₂ shall, if supported, accept to remove the signalling connection with eNB₁ if the X2 Benefit Value of the signalling connection determined at the candidate eNB₂ is lower than the value of the X2 Removal Threshold IE.

8.3.12.3 Unsuccessful Operation

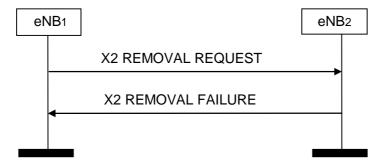


Figure 8.3.12.3-1: X2 Removal, unsuccessful operation

If the candidate eNB_2 cannot accept to remove the signaling connection with eNB_1 it shall respond with an X2 REMOVAL FAILURE message with an appropriate cause value.

8.3.12.4 Abnormal Conditions

Void.

8.3.13 Retrieve UE Context

8.3.13.1 General

The purpose of the Retrieve UE Context procedure is to retrieve the UE context from the eNB where the RRC connection has been suspended (old eNB) and transfer it to the eNB where the RRC Connection has been requested to be resumed (new eNB).

The procedure uses UE-associated signalling.

8.3.13.2 Successful Operation

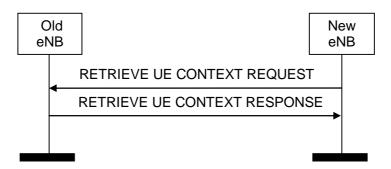


Figure 8.3.13.2-1: Retrieve UE Context, successful operation

The new eNB initiates the procedure by sending the RETRIEVE UE CONTEXT REQUEST message to the old eNB.

If the old eNB is able to identify the UE context and to successfully verify the UE by means of the Resume ID, the ShortMAC-I and the E-UTRAN Cell Identifier of the new cell contained in the RETRIEVE UE CONTEXT REQUEST message, it shall respond with the RETRIEVE UE CONTEXT RESPONSE message.

The allocation of resources according to the values of the *Allocation and Retention Priority* IE included in the *E-RAB Level QoS Parameters* IE shall follow the principles described for the E-RAB Setup procedure in TS 36.413 [4].

The old eNB may include in the GUMMEI IE any GUMMEI corresponding to the source MME node.

If the PLMN of the new cell is not the Serving PLMN stored in the UE Context the old eNB shall replace the Serving PLMN with the PLMN of the new cell and move the Serving PLMN to the equivalent PLMN list, before propagating the roaming and access restriction information to the new eNB. The new eNB shall act upon reception of the

- UE Security Capabilities IE,
- AS Security Information IE,
- Subscriber Profile ID for RAT/Frequency priority IE,
- Handover Restriction List IE,
- Location Reporting Information IE,
- Management Based MDT Allowed IE
- Management Based MDT PLMN List IE
- Trace Activation IE,
- SRVCC Operation Possible IE,
- Masked IMEISV IE
- Expected UE Behaviour IE,
- ProSe Authorized IE,

within the RETRIEVE UE CONTEXT RESPONSE message as specified for the target eNB upon reception of the HANDOVER REQUEST message for the Handover Preparation procedure.

8.3.13.3 Unsuccessful Operation

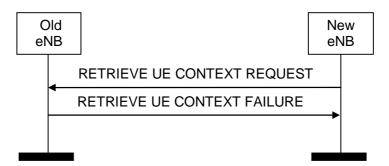


Figure 8.3.13.3-1: Retrieve UE Context, unsuccessful operation

If the old eNB is not able to identify the UE context by means of the Resume ID contained in the RETRIEVE UE CONTEXT REQUEST message, it shall respond to the new eNB with the RETRIEVE UE CONTEXT FAILURE message.

8.3.13.4 Abnormal Conditions

Void.

8.4 X2 Release

8.4.1 General

The purpose of the X2 Release procedure is to inform an eNB that the signalling (i.e. SCTP) connection to a peer eNB is unavailable.

8.4.2 Successful Operation



Figure 8.4.2-1: X2AP Release, successful operation

eNB₁ initiates the procedure by sending the X2 RELEASE message to eNB₂. Upon the reception of X2 RELEASE message, eNB₂ shall consider that the signalling connection to an eNB indicated by the *eNB ID* IE is unavailable. eNB₂ may delete all the context information related to the indicated eNB.

8.4.3 Unsuccessful Operation

Not Applicable

8.4.4 Abnormal Condition

Not Applicable.

8.5 X2AP Message Transfer

8.5.1 General

The purpose of the X2AP Message Transfer procedure is to allow indirect transport of an X2AP message (except the X2AP MESSAGE TRANSFER message) between two eNBs and to allow an eNB to perform registration.

8.5.2 Successful Operation



Figure 8.5.2-1: X2AP Message Transfer, successful operation

eNB₁ initiates the procedure by sending the X2AP MESSAGE TRANSFER message to eNB₂.

Upon the reception of X2 MESSAGE TRANSFER message the target eNB may:

- Retrieve the X2AP message included in the X2AP Message IE;

- Consider the target eNB ID contained in the *Target eNB ID* IE, included in the *RNL Header* IE, as the destination for the X2AP message signaled in the *X2AP Message* IE;
- Consider the source eNB ID contained in the *Source eNB ID* IE, included in the *RNL Header* IE, as the source of the X2AP message signaled in the *X2AP Message* IE.

In case the included *RNL Header* IE does not contain the *Target eNB ID* IE, the receiving eNB shall consider the eNB ID included in the *Source eNB ID* IE as the eNB ID corresponding to the TNL address(es) of the sender and update its internal information.

8.5.3 Unsuccessful Operation

Not Applicable.

8.5.4 Abnormal Condition

Not Applicable.

8.6 Procedures for Dual Connectivity

8.6.1 SeNB Addition Preparation

8.6.1.1 General

The purpose of the SeNB Addition Preparation procedure is to request the SeNB to allocate resources for dual connectivity operation for a specific UE.

The procedure uses UE-associated signalling.

8.6.1.2 Successful Operation

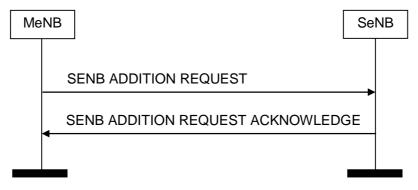


Figure 8.6.1.2-1: SeNB Addition Preparation, successful operation

The MeNB initiates the procedure by sending the SENB ADDITION REQUEST message to the SeNB. When the MeNB sends the SENB ADDITION REQUEST message, it shall start the timer T_{DCprep} .

The allocation of resources according to the values of the *Allocation and Retention Priority* IE included in the *E-RAB Level QoS Parameters* IE shall follow the principles described for the E-RAB Setup procedure in TS 36.413 [4].

If the SENB ADDITION REQUEST message contains the Serving PLMN IE, the SeNB may use it for RRM purposes.

If the SENB ADDITION REQUEST message contains the *Expected UE Behaviour* IE, the SeNB shall, if supported, store this information and may use it to optimize resource allocation.

The SeNB shall report to the MeNB, in the SENB ADDITION REQUEST ACKNOWLEDGE message, the result for all the requested E-RABs in the following way:

- A list of E-RABs which are successfully established shall be included in the *E-RABs Admitted To Be Added List* IE.
- A list of E-RABs which failed to be established shall be included in the E-RABs Not Admitted List IE.

NOTE: The MeNB may trigger the SeNB Addition Preparation procedure in the course of the Inter-MeNB handover without SeNB change procedure as described in 36.300 [15]. The deleted E-RABs are not included in the *E-RABs To Be Added List* IE in the SENB ADDITION REQUEST message, from MeNB point of view. If the SeNB reports a certain E-RAB to be successfully established, respective SCG resources, from an SeNB point of view, may be actually successfully established or modified or kept; if a certain E-RAB is reported to be failed to be established, respective SCG resources, from an SeNB point of view, may be actually failed to be established or modified or kept.

For each E-RAB configured with the SCG bearer option

- the SeNB shall choose the ciphering algorithm based on the information in the *UE Security Capabilities* IE and locally configured priority list of AS encryption algorithms and apply the key indicated in the *SeNB Security Key* IE as specified in the TS 33.401 [18].
- the MeNB may propose to apply forwarding of downlink data by including the *DL Forwarding* IE within the *E-RABs To be Added Item* IE of the SENB ADDITION REQUEST message. For each E-RAB that it has decided to admit, the SeNB may include the *DL Forwarding GTP Tunnel Endpoint* IE within the *E-RABs Admitted To Be Added Item* IE of the SENB ADDITION REQUEST ACKNOWLEDGE message to indicate that it accepts the proposed forwarding of downlink data for this bearer. This GTP tunnel endpoint may be different from the corresponding *DL GTP TEID* IE in the *E-RAB To Be Modified List* IE of the E-RAB MODIFICATION INDICATION message (see TS 36.413 [4]) depending on implementation choice.
- the SeNB may include for each bearer in the *E-RABs Admitted To Be Added List* IE the *UL Forwarding GTP Tunnel Endpoint* IE to indicate that it requests data forwarding of uplink packets to be performed for that bearer.
- If the *Correlation ID* IE for the concerned E-RAB is received by the SeNB, the SeNB shall use this information for LIPA operation for the concerned E-RAB.
- If the SIPTO Correlation ID IE for the concerned E-RAB is received by the SeNB, the SeNB shall use this information for SIPTO@LN operation for the concerned E-RAB.

If the CSG Membership Status IE is included in the SENB ADDITION REQUEST message, the SeNB shall act as specified in TS 36.300 [15].

Upon reception of the SENB ADDITION REQUEST ACKNOWLEDGE message the MeNB shall stop the timer T_{DCprep} .

If the *GW Transport Layer Address* IE is received in the SENB ADDITION REQUEST ACKNOWLEDGE message, the MeNB stores this information and use it according to TS 36.300 [15].

If the SIPTO L-GW Transport Layer Address IE is received in the SENB ADDITION REQUEST ACKNOWLEDGE message, the MeNB stores this information and use it according to TS 36.300 [15].

If the SeNB UE X2AP ID IE and/or SeNB UE X2AP ID Extension IE are contained in the SENB ADDITION REQUEST message, the SeNB shall, if supported, store this information and use it as defined in TS 36.300 [15].

If the *Tunnel Information for BBF* IE is received in the SENB ADDITION REQUEST ACKNOWLEDGE message, the MeNB shall, if supported, transfer the tunnel information for BBF to the core network.

Interactions with the SeNB Reconfiguration Completion procedure:

If the SeNB admits at least one E-RAB, the SeNB shall start the timer $T_{DCoverall}$ when sending the SENB ADDITION REQUEST ACKNOWLEDGE message to the MeNB. The reception of the SENB RECONFIGURATION COMPLETE message shall stop the timer $T_{DCoverall}$.

8.6.1.3 Unsuccessful Operation

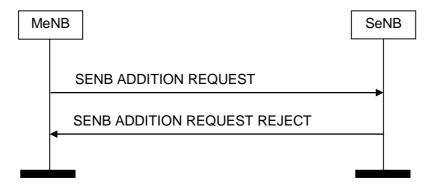


Figure 8.6.1.3-1: SeNB Addition Preparation, unsuccessful operation

If the SeNB is not able to accept any of the bearers or a failure occurs during the SeNB Addition Preparation, the SeNB sends the SENB ADDITION REQUEST REJECT message with an appropriate cause value to the MeNB.

8.6.1.4 Abnormal Conditions

If the SeNB receives a SENB ADDITION REQUEST message containing multiple *E-RAB ID* IEs (in the *E-RABs To Be Added List* IE) set to the same value, the SeNB shall consider the establishment of the corresponding E-RAB as failed.

If the SeNB receives a SENB ADDITION REQUEST message containing a *E-RAB Level QoS Parameters* IE which contains a *QCI* IE indicating a GBR bearer (as defined in TS 23.203 [13]), and which does not contain the *GBR QoS Information* IE, the SeNB shall consider the establishment of the corresponding E-RAB as failed.

If the supported algorithms for encryption defined in the *Encryption Algorithms* IE in the *UE Security Capabilities* IE, plus the mandated support of EEA0 in all UEs (TS 33.401 [18]), do not match any algorithms defined in the configured list of allowed encryption algorithms in the SeNB (TS 33.401 [18]), the SeNB shall reject the procedure using the SENB ADDITION REQUEST REJECT message.

If the SeNB receives a SENB ADDITION REQUEST message which does not contain the *CSG Membership Status* IE, and the SCell served by the SeNB is a hybrid cell, the SeNB shall reject the procedure using the SENB ADDITION REQUEST REJECT message.

If the SeNB receives a SENB ADDITION REQUEST message containing a *SeNB UE X2AP ID* IE that does not match any existing UE Context that has such ID, the SeNB shall reject the procedure using the SENB ADDITION REQUEST REJECT message.

If the SeNB receives a SENB ADDITION REQUEST message containing both the *Correlation ID* and the *SIPTO Correlation ID* IEs for the same E-RAB, the SeNB shall consider the establishment of the corresponding E-RAB as failed.

Interactions with the SeNB Reconfiguration Completion and SeNB initiated SeNB Release procedure:

If the timer $T_{DCoverall}$ expires before the SeNB has received the SENB RECONFIGURATION COMPLETE or the SENB RELEASE REQUEST message, the SeNB shall regard the requested RRC connection reconfiguration as being not applied by the UE and shall trigger the SeNB initiated SeNB Release procedure.

Interactions with the MeNB initiated SeNB Release procedure:

If the timer T_{DCprep} expires before the MeNB has received the SENB ADDITION REQUEST ACKNOWLEDGE message, the MeNB shall regard the SeNB Addition Preparation procedure as being failed and shall trigger the MeNB initiated SeNB Release procedure.

8.6.2 SeNB Reconfiguration Completion

8.6.2.1 General

The purpose of the SeNB Reconfiguration Completion procedure is to provide information to the SeNB whether the requested configuration was successfully applied by the UE.

The procedure uses UE-associated signalling.

8.6.2.2 Successful Operation



Figure 8.6.2.2-1: SeNB Reconfiguration Complete procedure, successful operation.

The MeNB initiates the procedure by sending the SENB RECONFIGURATION COMPLETE message to the SeNB.

The SENB RECONFIGURATION COMPLETE message may contain information that

- either the UE has successfully applied the configuration requested by the SeNB. The MeNB may also provide configuration information in the *MeNB to SeNB Container* IE.
- or the MeNB has not triggered configuration requested by the SeNB. The MeNB shall provide information with sufficient precision in the included *Cause* IE to enable the SeNB to know the reason for an unsuccessful reconfiguration. The MeNB may also provide configuration information in the *MeNB to SeNB Container* IE.

 $Upon\ reception\ of\ the\ SENB\ RECONFIGURATION\ COMPLETE\ message\ the\ SeNB\ shall\ stop\ the\ timer\ T_{DCoverall}.$

8.6.2.3 Abnormal Conditions

Void.

8.6.3 MeNB initiated SeNB Modification Preparation

8.6.3.1 General

This procedure is used to enable an MeNB to request an SeNB to modify the UE context at the SeNB.

The procedure uses UE-associated signalling.

8.6.3.2 Successful Operation

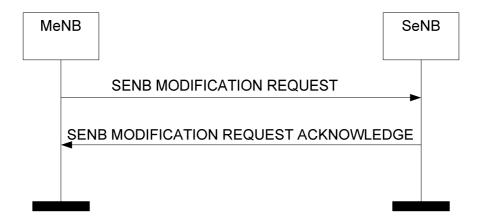


Figure 8.6.3.2-1: MeNB initiated SeNB Modification Preparation, successful operation

The MeNB initiates the procedure by sending the SENB MODIFICATION REQUEST message to the SeNB. When the MeNB sends the SENB MODIFICATION REQUEST message, it shall start the timer T_{DCprep} .

The SENB MODIFICATION REQUEST message may contain

- within the *UE Context Information* IE;
 - E-RABs to be added within the *E-RABs To Be Added Item* IE;
 - E-RABs to be modified within the *E-RABs To Be Modified Item* IE;
 - E-RABs to be released within the *E-RABs To Be Released Item* IE;
 - the SeNB UE Aggregate Maximum Bit Rate IE;
- the MeNB to SeNB Container IE;
- the SCG Change Indication IE;
- the CSG Membership Status IE.

If the SENB MODIFICATION REQUEST message contains the *Serving PLMN* IE, the SeNB may use it for RRM purposes.

If the SeNB UE Aggregate Maximum Bit Rate IE is included in the SENB MODIFICATION REQUEST message, the SeNB shall:

- replace the previously provided SeNB UE Aggregate Maximum Bit Rate by the received SeNB UE Aggregate Maximum Bit Rate in the UE context:
- use the received SeNB UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE as defined in TS 36.300 [15].

The allocation of resources according to the values of the *Allocation and Retention Priority* IE included in the *E-RAB Level QoS Parameters* IE shall follow the principles described for the E-RAB Setup procedure in TS 36.413 [4].

If at least one of the requested modifications is admitted by the SeNB, the SeNB shall modify the related part of the UE context accordingly and send the SENB MODIFICATION REQUEST ACKNOWLEDGE message back to the MeNB.

The SeNB shall include the E-RABs for which resources have been either added or modified or released at the SeNB either in the *E-RABs Admitted To Be Added List* IE or the *E-RABs Admitted To Be Modified List* IE or the *E-RABs Admitted To Be Released List* IE. The SeNB shall include the E-RABs that have not been admitted in the *E-RABs Not Admitted List* IE with an appropriate cause value.

For each E-RAB configured with the SCG bearer option

- the SeNB shall, if included, choose the ciphering algorithm based on the information in the *UE Security Capabilities* IE and locally configured priority list of AS encryption algorithms and apply the key indicated in the *SeNB Security Key* IE as specified in the TS 33.401 [18].
- if applicable, the MeNB may propose to apply forwarding of downlink data by including the *DL Forwarding* IE within the *E-RABs To Be Added Item* IE of the SENB MODIFICATION REQUEST message. For each E-RAB that it has decided to admit, the SeNB may include the *DL Forwarding GTP Tunnel Endpoint* IE within the *E-RABs Admitted To Be Added Item* IE of the SENB MODIFICATION REQUEST ACKNOWLEDGE message to indicate that it accepts the proposed forwarding of downlink data for this bearer. The MeNB may also provide for an applicable E-RAB to be released the *DL Forwarding GTP Tunnel Endpoint* IE and the *UL Forwarding GTP Tunnel Endpoint* IE within the *E-RABs To Be Released Item* IE of the SENB MODIFICATION REQUEST message.
- if applicable, the SeNB may include for each bearer in the *E-RABs Admitted To Be Added List* IE in the SENB MODIFICATION REQUEST ACKNOWLEDGE message the *UL Forwarding GTP Tunnel Endpoint* IE to indicate that it requests data forwarding of uplink packets to be performed for that bearer.
- If the *Correlation ID* IE for the concerned E-RAB is received by the SeNB, the SeNB shall use this information for LIPA operation for the concerned E-RAB.
- If the *SIPTO Correlation ID* IE for the concerned E-RAB is received by the SeNB, the SeNB shall use this information for SIPTO@LN operation for the concerned E-RAB.

For each E-RAB configured with the split bearer option to be modified, if the SENB MODIFICATION REQUEST message includes the *SCG Change Indication* IE and the *MeNB GTP Tunnel Endpoint* IE in the *E-RABs To Be Modified Item* IE, the SeNB shall act as specified in TS 36.300 [15].

For each E-RAB configured with the split bearer option to be modified (released)

- if applicable, the MeNB may provide for an applicable E-RAB to be released the *DL Forwarding GTP Tunnel Endpoint* IE within the *E-RABs To Be Released Item* IE of the SENB MODIFICATION REQUEST message.

If the *E-RAB level QoS parameter* IE is included in the SENB MODIFICATION REQUEST message for an E-RAB to be modified the SeNB shall allocate respective resources and provide corresponding radio configuration information within the *SeNB to MeNB Container* IE as described in TS 36.300 [15].

If the SENB MODIFICATION REQUEST message contains for an E-RAB to be modified which is configured with the SCG bearer option the S1 UL GTP Tunnel Endpoint IE the SeNB shall use it as the new UL S1-U address.

If the SENB MODIFICATION REQUEST message contains for an E-RAB to be modified which is configured with the split bearer option the *MeNB GTP Tunnel Endpoint* IE the SeNB shall use it as the new UL X2-U address.

For an E-RAB to be modified which is configured with the SCG bearer option the SeNB may include in the SENB MODIFICATION REQUEST ACKNOWLEDGE message the *S1 DL GTP Tunnel Endpoint* IE.

For an E-RAB to be modified which is configured with the split bearer option the SeNB may include in the SENB MODIFICATION REQUEST ACKNOWLEDGE message the *SeNB GTP Tunnel Endpoint* IE.

If the SCG Change Indication IE is included in the SENB MODIFICATION REQUEST message, the SeNB shall act as specified in TS 36.300 [15].

If the CSG Membership Status IE is included in the SENB MODIFICAITON REQUEST message, the SeNB shall act as specified in TS 36.300 [15].

Upon reception of the SENB MODIFICATION REQUEST ACKNOWLEDGE message the MeNB shall stop the timer T_{DCprep} . If the SENB MODIFICATION REQUEST ACKNOWLEDGE message has included the *SeNB to MeNB Container* IE the MeNB is then defined to have a Prepared SeNB Modification for that X2 UE-associated signalling.

When the SeNB supporting L-GW function for LIPA operation releases radio and control plane related resources associated to the LIPA bearer, it shall also request using intra-node signalling the collocated L-GW to release the LIPA PDN connection as defined in TS 23.401 [12].

Interactions with the SeNB Reconfiguration Completion procedure:

If the SeNB admits a modification of the UE context requiring the MeNB to report about the success of the RRC connection reconfiguration procedure, the SeNB shall start the timer $T_{DCoverall}$ when sending the SENB

MODIFICATION REQUEST ACKNOWLEDGE message to the MeNB. The reception of the SeNB RECONFIGURATION COMPLETE message shall stop the timer $T_{DCoverall}$.

8.6.3.3 Unsuccessful Operation



Figure 8.6.3.3-1: MeNB initiated SeNB Modification Preparation, unsuccessful operation

If the SeNB does not admit any modification requested by the MeNB, or a failure occurs during the MeNB initiated SeNB Modification Preparation, the SeNB shall send the SENB MODIFICATION REQUEST REJECT message to the MeNB. The message shall contain the *Cause* IE with an appropriate value.

If the SeNB receives a SENB MODIFICATION REQUEST message containing the *MeNB to SeNB Container* IE that does not include required information as specified in TS 36.331 [9], the SeNB shall send the SENB MODIFICATION REQUEST REJECT message to the MeNB.

8.6.3.4 Abnormal Conditions

If the SeNB receives a SENB MODIFICATION REQUEST message containing multiple *E-RAB ID* IEs (in the *E-RABs To Be Added List* IE and/or the *E-RABs To Be Modified List* IE) set to the same value, the SeNB shall not admit the action requested for the corresponding E-RABs.

If the SeNB receives an SENB MODIFICATION REQUEST message containing multiple *E-RAB ID* IEs (in the *E-RAB To Be Released List* IE) set to the same value, the SeNB shall initiate the release of one corresponding E-RAB and ignore the duplication of the instances of the selected corresponding E-RABs.

If the SeNB receives a SENB MODIFICATION REQUEST message containing a *E-RAB Level QoS Parameters* IE which contains a *QCI* IE indicating a GBR bearer (as defined in TS 23.203 [13]), and which does not contain the *GBR QoS Information* IE, the SeNB shall not admit the corresponding E-RAB.

If the supported algorithms for encryption defined in the *Encryption Algorithms* IE in the *UE Security Capabilities* IE in the *UE Context Information* IE, plus the mandated support of EEA0 in all UEs (TS 33.401 [18]), do not match any algorithms defined in the configured list of allowed encryption algorithms in the SeNB (TS 33.401 [18]), the SeNB shall reject the procedure using the SENB MODIFICATION REQUEST REJECT message.

If the timer T_{DCprep} expires before the MeNB has received the SENB MODIFICATION REQUEST ACKNOWLEDGE message, the MeNB shall regard the MeNB initiated SeNB Modification Preparation procedure as being failed and shall release the UE Context at the SeNB.

If the SeNB receives a SENB MODIFICATION REQUEST message containing both the *Correlation ID* and the *SIPTO Correlation ID* IEs for the same E-RAB, the SeNB shall consider the establishment of the corresponding E-RAB as failed.

Interactions with the SeNB Reconfiguration Completion and SeNB initiated SeNB Release procedure:

If the timer $T_{DCoverall}$ expires before the SeNB has received the SENB RECONFIGURATION COMPLETE or the SENB RELEASE REQUEST message, the SeNB shall regard the requested modification RRC connection reconfiguration as being not applied by the UE and shall trigger the SeNB initiated SeNB Release procedure.

Interaction with the SeNB initiated SeNB Modification Preparation procedure:

If the MeNB, after having initiated the MeNB initiated SeNB Modification procedure, receives the SENB MODIFICATION REQUIRED message, the MeNB shall refuse the SeNB initiated SeNB Modification procedure with an appropriate cause value in the *Cause* IE.

If the MeNB has a Prepared SeNB Modification and receives the SENB MODIFICATION REQUIRED message, the MeNB shall respond with the SENB MODIFICATION REFUSE message to the SeNB with an appropriate cause value in the *Cause* IE.

8.6.4 SeNB initiated SeNB Modification

8.6.4.1 General

This procedure is used by the SeNB to modify the UE context in the SeNB.

The procedure uses UE-associated signalling.

8.6.4.2 Successful Operation

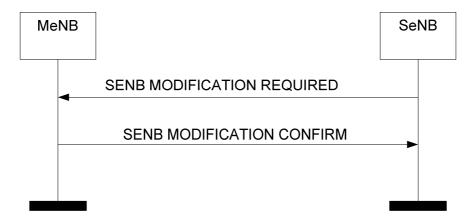


Figure 8.6.4.2-1: SeNB initiated SeNB Modification, successful operation.

The SeNB initiates the procedure by sending the SENB MODIFICATION REQUIRED message to the MeNB. When the SeNB sends the SENB MODIFICATION REQUIRED message, it shall start the timer T_{DCoverall}.

The SENB MODIFICATION REQUIRED message may contain

- the SeNB to MeNB Container IE.
- E-RABs to be released within the *E-RABs To Be Released Item* IE;
- the SCG Change Indication IE.

If the MeNB receives a SENB MODIFICATION REQUIRED message containing the *SCG Change Indication* IE, the MeNB shall act as specified in TS 36.300 [15].

If the MeNB is able to perform the modifications requested by the SeNB, the MeNB shall send the SENB MODIFICATION CONFIRM message to the SeNB. The SENB MODIFICATION CONFIRM message may contain the *MeNB to SeNB Container* IE.

Upon reception of the SENB MODIFICATION CONFIRM message the SeNB shall stop the timer T_{DCoverall}.

Interaction with the MeNB initiated SeNB Modification Preparation procedure:

If applicable, as specified in TS 36.300 [15], the SeNB may receive, after having initiated the SeNB initiated SeNB Modification procedure, the SENB MODIFICATION REQUEST message including the *DL Forwarding GTP Tunnel Endpoint* IE and the *UL Forwarding GTP Tunnel Endpoint* IE within the *E-RABs To Be Released List* IE.

If applicable, as specified in TS 36.300 [15], the SeNB may receive, after having initiated the SeNB initiated SeNB Modification procedure, the SENB MODIFICATION REQUEST message including the *SeNB Security Key* IE within the *UE Context Information* IE.

If the SeNB has initiated the SeNB initiated SeNB Modification procedure with the SENB MODIFICATION REQUIRED message including the *E-RABs To Be Released Item* IE, it may receive the SENB MODIFICATION REQUEST message including the *SCG Change Indication* IE, upon which the SeNB shall provide respective information in the *SeNB to MeNB Container* IE within the SENB MODIFICATION REQUEST ACKNOWLEDGMENT message, as specified in TS 36.300 [15].

8.6.4.3 Unsuccessful Operation

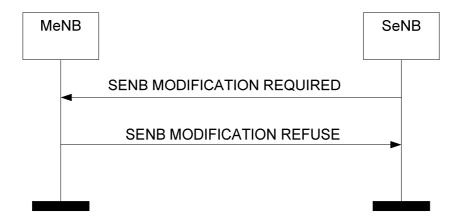


Figure 8.6.4.3-1: SeNB initiated SeNB Modification, unsuccessful operation.

In case the request modification cannot be performed successfully the MeNB shall respond with the SENB MODIFICATION REFUSE message to the SeNB with an appropriate cause value in the *Cause* IE.

The MeNB may also provide configuration information in the MeNB to SeNB Container IE.

8.6.4.4 Abnormal Conditions

If the timer T_{DCoverall} expires before the SeNB has received the SENB MODIFICATION CONFIRM or the SENB MODIFICATION REFUSE message, the SeNB shall regard the requested modification as failed and may take further actions like triggering the SeNB initiated SeNB Release procedure to release all SeNB resources allocated for the UE.

If the MeNB is aware that the SeNB didn"t receive the latest configuration information concerning the MCG, the MeNB may respond with the SENB MODIFICATION REFUSE message to the SeNB with an appropriate cause value in the *Cause* IE.

If the value received in the *E-RAB ID* IE of any of the *E-RABs To Be Released Items* IE is not known at the MeNB, the MeNB shall regard the procedure as failed and may take appropriate actions like triggering the MeNB initiated SeNB Release procedure.

Interaction with the MeNB initiated SeNB Modification Preparation procedure:

If the SeNB, after having initiated the SeNB initiated SeNB Modification procedure, receives the SENB MODIFICATION REQUEST message including other IEs than an applicable *SeNB Security Key* IE and/or applicable forwarding addresses and/or the *SCG Change Indication* IE the SeNB shall

- regard the SeNB initiated SeNB Modification Procedure as being failed,
- stop the T_{DCoverall}, which was started to supervise the SeNB initiated SeNB Modification procedure,
- be prepared to receive the SENB MODIFICATION REFUSE message from the MeNB and
- continue with the MeNB initiated SeNB Modification Preparation procedure as specified in section 8.6.3.

8.6.5 MeNB initiated SeNB Release

8.6.5.1 General

The MeNB initiated SeNB Release procedure is triggered by the MeNB to initiate the release of the resources for a specific UE.

The procedure uses UE-associated signalling.

8.6.5.2 Successful Operation



Figure 8.6.5.2-1: MeNB initiated SeNB Release, successful operation

The MeNB initiates the procedure by sending the SENB RELEASE REQUEST message. Upon reception of the SENB RELEASE REQUEST message the SeNB shall stop providing user data to the UE. The SeNB UE X2AP ID IE and, if available, the SeNB UE X2AP ID Extension IE shall be included if it has been obtained from the SeNB. The MeNB may provide appropriate information within the Cause IE.

If the bearer context in the SeNB was configured with the SCG bearer option, for each SCG bearer for which the MeNB requests forwarding of uplink/downlink data, the MeNB includes the *UL Forwarding GTP Tunnel Endpoint/DL Forwarding GTP Tunnel Endpoint* IE within the *E-RABs To Be Released Item* IE of the SENB RELEASE REQUEST message to indicate that the SeNB should perform data forwarding of uplink/downlink packets for that SCG bearer.

If the bearer context in the SeNB was configured with the split bearer option, for each Split bearer for which the MeNB requests forwarding of downlink data, the MeNB includes the *DL Forwarding GTP Tunnel Endpoint* IE within the *E-RABs To Be Released Item* IE of the SENB RELEASE REQUEST message to indicate that the SeNB should perform data forwarding of downlink packets for that split bearer.

Upon reception of the SENB RELEASE REQUEST message containing *UE Context Kept Indicator* IE set to 'True', the SeNB shall, if supported, only initiate the release of the resources related to the UE-associated signalling connection between the MeNB and the SeNB.

8.6.5.3 Unsuccessful Operation

Not applicable.

8.6.5.4 Abnormal Conditions

Should the SENB RELEASE REQUEST message refer to a context that does not exist, the SeNB shall ignore the message.

When the MeNB has initiated the procedure and did not include the *SeNB UE X2AP ID* IE the MeNB shall regard the resources for the UE at the SeNB as being fully released.

8.6.6 SeNB initiated SeNB Release

8.6.6.1 General

This procedure is triggered by the SeNB to initiate the release of the resources for a specific UE.

The procedure uses UE-associated signalling.

8.6.6.2 Successful Operation

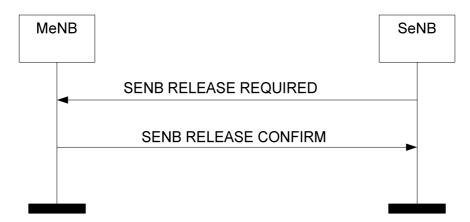


Figure 8.6.6.2-1: SeNB initiated SeNB Release, successful operation.

The SeNB initiates the procedure by sending the SENB RELEASE REQUIRED message to the MeNB.

Upon reception of the SENB RELEASE REQUIRED message, the MeNB replies with the SENB RELEASE CONFIRM message. For each E-RAB configured with the SCG bearer option, the MeNB may include the *DL Forwarding GTP Tunnel Endpoint* IE and the *UL Forwarding GTP Tunnel Endpoint* IE within the *E-RABs To Be Released Item* IE to indicate that it requests data forwarding of uplink and downlink packets to be performed for that bearer. For each E-RAB configured with the split bearer option, the MeNB may include the *DL Forwarding GTP Tunnel Endpoint* IE within the *E-RABs To Be Released Item* IE to indicate that it requests data forwarding of downlink packets to be performed for that bearer.

The SeNB may start data forwarding and stop providing user data to the UE upon reception of the SENB RELEASE CONFIRM message,

8.6.6.3 Unsuccessful Operation

Not applicable.

8.6.6.4 Abnormal Conditions

Void.

8.6.7 SeNB Counter Check

8.6.7.1 General

This procedure is initiated by the SeNB to request the MeNB to execute a counter check procedure to verify the value of the PDCP COUNTs associated with SCG bearers established in the SeNB.

The procedure uses UE-associated signalling.

8.6.7.2 Successful Operation



Figure 8.6.7.2-1: SeNB Counter Check procedure, successful operation.

The SeNB initiates the procedure by sending the SENB COUNTER CHECK REQUEST message to the MeNB.

Upon reception of the SENB COUNTER CHECK REQUEST message, the MeNB may perform the RRC counter check procedure as defined in TS 33.401 [18].

8.6.7.3 Unsuccessful Operation

Not applicable.

8.6.7.4 Abnormal Conditions

Not applicable.

9 Elements for X2AP Communication

9.0 General

Sub clauses 9.1 and 9.2 describe the structure of the messages and information elements required for the X2AP protocol in tabular format. Sub clause 9.3 provides the corresponding ASN.1 definition.

The following attributes are used for the tabular description of the messages and information elements: Presence, Range Criticality and Assigned Criticality. Their definition and use can be found in TS 36.413 [4].

NOTE: The messages have been defined in accordance to the guidelines specified in TR 25.921 [30].

9.1 Message Functional Definition and Content

9.1.1 Messages for Basic Mobility Procedures

9.1.1.1 HANDOVER REQUEST

This message is sent by the source eNB to the target eNB to request the preparation of resources for a handover.

Direction: source eNB \rightarrow target eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Old eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the source eNB	YES	reject
Cause	М		9.2.6		YES	ignore
Target Cell ID	M		ECGI 9.2.14		YES	reject
GUMMEI	M		9.2.16		YES	reject
UE Context Information		1			YES	reject
>MME UE S1AP ID	М		INTEGER (02 ³² -1)	MME UE S1AP ID allocated at the MME	-	_
>UE Security Capabilities	M		9.2.29		_	_
>AS Security Information	M		9.2.30		_	_
>UE Aggregate Maximum Bit Rate	М		9.2.12		_	_
>Subscriber Profile ID for RAT/Frequency priority	0		9.2.25		_	_
>E-RABs To Be Setup List		1			_	_
>>E-RABs To Be Setup		1 <maxnoof Bearers></maxnoof 			EACH	ignore
>>>E-RAB ID	M		9.2.23		_	_
>>>E-RAB Level QoS Parameters	М		9.2.9	Includes necessary QoS parameters	_	_
>>>DL Forwarding	0		9.2.5		_	_
>>>UL GTP Tunnel Endpoint	М		GTP Tunnel Endpoint 9.2.1	SGW endpoint of the S1 transport bearer. For delivery of UL PDUs.	_	_
>>>Bearer Type	0		9.2.92		YES	reject
>RRC Context	M		OCTET STRING	Includes the RRC Handover Preparation Information message as defined in subclause 10.2.2 of TS 36.331 [9]	_	_
	0		9.2.3		_	_
>Location Reporting Information	0		9.2.21	Includes the necessary parameters for location reporting	_	_
>Management Based MDT Allowed	0		9.2.59		YES	ignore
>Management Based MDT PLMN List	0		MDT PLMN List 9.2.64		YES	ignore
UE History Information	М		9.2.38	Same definition as in TS 36.413 [4]	YES	ignore
Trace Activation	0		9.2.2		YES	ignore
SRVCC Operation Possible	0		9.2.33		YES	ignore
CSG Membership Status	0		9.2.52		YES	reject
Mobility Information	0		BIT STRING (SIZE (32))	Information related to the handover; the source eNB provides it in order to enable later analysis of the conditions that led to a wrong HO.	YES	ignore
Masked IMEISV	0		9.2.69		YES	ignore
UE History Information from the UE	0		OCTET STRING	VisitedCellInfoList contained in the	YES	ignore

			UEInformationResp onse message (TS 36.331 [9])		
Expected UE Behaviour	0	9.2.70		YES	ignore
ProSe Authorized	0	9.2.78		YES	ignore
UE Context Reference at the SeNB	0			YES	ignore
>Global SeNB ID	М	Global eNB ID 9.2.22			
>SeNB UE X2AP ID	M	eNB UE X2AP ID 9.2.24	Allocated at the SeNB		
>SeNB UE X2AP ID Extension	0	Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB		
Old eNB UE X2AP ID Extension	0	Extended eNB UE X2AP ID 9.2.86	Allocated at the source eNB	YES	reject

Range bound	Explanation
maxnoofBearers	Maximum no. of E-RABs. Value is 256
maxnoofMDTPLMNs	PLMNs in the Management Based MDT PLMN list. Value is 16.

9.1.1.2 HANDOVER REQUEST ACKNOWLEDGE

This message is sent by the target eNB to inform the source eNB about the prepared resources at the target.

Direction: target eNB \rightarrow source eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.13	•	YES	reject
Old eNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the source eNB	YES	ignore
New eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the target eNB	YES	ignore
E-RABs Admitted List		1			YES	ignore
> E-RABs Admitted		1 <maxnoof< td=""><td></td><td></td><td>EACH</td><td>ignore</td></maxnoof<>			EACH	ignore
Item		Bearers>	2.2.22			
>>E-RAB ID	M O		9.2.23	11 66 0	_	_
>>UL GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	-	_
>>DL GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer. used for forwarding of DL PDUs	-	-
E-RABs Not Admitted List	0		E-RAB List 9.2.28	A value for E-RAB ID shall only be present once in E-RABs Admitted List IE and in E- RABs Not Admitted List IE.	YES	ignore
Target eNB To Source eNB Transparent Container	M		OCTET STRING	Includes the RRC E- UTRA Handover Command message as defined in subclause 10.2.2 in TS 36.331 [9]	YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore
UE Context Kept Indicator	0		9.2.85		YES	ignore
Old eNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the source eNB	YES	ignore
New eNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the target eNB	YES	reject

Range bound	Explanation		
maxnoofBearers	Maximum no. of E-RABs. Value is 256		

9.1.1.3 HANDOVER PREPARATION FAILURE

This message is sent by the target eNB to inform the source eNB that the Handover Preparation has failed.

Direction: target eNB \rightarrow source eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Old eNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the source eNB	YES	ignore
Cause	M		9.2.6		YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore
Old eNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the source eNB	YES	ignore

9.1.1.4 SN STATUS TRANSFER

This message is sent by the source eNB to the target eNB to transfer the uplink/downlink PDCP SN and HFN status during a handover.

Direction: source eNB \rightarrow target eNB (handover), eNB from which the E-RAB context is transferred \rightarrow eNB to which the E-RAB context is transferred (dual connectivity).

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	ignore
Old eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated for handover at the source eNB and for dual connectivity at the eNB from which the E-RAB context is transferred	YES	reject
New eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated for handover at the target eNB and for dual connectivity at the eNB to which the E- RAB context is transferred	YES	reject
E-RABs Subject To Status Transfer List		1			YES	ignore
>E-RABs Subject To Status Transfer Item		1 <maxnoof Bearers></maxnoof 			EACH	ignore
>>E-RAB ID	M		9.2.23		-	-
>>Receive Status Of UL PDCP SDUs	0		BIT STRING (4096)	PDCP Sequence Number = (First Missing SDU Number + bit position) modulo 4096 0: PDCP SDU has not been received. 1: PDCP SDU has been received correctly.	_	_
>>UL COUNT Value	М		COUNT Value 9.2.15	PDCP-SN and Hyper Frame Number of the first missing UL SDU in case of 12 bit long PDCP-SN	-	-
>>DL COUNT Value	М		COUNT Value 9.2.15	PDCP-SN and Hyper frame number that the target eNB should assign for the next DL SDU not having an SN yet in case of 12 bit long PDCP-SN	-	-
>>Receive Status Of UL PDCP SDUs Extended	0		BIT STRING (116384)	The IE is used in case of 15 bit long PDCP-SN in this release. The first bit indicates the status of the SDU after the First Missing UL PDCP SDU. The N th bit indicates the status of the UL PDCP SDU in position (N + First Missing SDU Number) modulo (1 + the maximum value of the PDCP-SN). 0: PDCP SDU has not been received. 1: PDCP SDU has been received correctly.	YES	ignore
>>UL COUNT Value Extended	0		COUNT Value Extended 9.2.66	PDCP-SN and Hyper Frame Number of the first missing UL SDU in case of 15 bit long	YES	ignore

			PDCP-SN		
>>DL COUNT Value Extended	0	COUNT Value Extended 9.2.66	PDCP-SN and Hyper Frame Number that the target eNB should assign for the next DL SDU not having an SN yet in case of 15 bit long PDCP-SN	YES	ignore
>>Receive Status Of UL PDCP SDUs for PDCP SN Length 18	0	BIT STRING (1131072)	The IE is used in case of 18 bit long PDCP-SN. The first bit indicates the status of the SDU after the First Missing UL PDCP SDU. The Nth bit indicates the status of the UL PDCP SDU in position (N + First Missing SDU Number) modulo (1 + the maximum value of the PDCP-SN). 0: PDCP SDU has not been received. 1: PDCP SDU has been received correctly.	YES	ignore
>>UL COUNT Value for PDCP SN Length 18	0	COUNT Value for PDCP SN Length 18 9.2.82	PDCP-SN and Hyper Frame Number of the first missing UL SDU in case of 18 bit long PDCP-SN	YES	ignore
>>DL COUNT Value for PDCP SN Length 18	0	COUNT Value for PDCP SN Length 18 9.2.82	PDCP-SN and Hyper Frame Number that the target eNB should assign for the next DL SDU not having an SN yet in case of 18 bit long PDCP-SN	YES	ignore
DId eNB UE X2AP ID Extension	0	Extended eNB UE X2AP ID 9.2.86	Allocated for handover at the source eNB and for dual connectivity at the eNB from which the E-RAB context is transferred.	YES	reject
New eNB UE X2AP ID Extension	0	Extended eNB UE X2AP ID 9.2.86	Allocated for handover at the target eNB and for dual connectivity at the eNB to which the E-RAB context is transferred.	YES	reject

Range bound	Explanation			
maxnoofBearers	Maximum no. of E-RABs. Value is 256.			

9.1.1.5 UE CONTEXT RELEASE

This message is sent by the target eNB to the source eNB to indicate that resources can be released.

Direction: target eNB \rightarrow source eNB (handover), MeNB \rightarrow SeNB (dual connectivity).

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13	•	YES	ignore
Old eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated for handover at the source eNB and for dual connectivity at the SeNB.	YES	reject
New eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated for handover at the target eNB and for dual connectivity at the MeNB.	YES	reject
Old eNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated for handover at the source eNB and for dual connectivity at the SeNB.	YES	reject
New eNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated for handover at the source eNB and for dual connectivity at the MeNB.	YES	reject
SIPTO Bearer Deactivation Indication	0		ENUMERATED (True,,)	Indicates that SIPTO@LN PDN connection deactivation is needed.	YES	ignore

9.1.1.6 HANDOVER CANCEL

This message is sent by the source eNB to the target eNB to cancel an ongoing handover.

Direction: source eNB \rightarrow target eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	ignore
Old eNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the source eNB	YES	reject
New eNB UE X2AP ID	0		eNB UE X2AP ID 9.2.24	Allocated at the target eNB	YES	ignore
Cause	M		9.2.6		YES	ignore
Old eNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the source eNB	YES	reject
New eNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the target eNB	YES	ignore

9.1.2 Messages for global procedures

9.1.2.1 LOAD INFORMATION

This message is sent by an eNB to neighbouring eNBs to transfer load and interference co-ordination information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13	•	YES	ignore
Cell Information	M				YES	ignore
>Cell Information Item		1 <maxcellinenb></maxcellinenb>			EACH	ignore
>>Cell ID	M		ECGI 9.2.14	Id of the source cell	_	_
>>UL Interference Overload Indication	0		9.2.17		_	_
>>UL High Interference Information		0 <maxcellinenb></maxcellinenb>			-	_
>>>Target Cell ID	M		ECGI 9.2.14	Id of the cell for which the HII is meant	-	_
>>>UL High Interference Indication	M		9.2.18		-	_
>>Relative Narrowband Tx Power (RNTP)	0		9.2.19		-	_
>>ABS Information	0		9.2.54		YES	ignore
>>Invoke Indication	0		9.2.55		YES	ignore
>>Intended UL-DL Configuration	0		ENUMERAT ED(sa0, sa1, sa2, sa3, sa4, sa5, sa6,)	One of the UL-DL configuration s defined in TS 36.211 [10]. The UL subframe(s) in the indicated configuration is subset of those in SIB1 UL-DL configuration . This IE applies to TDD only.	YES	ignore
>>Extended UL Interference Overload Info	0		9.2.67	This IE applies to TDD only.	YES	ignore
>>CoMP Information	0		9.2.74	1	YES	ignore
>>Dynamic DL transmission information	0		9.2.77		YES	ignore

Range bound	Explanation			
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.			

9.1.2.2 ERROR INDICATION

This message is used to indicate that some error has been detected in the eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	ignore
Old eNB UE X2AP ID	0		eNB UE X2AP ID 9.2.24	Allocated for handover at the source eNB and for dual connectivity at the SeNB or the eNB from which the E-RAB context is transferred.	YES	ignore
New eNB UE X2AP ID	0		eNB UE X2AP ID 9.2.24	Allocated for handover at the target eNB and for dual connectivity at the MeNB or the eNB to which the E-RAB context is transferred.	YES	ignore
Cause	0		9.2.6		YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore
Old eNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated for handover at the source eNB and for dual connectivity at the SeNB or the eNB from which the E-RAB context is transferred.	YES	ignore
New eNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated for handover at the target eNB and for dual connectivity at the MeNB or the eNB to which the E-RAB context is transferred.	YES	ignore

9.1.2.3 X2 SETUP REQUEST

This message is sent by an eNB to a neighbouring eNB to transfer the initialization information for a TNL association.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.13	•	YES	reject
Global eNB ID	M		9.2.22		YES	reject
Served Cells		1 <maxcellinenb></maxcellinenb>		Complete list of cells served by the eNB	YES	reject
>Served Cell Information	M		9.2.8		-	_
>Neighbour Information		0 <maxnoofneighb ours></maxnoofneighb 			_	_
>>ECGI	М		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the neighbour cell	-	_
>>PCI	М		INTEGER (0503,)	Physical Cell Identifier of the neighbour cell	_	_
>>EARFCN	М		9.2.26	DL EARFCN for FDD or EARFCN for TDD	_	_
>>TAC	0		OCTET STRING (2)	Tracking Area Code	YES	ignore
>>EARFCN Extension	O		9.2.65	DL EARFCN for FDD or EARFCN for TDD. If this IE is present, the value signalled in the EARFCN IE is ignored.	YES	reject
GU Group ld List		0 <maxfpools></maxfpools>		List of all the pools to which the eNB belongs	GLOBAL	reject
>GU Group Id	M		9.2.20		-	-
LHN ID	0		9.2.83		YES	ignore

Range bound	Explanation
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.
maxnoofNeighbours	Maximum no. of neighbour cells associated to a given served cell.
-	Value is 512.
maxPools	Maximum no, of pools an eNB can belong to. Value is 16.

9.1.2.4 X2 SETUP RESPONSE

 $This \ message \ is \ sent \ by \ an \ eNB \ to \ a \ neighbouring \ eNB \ to \ transfer \ the \ initialization \ information \ for \ a \ TNL \ association.$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.13	•	YES	reject
Global eNB ID	M		9.2.22		YES	reject
Served Cells		1 <maxcellinenb></maxcellinenb>		Complete list of cells served by the eNB	GLOBAL	reject
>Served Cell Information	M		9.2.8		ı	ı
>Neighbour Information		0 <maxnoofneighb ours></maxnoofneighb 			1	ı
>>ECGI	М		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the neighbour cell	-	-
>>PCI	М		INTEGER (0503,)	Physical Cell Identifier of the neighbour cell	-	I
>>EARFCN	М		9.2.26	DL EARFCN for FDD or EARFCN for TDD	-	-
>>TAC	0		OCTET STRING (2)	Tracking Area Code	YES	ignore
>>EARFCN Extension	O		9.2.65	DL EARFCN for FDD or EARFCN for TDD. If this IE is present, the value signalled in the EARFCN IE is ignored.	YES	reject
GU Group ld List		0 <maxpools></maxpools>		List of all the pools to which the eNB belongs	GLOBAL	reject
>GU Group Id	M		9.2.20		-	-
Criticality Diagnostics	0		9.2.7		YES	ignore
LHN ID	0		9.2.83		YES	ignore

Range bound	Explanation
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.
maxnoofNeighbours	Maximum no. of neighbour cells associated to a given served cell.
	Value is 512.
maxPools	Maximum no. of pools an eNB can belong to. Value is 16.

9.1.2.5 X2 SETUP FAILURE

This message is sent by the eNB to indicate X2 Setup failure.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.13		YES	reject
Cause	M		9.2.6		YES	ignore
Time To Wait	0		9.2.32		YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore

9.1.2.6 RESET REQUEST

This message is sent from one eNB to another eNB and is used to request the X2 interface between the two eNB to be reset.

Direction: $eNB_1 \rightarrow eNB_2$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Cause	M		9.2.6		YES	ignore

9.1.2.7 RESET RESPONSE

This message is sent by a eNB as a response to a RESET REQUEST message.

Direction: $eNB_2 \rightarrow eNB_1$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Criticality Diagnostics	0		9.2.7		YES	ignore

9.1.2.8 ENB CONFIGURATION UPDATE

This message is sent by an eNB to a peer eNB to transfer updated information for a TNL association.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.13		YES	reject
Served Cells To Add		0 <maxcellinenb></maxcellinenb>		Complete list of added cells served by the eNB	GLOBAL	reject
>Served Cell Information	М		9.2.8		-	1
>Neighbour Information		0 <maxnoofneighb ours></maxnoofneighb 			-	-
>>ECGI	М		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the neighbour cell	-	-
>>PCI	М		INTEGER (0503,)	Physical Cell Identifier of the neighbour cell	-	_
>>EARFCN	М		9.2.26	DL EARFCN for FDD or EARFCN for TDD	-	-
>>TAC	0		OCTET STRING (2)	Tracking Area Code	YES	ignore
>>EARFCN Extension	0		9.2.65	DL EARFCN for FDD or EARFCN for TDD. If this IE is present, the value signalled in the EARFCN IE is ignored.	YES	reject
Served Cells To Modify		0 <maxcellinenb></maxcellinenb>		Complete list of modified cells served by the eNB	GLOBAL	reject
>Old ECGI	М		ECGI 9.2.14	Old E-UTRAN Cell Global Identifier	-	-
>Served Cell Information	M		9.2.8		_	-
>Neighbour Information		0 <maxnoofneighb ours></maxnoofneighb 			-	_
>>ECGI	М		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the neighbour cell	-	-
>>PCI	М		INTEGER (0503,)	Physical Cell Identifier of the neighbour cell	-	_
>>EARFCN	М		9.2.26	DL EARFCN for FDD or EARFCN for TDD	-	-
>>TAC	0		OCTET STRING (2)	Tracking Area Code	YES	ignore
>>EARFCN Extension	0		9.2.65	DL EARFCN for FDD or EARFCN for TDD. If this IE is present, the value signalled in the EARFCN IE is ignored.	YES	reject
>Deactivation Indication	0		ENUMERAT ED(deactivat ed,)	Indicates that	YES	ignore

				saving reasons		
Served Cells To Delete		0 <maxcellinenb></maxcellinenb>		Complete list of deleted cells served by the eNB	GLOBAL	reject
>Old ECGI	M		ECGI 9.2.14	Old E-UTRAN Cell Global Identifier of the cell to be deleted	-	-
GU Group Id To Add List		0 <maxpools></maxpools>			GLOBAL	reject
>GU Group Id	M		9.2.20		-	-
GU Group Id To Delete List		0 <maxpools></maxpools>			GLOBAL	reject
>GU Group Id	M		9.2.20		-	-
Coverage Modification List		0 <maxcellinenb></maxcellinenb>		List of cells with modified coverage	GLOBAL	reject
>ECGI	M		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the cell to be modified	-	-
>Cell Coverage State	M		INTEGER (015,)	Value "0" indicates that the cell is inactive. Other values Indicates that the cell is active and also indicates the coverage configuration of the concerned cell	-	-
>Cell Deployment Status Indicator	0		ENUMERAT ED(pre- change- notification,)	Indicates the Cell Coverage State is planned to be used at the next reconfiguration		
>Cell Replacing Info	C- ifCellDeplo ymentStat usIndicator Present					
>>Replacing Cells		0 <maxcellinenb></maxcellinenb>				
>>>ECGI			ECGI 9.2.14	E-UTRAN Cell Global Identifier of a cell that may replace all or part of the coverage of the cell to be modified		

Range bound	Explanation
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.
maxnoofNeighbours	Maximum no. of neighbour cells associated to a given served cell. Value is 512.
maxPools	Maximum no. of pools an eNB can belong to. Value is 16.

Condition	Explanation
ifCellDeploymentStatusIndicatorPresent	This IE shall be present if the Cell Deployment Status Indicator IE is
	present.

9.1.2.9 ENB CONFIGURATION UPDATE ACKNOWLEDGE

This message is sent by an eNB to a peer eNB to acknowledge update of information for a TNL association.

Direction: $eNB_2 \rightarrow eNB_1$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Criticality Diagnostics	0		9.2.7		YES	ignore

9.1.2.10 ENB CONFIGURATION UPDATE FAILURE

This message is sent by an eNB to a peer eNB to indicate eNB Configuration Update Failure.

Direction: $eNB_2 \rightarrow eNB_1$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Cause	M		9.2.6		YES	ignore
Time To Wait	0		9.2.32		YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore

9.1.2.11 RESOURCE STATUS REQUEST

This message is sent by an eNB_1 to neighbouring eNB_2 to initiate the requested measurement according to the parameters given in the message.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.13		YES	reject
eNB1 Measurement ID	M		INTEGER (14095,)	Allocated by eNB ₁	YES	reject
eNB2 Measurement ID	C- ifRegistrati onRequest StoporPart ialStoporA dd		INTEGER (14095,)	Allocated by eNB ₂	YES	ignore
Registration Request	М		ENUMERAT ED(start, stop, , partial stop, add)	Type of request for which the resource status is required.	YES	reject
Report Characteristics	0		BITSTRING (SIZE(32))	Each position in the bitmap indicates measurement object the eNB ₂ is requested to report. First Bit = PRB Periodic, Second Bit = TNL load Ind Periodic, Third Bit = HW Load Ind Periodic, Fourth Bit = Composite Available Capacity Periodic, this bit should be set to 1 if at least one of the First, Second or Third bits is set to 1, Fifth Bit = ABS Status Periodic, Sixth Bit = RSRP Measurement Report Periodic, Seventh Bit = CSI Report Periodic. Other bits shall be ignored by the eNB ₂ .	YES	reject
Cell To Report		1		Cell ID list to which the request applies.	YES	ignore
>Cell To Report Item		1 <maxcel lineNB></maxcel 		. очисок арриос.	EACH	ignore
>>Cell ID	М		ECGI 9.2.14		-	-
Reporting Periodicity	0		ENUMERAT ED(1000ms, 2000ms, 5000ms,100 00ms,)	Periodicity that can be used for reporting of PRB Periodic, TNL Load Ind Periodic, HW Load Ind Periodic, Composite Available Capacity Periodic or ABS Status Periodic.	YES	ignore
Partial Success Indicator	0		ENUMERAT ED(partial success allowed,)	Included if partial success is allowed	YES	ignore
Reporting Periodicity of RSRP Measurement Report	0		ENUMERAT ED(120ms, 240ms, 480ms, 640ms,)	Periodicity that can be used for the reporting of RSRP Measurement Report Periodic.	YES	ignore
Reporting Periodicity of CSI Report	0		ENUMERAT ED(5ms, 10ms, 20ms,	Periodicity that can be used for the reporting of CSI Report Periodic.	YES	ignore

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Range bound	Explanation
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.

Condition	Explanation
ifRegistrationRequestStoporPartialStoporA	This IE shall be present if the Registration Request IE is set to the
dd	value 'stop', 'partial stop' or 'add'.

9.1.2.12 RESOURCE STATUS RESPONSE

This message is sent by the eNB_2 to indicate that the requested measurement, for all or for a subset of the measurement objects included in the measurement is successfully initiated.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
eNB1 Measurement ID	M		INTEGER (14095,)	Allocated by eNB ₁	YES	reject
eNB2 Measurement ID	M		INTEGER (14095,)	Allocated by eNB ₂	YES	reject
Criticality Diagnostics	0		9.2.7		YES	ignore
Measurement Initiation Result		01		List of all cells in which measurement objects were requested, included when indicating partial success	YES	ignore
>Measurement Initiation Result Item		1 <maxce IlineNB></maxce 			EACH	ignore
>>Cell ID	М		ECGI 9.2.14		-	_
>>Measurement Failure Cause List		01		Indicates that eNB ₂ could not initiate the measurement for at least one of the requested measurement objects in the cell	-	_
>>>Measurement Failure Cause Item		1 <maxfa iledMea sObject s></maxfa 			EACH	ignore
>>>>Measurement Failed Report Characteristics	M		BITSTRING (SIZE(32))	Each position in the bitmap indicates measurement object that failed to be initiated in the eNB ₂ . First Bit = PRB Periodic, Second Bit = TNL load Ind Periodic, Third Bit = HW Load Ind Periodic, Fourth Bit = Composite Available Capacity Periodic, Fifth Bit = ABS Status Periodic, Sixth Bit = RSRP Measurement Report Periodic, Seventh Bit = CSI Report Periodic. Other bits shall be ignored by the eNB ₁ .		
>>>Cause	М		9.2.6	Failure cause for measurement objects for which the measurement cannot be initiated	-	_

Range bound	Explanation
maxFailedMeasObjects	Maximum number of measurement objects that can fail per
	measurement. Value is 32.
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.

9.1.2.13 RESOURCE STATUS FAILURE

This message is sent by the eNB_2 to indicate that for none of the requested measurement objects the measurement can be initiated.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.13		YES	reject
eNB1 Measurement ID	М		INTEGER (14095,)	Allocated by eNB ₁	YES	reject
eNB2 Measurement ID	М		INTEGER (14095,)	Allocated by eNB ₂	YES	reject
Cause	M		9.2.6	Ignored by the receiver when the Complete Failure Cause Information IE is included	YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore
Complete Failure Cause Information		01		Complete list of failure causes for all requested cells	YES	ignore
>Complete Failure Cause Information Item		1 <maxce IlineNB></maxce 			EACH	ignore
>>Cell ID	М		ECGI 9.2.14		_	_
>>Measurement Failure Cause List		1			_	_
>>>Measurement Failure Cause Item		1 <maxfa iledMea sObject s></maxfa 			EACH	ignore
>>>>Measuremen t Failed Report Characteristics	M		BITSTRING (SIZE(32))	Each position in the bitmap indicates measurement object that failed to be initiated in the eNB ₂ . First Bit = PRB Periodic, Second Bit = TNL load Ind Periodic, Third Bit = HW Load Ind Periodic, Fourth Bit = Composite Available Capacity Periodic, Fifth Bit = ABS Status Periodic, Sixth Bit = RSRP Measurement Report Periodic, Seventh Bit = CSI Report Periodic. Other bits shall be ignored by the eNB ₁ .		
>>>Cause	М		9.2.6	Failure cause for measurements that cannot be initiated	_	_

Range bound	Explanation
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.
maxFailedMeasObjects	Max number of measurement objects that can fail per measurement. Value is 32.

9.1.2.14 RESOURCE STATUS UPDATE

This message is sent by eNB_2 to neighbouring eNB_1 to report the results of the requested measurements.

Direction: $eNB_2 \rightarrow eNB_1$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13	-	YES	ignore
eNB1 Measurement ID	М		INTEGER (14095,)	Allocated by eNB ₁	YES	reject
eNB2 Measurement ID	М		INTEGER (14095,)	Allocated by eNB ₂	YES	reject
Cell Measurement Result		1			YES	ignore
>Cell Measurement Result Item		1 <maxcellinenb></maxcellinenb>			EACH	ignore
>>Cell ID	М		ECGI 9.2.14			
>>Hardware Load Indicator	0		9.2.34			
>>S1 TNL Load Indicator	0		9.2.35			
>>Radio Resource Status	0		9.2.37			
>>Composite Available Capacity Group	0		9.2.44		YES	ignore
>>ABS Status	0		9.2.58		YES	ignore
>>RSRP Measurement Report List	0		9.2.76		YES	ignore
>>CSI Report	0		9.2.79		YES	ignore
>>Cell Reporting Indicator	0		ENUMERAT ED(stop request,)		YES	ignore

Range bound	Explanation
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.

9.1.2.15 MOBILITY CHANGE REQUEST

This message is sent by an eNB₁ to neighbouring eNB₂ to initiate adaptation of mobility parameters.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
eNB1 Cell ID	М		ECGI 9.2.14		YES	reject
eNB2 Cell ID	М		ECGI 9.2.14		YES	reject
eNB1 Mobility Parameters	0		Mobility Parameters Information 9.2.48	Configuration change in eNB ₁ cell	YES	ignore
eNB2 Proposed Mobility Parameters	М		Mobility Parameters Information 9.2.48	Proposed configuration change in eNB ₂ cell	YES	reject
Cause	M		9.2.6		YES	reject

9.1.2.16 MOBILITY CHANGE ACKNOWLEDGE

This message is sent by the eNB_2 to indicate that the eNB_2 Proposed Mobility Parameter proposed by eNB_1 was accepted.

Direction: $eNB_2 \rightarrow eNB_1$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
eNB1 Cell ID	M		ECGI		YES	reject
			9.2.14			
eNB2 Cell ID	M		ECGI		YES	reject
			9.2.14			
Criticality Diagnostics	0		9.2.7		YES	ignore

9.1.2.17 MOBILITY CHANGE FAILURE

This message is sent by the eNB_2 to indicate that the eNB_2 Proposed Mobility Parameter proposed by eNB_1 was refused.

Direction: $eNB_2 \rightarrow eNB_1$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
eNB1 Cell ID	М		ECGI 9.2.14		YES	ignore
eNB2 Cell ID	M		ECGI 9.2.14		YES	ignore
Cause	M		9.2.6		YES	ignore
Mobility Parameters Modification Range	0		9.2.49		YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore

9.1.2.18 RLF INDICATION

This message is sent by the eNB_2 to indicate an RRC re-establishment attempt or a reception of an RLF Report from a UE that suffered a connection failure at eNB_1 .

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13	-	YES	ignore
Failure cell PCI	M		INTEGER (0503,)	Physical Cell Identifier	YES	ignore
Re-establishment cell ECGI	М		ECGI 9.2.14		YES	ignore
C-RNTI	M		BIT STRING (SIZE (16))	C-RNTI contained in the RRC Re- establishment Request message (TS 36.331 [9])	YES	ignore
ShortMAC-I	0		BIT STRING (SIZE (16))	ShortMAC-I contained in the RRC Re- establishment Request message (TS 36.331 [9])	YES	ignore
UE RLF Report Container	0		OCTET STRING	RLF -Report-r9 IE contained in the UEInformationRe sponse message (TS 36.331 [9])	YES	ignore
RRC Conn Setup Indicator	0		ENUMERATED(RR C Conn Setup,)	Included if the RLF Report within the UE RLF Report Container IE is retrieved after an RRC connection setup or an incoming successful handover	YES	reject
RRC Conn Reestab Indicator	0		ENUMERATED(rec onfigurationFailure, handoverFailure, otherFailure,)	The Reestablishment Cause in RRCConnection Reestablishment Request message(TS 36.331 [9])	YES	ignore
UE RLF Report Container for extended bands	0		OCTET STRING	RLF-Report-v9e0 IE contained in the UEInformationRe sponse message (TS 36.331 [9])	YES	ignore

9.1.2.19 HANDOVER REPORT

This message is sent by the eNB₁ to report a handover failure event or other critical mobility problem.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13	•	YES	ignore
Handover Report Type	М		ENUMERATED (HO too early, HO to wrong cell, , InterRAT ping-pong)		YES	ignore
Handover Cause	M		Cause 9.2.6	Indicates handover cause employed for handover from eNB ₂	YES	ignore
Source cell ECGI	M		ECGI 9.2.14	ECGI of source cell for handover procedure (in eNB ₂)	YES	ignore
Failure cell ECGI	М		ECGI 9.2.14	ECGI of target cell for handover procedure (in eNB ₁)	YES	ignore
Re-establishment cell ECGI	C- ifHandoverR eportType HoToWrong Cell		ECGI 9.2.14	ECGI of cell where UE attempted re- establishment	YES	ignore
Target cell in UTRAN	C- ifHandoverR eportType InterRATpin gpong		OCTET STRING	Encoded according to UTRAN Cell ID in the Last Visited UTRAN Cell Information IE, as defined in in TS 25.413 [24]	YES	ignore
Source cell C-RNTI	0		BIT STRING (SIZE (16))	C-RNTI allocated at the source eNB (in eNB ₂) contained in the AS-config (TS 36.331 [9]).	YES	ignore
Mobility Information	0		BIT STRING (SIZE (32))	Information provided in the HANDOVER REQUEST message from eNB ₂ .	YES	ignore
UE RLF Report Container	0		OCTET STRING	The UE RLF Report Container IE received in the RLF INDICATION message.	YES	ignore
UE RLF Report Container for extended bands	0		OCTET STRING	The UE RLF Report Container for extended bands IE received in the RLF INDICATION message.	YES	ignore

Condition	Explanation
ifHandoverReportType HoToWrongCell	This IE shall be present if the Handover Report Type IE is set to the
	value "HO to wrong cell"
ifHandoverReportType InterRATpingpong	This IE shall be present if the Handover Report Type IE is set to the
	value "InterRAT ping-pong"

9.1.2.20 CELL ACTIVATION REQUEST

This message is sent by an eNB to a peer eNB to request a previously switched-off cell/s to be re-activated.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.13	•	YES	reject
Served Cells To Activate		1 <maxcellinenb></maxcellinenb>			GLOBAL	reject
>ECGI	M		9.2.14		-	-

Range bound	Explanation					
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.					

9.1.2.21 CELL ACTIVATION RESPONSE

This message is sent by an eNB to a peer eNB to indicate that one or more cell(s) previously switched-off has(have) been activated.

Direction: $eNB_2 \rightarrow eNB_1$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Activated Cell List		1			GLOBAL	ignore
		<maxcellinenb></maxcellinenb>				
>ECGI	M		9.2.14		-	-
Criticality Diagnostics	0		9.2.7		YES	ignore

Range bound	Explanation
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.

9.1.2.22 CELL ACTIVATION FAILURE

This message is sent by an eNB to a peer eNB to indicate cell activation failure.

Direction: $eNB_2 \rightarrow eNB_1$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Cause	M		9.2.6		YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore

9.1.2.23 X2 RELEASE

This message is used to indicate that the signalling connection to an eNB is unavailable.

Direction: $eNB_1 \rightarrow eNB_2$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Global eNB ID	M		9.2.22		YES	reject

9.1.2.24 X2AP MESSAGE TRANSFER

This message is used for indirect transport of an X2AP message (except the X2AP MESSAGE TRANSFER message) between two eNBs, and to allow an eNB to perform registration.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.13		YES	reject
RNL Header	M		9.2.68		YES	reject
X2AP Message	0		OCTET STRING	Includes any X2AP message except the X2AP MESSAGE TRANSFER message	YES	reject

9.1.2.25 X2 REMOVAL REQUEST

This message is sent by an eNB to a neighbouring eNB to initiate the removal of the signaling connection.

Direction: $eNB_1 \rightarrow eNB_2$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Global eNB ID	M		9.2.22		YES	reject
X2 Removal Threshold	0		X2 Benefit Value 9.2.90		YES	reject

9.1.2.26 X2 REMOVAL RESPONSE

This message is sent by an eNB to a neighbouring eNB to acknowledge the initiation of removal of the signaling connection.

Direction: $eNB_2 \rightarrow eNB_1$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Global eNB ID	M		9.2.22		YES	reject
Criticality Diagnostics	0		9.2.7		YES	ignore

9.1.2.27 X2 REMOVAL FAILURE

This message is sent by the eNB to indicate that removing the signaling connection cannot be accepted.

Direction: $eNB_2 \rightarrow eNB_1$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Cause	M		9.2.6		YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore

9.1.2.28 RETRIEVE UE CONTEXT REQUEST

This message is sent by the new eNB to request the old eNB to transfer the UE Context to the new eNB.

Direction: new eNB \rightarrow old eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	ignore
New eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the new eNB	YES	reject
New eNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the new eNB	YES	reject
Resume ID	M		9.2.91		YES	reject
ShortMAC-I	M		BIT STRING (SIZE (16))	ShortResumeMA C-I contained in the RRCConnection ResumeRequest message (TS 36.331 [9])	YES	reject
New E-UTRAN Cell Identifier	М		BIT STRING (SIZE (28))	The E-UTRAN Cell Identifier of the cell where the RRC connection has been requested to be resumed.	YES	reject

9.1.2.29 RETRIEVE UE CONTEXT RESPONSE

This message is sent by the old eNB to transfer the UE context to the new eNB.

Direction: old eNB \rightarrow new eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.13		YES	ignore
New eNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the new eNB	YES	ignore
New eNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the new eNB	YES	ignore
Old eNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the old eNB	YES	ignore
Old eNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the old eNB	YES	ignore
GUMMEI	M		9.2.16		YES	reject
UE Context Information		1			YES	reject
>MME UE S1AP ID	M		INTEGER (02 ³² - 1)	MME UE S1AP ID allocated at the MME	_	_
>UE Security Capabilities	М		9.2.29		_	_
>AS Security Information	М		9.2.30		_	_
>UE Aggregate Maximum Bit Rate	М		9.2.12		_	_
>Subscriber Profile ID for RAT/Frequency priority	0		9.2.25		_	_
>E-RABs To Be Setup List		1			_	_
>>E-RABs To Be Setup Item		1 <maxno of Bearers</maxno 			EACH	ignore
>>>E-RAB ID	M	>	9.2.23		_	_
>>>E-RAB Level	M		9.2.9	Includes	_	_
QoS Parameters			0.2.0	necessary QoS parameters		
>>>Bearer Type	0		9.2.92		YES	reject
>RRC Context	M		OCTET STRING	Includes either the RRC Handover Preparation Information message as defined in subclause 10.2.2 of TS 36.331 [9], or the HandoverPrepar ationInformation-NB message as defined in subclause 10.6.2 of TS 36.331 [9].	_	_
>Handover Restriction List	0		9.2.3		_	_
>Location Reporting Information	0		9.2.21	Includes the necessary parameters for location reporting	-	_
>Management Based MDT Allowed	0		9.2.59		_	_
>Management Based MDT PLMN List	0		MDT PLMN List 9.2.64		_	_
Trace Activation	0		9.2.2		YES	ignore
SRVCC Operation	0		9.2.33		YES	ignore

Possible					
Masked IMEISV	0	9.2.	69	YES	ignore
Expected UE Behaviour	0	9.2.	70	YES	ignore
ProSe Authorized	0	9.2.	78	YES	ignore
Criticality Diagnostics	0	9.2.	7	YES	ignore

Range bound	Explanation			
maxnoofBearers	Maximum no. of E-RABs. Value is 256			

9.1.2.30 RETRIEVE UE CONTEXT FAILURE

This message is sent by the old eNB to inform the new eNB that the Retrieve UE Context procedure has failed.

Direction: old eNB \rightarrow new eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
New eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the new eNB	YES	ignore
New eNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the new eNB	YES	ignore
Cause	M		9.2.6		YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore

9.1.3 Messages for Dual Connectivity Procedures

9.1.3.1 SENB ADDITION REQUEST

This message is sent by the MeNB to the SeNB to request the preparation of resources for dual connectivity operation for a specific UE

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.13		YES	reject
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	reject
UE Security Capabilities	C- ifSCGBear erOption		9.2.29		YES	reject
SeNB Security Key	C- ifSCGBear erOption		9.2.72	The S-KeNB which is provided by the MeNB, see TS 33.401 [18].	YES	reject
SeNB UE Aggregate Maximum Bit Rate	М		UE Aggregate Maximum Bit Rate 9.2.12	The UE Aggregate Maximum Bit Rate is split into MeNB UE Aggregate Maximum Bit Rate and SeNB UE Aggregate Maximum Bit Rate which are enforced by MeNB and SeNB respectively.	YES	reject
Serving PLMN	0		PLMN Identity 9.2.4	The serving PLMN of the SCG in the SeNB.	YES	ignore
E-RABs To Be Added List		1	J	302.	YES	reject
>E-RABs To Be Added Item		1 <maxnoof Bearers></maxnoof 			EACH	reject
>>CHOICE Bearer Option	М					
>>>SCG Bearer						
>>>E-RAB ID	M		9.2.23		_	_
>>>>E-RAB Level QoS Parameters	М		9.2.9	Includes necessary QoS parameters	_	_
>>>DL Forwarding	0		9.2.5	00111	_	_
>>>>S1 UL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SGW endpoint of the S1 transport bearer. For delivery of UL PDUs.	_	_
>>>Correlation ID	0		Correlation ID 9.2.84		_	_
>>>SIPTO Correlation ID	0		Correlation ID 9.2.84		_	_
>>>Split Bearer						
>>>E-RAB ID	M		9.2.23		_	_
>>>>E-RAB Level QoS Parameters	М		9.2.9	Includes necessary QoS parameters	_	_
>>>>MeNB GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2 transport bearer. For delivery of UL PDUs.	_	_
MeNB to SeNB Container	M		OCTET STRING	Includes the SCG- ConfigInfo message as defined in TS 36.331 [9]	YES	reject
CSG Membership Status	0		9.2.52		YES	reject
SeNB UE X2AP ID	0		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	reject
SeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID	Allocated at the SeNB	YES	reject

		9.2.86			
Expected UE Behaviour	0	9.2.70		YES	ignore
MeNB UE X2AP ID	0	Extended	Allocated at the	YES	reject
Extension		eNB UE	MeNB		
		X2AP ID			
		9.2.86			

Range bound	Explanation			
maxnoofBearers	Maximum no. of E-RABs. Value is 256			

Condition	Explanation
ifSCGBearerOption	This IE shall be present if the Bearer Option IE is set to the value
	"SCG bearer".

9.1.3.2 SENB ADDITION REQUEST ACKNOWLEDGE

This message is sent by the SeNB to confirm the MeNB about the SeNB addition preparation.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	reject
E-RABs Admitted To Be Added List		1			YES	ignore
>E-RABs Admitted To Be Added Item		1 <maxnoof Bearers></maxnoof 			EACH	ignore
>>CHOICE Bearer Option	М					
>>>SCG Bearer						
>>>E-RAB ID	M		9.2.23		_	_
>>>>S1 DL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SeNB endpoint of the S1 transport bearer. For delivery of DL PDUs.	-	_
>>>>DL Forwarding GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	_	_
>>>>UL Forwarding GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	_	_
>>>Split Bearer						
>>>E-RAB ID	M		9.2.23		_	_
>>>SeNB GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	Endpoint of the X2 transport bearer at the SeNB.	-	-
E-RABs Not Admitted List	0		E-RAB List 9.2.28	A value for E-RAB ID shall only be present once in E- RABs Admitted List IE and in E-RABs Not Admitted List IE.	YES	ignore
SeNB to MeNB Container	M		OCTET STRING	Includes the SCG- Config message as defined in TS 36.331 [9]	YES	reject
Criticality Diagnostics	0		9.2.7		YES	ignore
GW Transport Layer Address	0		BIT STRING (1160,)	Indicating GW Transport Layer Address.	YES	ignore
SIPTO L-GW Transport Layer Address	0		BIT STRING (1160,)	Indicating SIPTO L- GW Transport Layer Address.	YES	ignore
MeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	reject
Tunnel Information for BBF	0		Tunnel Information 9.2.89	Indicating eNB"s Local IP Address assigned by the broadband access provider, UDP port Number.	YES	ignore

Range bound	Explanation			
maxnoofBearers	Maximum no. of E-RABs. Value is 256			

9.1.3.3 SENB ADDITION REQUEST REJECT

This message is sent by the SeNB to inform the MeNB that the SeNB Addition Preparation has failed.

Direction: SeNB \rightarrow MeNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
MeNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	reject
Cause	M		9.2.6		YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	reject

9.1.3.4 SENB RECONFIGURATION COMPLETE

This message is sent by the MeNB to the SeNB to indicate whether the configuration requested by the SeNB was applied by the UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	ignore
MeNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	reject
Response Information	M				YES	ignore
>CHOICE Response Type	M					
>>Configuration successfully applied						
>>>MeNB to SeNB Container	0		OCTET STRING	Includes the SCG- ConfigInfo message as defined in TS 36.331 [9]	-	-
>>Configuration rejected by the MeNB						
>>>Cause	M		9.2.6		-	-
>>>MeNB to SeNB Container	0		OCTET STRING	Includes the SCG- ConfigInfo message as defined in TS 36.331 [9]	-	-
MeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	reject

9.1.3.5 SENB MODIFICATION REQUEST

 $This \ message \ is \ sent \ by \ the \ MeNB \ to \ the \ SeNB \ to \ request \ the \ preparation \ to \ modify \ SeNB \ resources \ for \ a \ specific \ UE.$

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
•			reference	description		Criticality
Message Type	M		9.2.13		YES	reject
MeNB UE X2AP ID	M		eNB UE	Allocated at the	YES	reject
			X2AP ID	MeNB		
			9.2.24			
SeNB UE X2AP ID	M		eNB UE	Allocated at the	YES	reject
			X2AP ID	SeNB		
			9.2.24			
Cause	M		9.2.6		YES	ignore
SCG Change Indication	0		9.2.73		YES	ignore
Serving PLMN	0		PLMN	The serving PLMN	YES	ignore
			Identity	of the SCG in the		_
			9.2.4	SeNB.		
UE Context Information		01			YES	reject
>UE Security Capabilities	0		9.2.29		_	_
>SeNB Security Key	0		9.2.72		_	_
>SeNB UE Aggregate	0		UE		_	_
Maximum Bit Rate			Aggregate			
			Maximum Bit			
			Rate			
			9.2.12			
>E-RABs To Be Added		01			_	_
List						
>>E-RABs To Be Added		1 <maxnoof< td=""><td></td><td></td><td>EACH</td><td>ignore</td></maxnoof<>			EACH	ignore
Item		Bearers>				, and the second
>>>CHOICE Bearer	M					
Option						
>>>SCG Bearer						
>>>>E-RAB ID	M		9.2.23		_	_
>>>>E-RAB Level	M		9.2.9	Includes necessary	_	_
QoS Parameters	'''		0.2.0	QoS parameters		
>>>>DL	0		9.2.5	ass parameters	_	_
Forwarding			0.2.0			
>>>>S1 UL GTP	М		GTP Tunnel	SGW endpoint of	_	_
Tunnel Endpoint			Endpoint	the S1 transport		
ramio. Imaponio			9.2.1	bearer. For delivery		
			0.2	of UL PDUs.		
>>>>Correlation ID	0		Correlation		_	_
			ID			
			9.2.84			
>>>>SIPTO	0		Correlation		_	_
Correlation ID			ID			
Corrolation 12			9.2.84			
>>>Split Bearer			0.2.0			
>>>>E-RAB ID	М		9.2.23		_	_
>>>>E-RAB Level	M		9.2.9	Includes necessary	_	_
QoS Parameters			5.2.5	QoS parameters		
>>>>MeNB GTP	М		GTP Tunnel	MeNB endpoint of	_	_
Tunnel Endpoint	101		Endpoint	the X2 transport		
Tallion Emaporite			9.2.1	bearer. For delivery		
			0.2.1	of UL PDUs.		
>E-RABs To Be Modified		01	+	0. 0L 1 D03.	_	_
List		""				
>>E-RABs To Be		1 <maxnoof< td=""><td>1</td><td></td><td>EACH</td><td>ignore</td></maxnoof<>	1		EACH	ignore
Modified Item		Bearers>				3
>>>CHOICE Bearer	М		1			
Option						
>>>SCG Bearer			1			
>>>>E-RAB ID	М		9.2.23		_	_
>>>>E-RAB Level	O		9.2.9	Includes QoS	_	_
QoS Parameters	~		3.2.3	parameters to be	_	_
QUO FAIAIIIEIEIS				modified		
>>>>S1 UL GTP	0		GTP Tunnel	SGW endpoint of	_	_
Tunnel Endpoint	~		Endpoint	the S1 transport	_	_
Turiner Enapoint			9.2.1	bearer. For delivery		
			3.2.1	of UL PDUs.		
	l .	1	1	JI UL I DUS.		1

>>>Split Bearer						
>>>>E-RAB ID	М		9.2.23		_	_
>>>>E-RAB Level QoS Parameters	0		9.2.9	Includes QoS parameters to be modified	-	Ι
>>>>MeNB GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2 transport bearer. For delivery of UL PDUs.	_	I
>E-RABs To Be Released List		01			_	_
>>E-RABs To Be Released Item		1 <maxnoof Bearers></maxnoof 			EACH	ignore
>>>CHOICE Bearer Option	M					
>>>SCG Bearer						
>>>>E-RAB ID	M		9.2.23		_	_
>>>>DL Forwarding GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	_	I
>>>>UL Forwarding GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer. used for forwarding of UL PDUs	_	_
>>>Split Bearer						
>>>>E-RAB ID	M		9.2.23		_	_
>>>>DL Forwarding GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	I	1
MeNB to SeNB Container	0		OCTET STRING	Includes the SCG- ConfigInfo message as defined in TS 36.331 [9]	YES	ignore
CSG Membership Status	0		9.2.52		YES	reject
MeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	reject

Range bound	Explanation
maxnoofBearers	Maximum no. of F-RABs. Value is 256

9.1.3.6 SENB MODIFICATION REQUEST ACKNOWLEDGE

This message is sent by the SeNB to confirm the MeNB"s request to modify the SeNB resources for a specific UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	ignore
E-RABs Admitted List		01			YES	ignore
>E-RABs Admitted To Be Added List		1			_	_
>>E-RABs Admitted To Be Added Item		1 <maxnoof Bearers></maxnoof 			EACH	ignore
>>>CHOICE Bearer Option	М					
>>>SCG Bearer			0.000			
>>>>E-RAB ID	M		9.2.23	O-ND	_	_
>>>>S1 DL GTP Tunnel Endpoint	М		GTP Tunnel Endpoint 9.2.1	SeNB endpoint of the S1 transport bearer. For delivery of DL PDUs.	-	_
>>>>DL Forwarding GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	-	-
>>>>UL Forwarding GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	-	-
>>>Split Bearer						
>>>>E-RAB ID	M		9.2.23			_
>>>>SeNB GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	Endpoint of the X2 transport bearer at the SeNB.	-	_
>E-RABs Admitted To Be Modified List		01			-	-
>>E-RABs Admitted To Be Modified Item		1 <maxnoof Bearers></maxnoof 			EACH	ignore
>>>CHOICE Bearer Option	М					
>>>SCG Bearer						
>>>>E-RAB ID	M		9.2.23			_
>>>>S1 DL GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	SeNB endpoint of the S1 transport bearer. For delivery of DL PDUs.	-	_
>>>Split Bearer						
>>>>E-RAB ID	M		9.2.23		-	_
>>>>SeNB GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Endpoint of the X2 transport bearer at the SeNB.	-	_
>E-RABs Admitted To Be		01			_	_
	i .	1 1	i			1

Released List						
>>E-RABs Admitted To		1 <maxnoof< th=""><th></th><th></th><th>EACH</th><th>ignore</th></maxnoof<>			EACH	ignore
Be Released Item		Bearers>				
>>>CHOICE Bearer	M					
Option						
>>>SCG Bearer						
>>>>E-RAB ID	M		9.2.23		-	_
>>>Split Bearer						
>>>>E-RAB ID	M		9.2.23		-	_
E-RABs Not Admitted List	0		E-RAB List 9.2.28	A value for E-RAB ID shall only be present once in E-RABs Admitted List IE and in E- RABs Not Admitted List IE.	YES	ignore
SeNB to MeNB Container	0		OCTET STRING	Includes the SCG-Config message as defined in TS 36.331	YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	Ignore

Range bound	Explanation			
maxnoofBearers	Maximum no. of E-RABs. Value is 256			

9.1.3.7 SENB MODIFICATION REQUEST REJECT

This message is sent by the SeNB to inform the MeNB that the MeNB initiated SeNB Modification Preparation has failed.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.13		YES	reject
MeNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	ignore
Cause	M		9.2.6		YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	ignore

9.1.3.8 SENB MODIFICATION REQUIRED

This message is sent by the SeNB to the MeNB to request the modification of SeNB resources for a specific UE.

Direction: SeNB \rightarrow MeNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	reject
Cause	M		9.2.6		YES	ignore
SCG Change Indication	0		9.2.73		YES	ignore
E-RABs To Be Released List		01			YES	ignore
>E-RABs To Be Released Item		1 <maxnoof Bearers></maxnoof 			EACH	ignore
>>E-RAB ID	M		9.2.23		_	_
>>Cause	M		9.2.6		_	_
SeNB to MeNB Container	0		OCTET STRING	Includes the SCG- Config message as defined in TS 36.331 [9]	YES	ignore
MeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	reject

Range bound	Explanation			
maxnoofBearers	Maximum no. of E-RABs. Value is 256			

9.1.3.9 SENB MODIFICATION CONFIRM

This message is sent by the MeNB to inform the SeNB about the successful modification.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	ignore
MeNB to SeNB Container	0		OCTET STRING	Includes the SCG-ConfigInfo message as defined in TS 36.331	YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	ignore

Range bound	Explanation				
maxnoofBearers	Maximum no. of E-RABs. Value is 256				

9.1.3.10 SENB MODIFICATION REFUSE

This message is sent by the MeNB to inform the SeNB that the SeNB initiated SeNB Modification has failed.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13	_	YES	reject
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	ignore
Cause	M		9.2.6		YES	ignore
MeNB to SeNB Container	0		OCTET STRING	Includes the SCG-ConfigInfo message as defined in TS 36.331	YES	ignore
Criticality Diagnostics	0		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	ignore

9.1.3.11 SENB RELEASE REQUEST

This message is sent by the MeNB to the SeNB to request the release of resources.

Direction: MeNB \rightarrow SeNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	ignore
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID	0		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	reject
Cause	0		9.2.6		YES	ignore
E-RABs To Be Released List		01			YES	ignore
> E-RABs To Be Released Item		1 <maxnoof Bearers></maxnoof 			EACH	ignore
>>CHOICE Bearer Option >>>SCG Bearer	M					
>>>E-RAB ID	M		9.2.23		_	_
>>>UL Forwarding GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	_	_
>>>>DL Forwarding GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer. used for forwarding of DL PDUs	-	_
>>>Split Bearer						
>>>E-RAB ID	M		9.2.23		_	_
>>>>DL Forwarding GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer. used for forwarding of DL PDUs	-	-
UE Context Kept Indicator	0		9.2.85		YES	ignore
MeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	reject

Range bound	Explanation
maxnoofBearers	Maximum no. of E-RABs. Value is 256

9.1.3.12 SENB RELEASE REQUIRED

This message is sent by the SeNB to request the release of all resources for a specific UE at the SeNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
MeNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	reject
Cause	M		9.2.6		YES	ignore
MeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	reject

9.1.3.13 SENB RELEASE CONFIRM

This message is sent by the MeNB to confirm the release of all resources for a specific UE at the SeNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
MeNB UE X2AP ID	М		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	ignore
E-RABs to be Released List		01			YES	ignore
>E-RABs To Be Released Item		1 <maxnoof Bearers></maxnoof 			_	_
>>CHOICE Bearer Option	М					
>>>Split Bearer	M		9.2.23			
>>>>E-RAB ID >>>>DL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	-	-
>>>>UL Forwarding GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	-	-
>>>SCG Bearer				02.200		
>>>E-RAB ID	М		9.2.23		_	_
>>>>DL Forwarding GTP Tunnel Endpoint	0		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	-	-
Criticality Diagnostics	0		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID Extension	0		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	ignore

Range bound	Explanation		
maxnoofBearers	Maximum no. of E-RABs. Value is 256		

9.1.3.14 SENB COUNTER CHECK REQUEST

This message is sent by the SeNB to request the verification of the value of the PDCP COUNTs associated with SCG bearers established in the SeNB.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
Manager Town	N 4		reference	description	VEO	Criticality
Message Type MeNB UE X2AP ID	M		9.2.13 eNB UE	Allocated at	YES YES	reject
Menb de XZAP ID	IVI		X2AP ID	the MeNB	YES	ignore
			9.2.24	the Meind		
SeNB UE X2AP ID	M		eNB UE	Allocated at	YES	ignore
SEIND UE AZAP ID	IVI		X2AP ID	the SeNB	TES	ignore
			9.2.24	the GeND		
E-RABs Subject to		1			YES	ignore
Counter Check List						
>E-RABs Subject to		1 <maxnoof< td=""><td></td><td></td><td>EACH</td><td>ignore</td></maxnoof<>			EACH	ignore
Counter Check Item		Bearers>				
>>E-RAB ID	М		9.2.23		-	-
>>UL COUNT	M	INTEGER(0		Indicates the	-	-
		4294967295)		value of		
				uplink		
				COUNT		
				associated		
				to this E-		
				RAB.		
>>DL COUNT	M	INTEGER(0		Indicates the	-	-
		4294967295)		value of		
				downlink		
				COUNT		
				associated to this E-		
				RAB.		
MeNB UE X2AP ID	0		Extended	Allocated at	YES	ignore
Extension			eNB UE	the MeNB	IES	ignore
LATORISION			X2AP ID	THE MEND		
			9.2.86			
SeNB UE X2AP ID Extension	0		Extended	Allocated at	YES	ignore
			eNB UE	the SeNB		
			X2AP ID			
			9.2.86			

Range bound	Explanation		
maxnoofBearers	Maximum no. of E-RABs. Value is 256		

9.2 Information Element definitions

9.2.0 General

When specifying information elements which are to be represented by bit strings, if not otherwise specifically stated in the semantics description of the concerned IE or elsewhere, the following principle applies with regards to the ordering of bits:

- The first bit (leftmost bit) contains the most significant bit (MSB);
- The last bit (rightmost bit) contains the least significant bit (LSB);
- When importing bit strings from other specifications, the first bit of the bit string contains the first bit of the concerned information.

9.2.1 GTP Tunnel Endpoint

The *GTP Tunnel Endpoint* IE identifies an X2 transport bearer or the S-GW endpoint of the S1 transport bearer associated to an E-RAB. It contains a Transport Layer Address and a GTP Tunnel Endpoint Identifier. The Transport Layer Address is an IP address to be used for the X2 user plane transport (see TS 36.424 [8]) or for the S1 user plane

transport (see TS 36.414 [19]). The GTP Tunnel Endpoint Identifier is to be used for the user plane transport between eNB and the S-GW or between eNBs.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Transport Layer Address	M		BIT STRING (1160,)	For details on the Transport Layer Address, see TS 36.424 [8], TS 36.414 [19]	-	I
GTP TEID	М		OCTET STRING (4)	For details and range, see TS 29.281 [26]	_	-

9.2.2 Trace Activation

Defines parameters related to trace activation.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
E-UTRAN Trace ID	М		OCTET STRING (8)	The E-UTRAN Trace ID IE is composed of the following: Trace Reference defined in TS 32.422 [6] (leftmost 6 octets, with PLMN information coded as in 9.2.4), and Trace Recording Session Reference defined in TS 32.422 [6] (last 2 octets)	-	-
Interfaces To Trace	M		BIT STRING (8)	Each position in the bitmap represents a eNB interface: first bit =S1-MME, second bit =X2, third bit =Uu. Other bits reserved for future use. Value "1" indicates "should be traced". Value "0" indicates "should not be traced".	-	_
Trace Depth	M		ENUMERATED(minimum, medium, maximum, MinimumWithoutVend orSpecificExtension, MediumWithoutVend orSpecificExtension, MaximumWithoutVen dorSpecificExtension,)	Defined in TS 32.421 [7]	_	_
Trace Collection Entity IP Address	M		BIT STRING (1160,)	For details on the Transport Layer Address, see TS 36.424 [8], TS 36.414 [19]	-	-
MDT Configuration	0		9.2.56		YES	ignore

9.2.3 Handover Restriction List

This IE defines roaming or access restrictions for subsequent mobility action for which the eNB provides information about the target of the mobility action towards the UE, e.g., handover and CCO, or for SCG selection during dual connectivity operation.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Serving PLMN	M		PLMN Identity 9.2.4		_	-
Equivalent PLMNs		0 <maxnoof EPLMNs></maxnoof 		Allowed PLMNs in addition to Serving PLMN. This list corresponds to the list of 'equivalent PLMNs list' as defined in TS 24.301 [14]. This list is part of the roaming restriction information. Roaming restrictions apply to PLMNs other than the serving PLMN and Equivalent PLMNs.	_	_
>PLMN Identity	М		9.2.4		_	_
Forbidden TAs		0 <maxnoof EPLMNsPlu sOne></maxnoof 		intra E-UTRAN roaming restrictions	-	-
>PLMN Identity	М		9.2.4	The PLMN of forbidden TACs	_	_
>Forbidden TACs		1 <maxnoof ForbTACs></maxnoof 			_	_
>>TAC	M		OCTET STRING(2)	The forbidden TAC	_	_
Forbidden LAs		0 <maxnoof EPLMNsPlu sOne></maxnoof 		inter-3GPP RAT roaming restrictions	-	-
>PLMN Identity	М		9.2.4		_	_
>Forbidden LACs		1 <maxnoof ForbLACs></maxnoof 			_	_
>>LAC	M		OCTET STRING(2)		_	_
Forbidden inter RATs	0		ENUMERATED(ALL, GERAN, UTRAN, CDMA2000,,GERAN and UTRAN, CDMA2000 and UTRAN)	inter-3GPP and 3GPP2 RAT access restrictions	-	_

Range bound	Explanation
maxnoofEPLMNs	Maximum no. of equivalent PLMN lds. Value is 15.
maxnoofEPLMNsPlusOne	Maximum no. of equivalent PLMN lds plus one. Value is 16.
maxnoofForbTACs	Maximum no. of forbidden Tracking Area Codes. Value is 4096.
maxnoofForbLACs	Maximum no. of forbidden Location Area Codes. Value is 4096.

9.2.4 PLMN Identity

This information element indicates the PLMN Identity.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		OCTET STRING (3)	- digits 0 to 9, encoded 0000 to 1001, - 1111 used as filler digit, two digits per octet, - bits 4 to 1 of octet n encoding digit 2n- 1 - bits 8 to 5 of octet n encoding digit 2n -The PLMN identity consists of 3 digits from MCC followed by either -a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or -3 digits from MNC (in case of a 3 digit MNC).

9.2.5 DL Forwarding

This element indicates that the E-RAB is proposed for forwarding of downlink packets.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL Forwarding	M		ENUMERATED	
			(DL forwarding	
			proposed,)	

9.2.6 Cause

The purpose of the cause information element is to indicate the reason for a particular event for the whole protocol.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Cause Group	М			
>Radio Network Layer				
>>Radio Network Layer Cause	M		ENUMERATED (Handover Desirable for Radio Reasons, Time Critical Handover, Resource Optimisation Handover, Reduce Load in Serving Cell, Partial Handover, Unknown New eNB UE X2AP ID, Unknown Old eNB UE X2AP ID, Unknown Pair of UE X2AP ID, HO Target not Allowed, TX2 _{RELOCoverall} Expiry, TRELOCprep Expiry, Cell not Available, No Radio Resources Available in Target Cell, Invalid MME Group ID, Unknown MME Code, Encryption And/Or Integrity Protection Algorithms Not Supported, ReportCharacteristicsEmpty, NoReportPeriodicity, ExistingMeasurementID, Unknown eNB Measurement ID, Measurement Temporarily not Available, Unspecified,,Load Balancing, Handover Optimisation, Value out of allowed range, Multiple E-RAB ID instances, Switch Off Ongoing, Not supported QCI value, Measurement not supported for the object,TDCoverall Expiry, TDCprep Expiry, Action Desirable for Radio Reasons, Reduce Load, Resource Optimisation, Time Critical action, Target not Allowed, No Radio Resources Available, Invalid QoS combination, Encryption Algorithms Not Supported, Procedure cancelled, RRM purpose, Improve user bit rate, User Inactivity, Radio Connection With UE Lost, Failure in the Radio Interface Procedure, Bearer Option not Supported)	
Transport Laver			реатег Орноп пог бирропеа)	
>Transport Layer >>Transport Layer Cause	M		ENUMERATED (Transport Resource Unavailable, Unspecified,)	
>Protocol				
>>Protocol Cause	M		ENUMERATED (Transfer Syntax Error, Abstract Syntax Error (Reject), Abstract Syntax Error (Ignore and Notify), Message not Compatible with Receiver State, Semantic Error, Unspecified, Abstract Syntax Error (Falsely Constructed	

		Message),)
>Misc		
>>Miscellaneous Cause	M	ENUMERATED (Control Processing Overload, Hardware Failure,O&M Intervention,Not enough User Plane Processing Resources,Unspecified,)

The meaning of the different cause values is described in the following table. In general, "not supported" cause values indicate that the concerned capability is missing. On the other hand, "not available" cause values indicate that the concerned capability is present, but insufficient resources were available to perform the requested action.

Radio Network Layer cause	Meaning
Cell not Available	The concerned cell is not available.
Handover Desirable for Radio Reasons	The reason for requesting handover is radio related.
Handover Target not Allowed	Handover to the indicated target cell is not allowed for the UE in question
Invalid MME Group ID	The target eNB doesn"t belong to the same pool area of the source eNB
	i.e. S1 handovers should be attempted instead.
No Radio Resources Available in Target Cell	The target cell doesn"t have sufficient radio resources available.
Partial Handover	Provides a reason for the handover cancellation. The target eNB did not
	admit all E-RABs included in the HANDOVER REQUEST and the source
	eNB estimated service continuity for the UE would be better by not
	proceeding with handover towards this particular target eNB.
Reduce Load in Serving Cell	Load in serving cell needs to be reduced. When applied to handover
	preparation, it indicates the handover is triggered due to load balancing.
Resource Optimisation Handover	The reason for requesting handover is to improve the load distribution with the neighbour cells.
Time Critical Handover	Handover is requested for time critical reason i.e. this cause value is
	reserved to represent all critical cases where the connection is likely to be dropped if handover is not performed.
TX2 _{RELOCoverall} Expiry	The reason for the action is expiry of timer TX2 _{RELOCoverall} .
T _{RELOCprep} Expiry	Handover Preparation procedure is cancelled when timer T _{RELOCprep}
	expires.
Unknown MME Code	The target eNB belongs to the same pool area of the source eNB and
	recognizes the MME Group ID. However, the MME Code is unknown to
III NE VENEZOADIE	the target eNB.
Unknown New eNB UE X2AP ID	The action failed because the New eNB UE X2AP ID or the MeNB UE X2AP ID is unknown.
Unknown Old eNB UE X2AP ID	The action failed because the Old eNB UE X2AP ID or the SeNB UE X2AP ID is unknown.
Unknown Pair of UE X2AP ID	The action failed because the pair of UE X2 AP IDs is unknown.
Encryption And/Or Integrity	The target eNB is unable to support any of the encryption and/or integrity
Protection Algorithms Not Supported	protection algorithms supported by the UE.
ReportCharacteristicsEmpty	The action failed because there is no characteristic reported.
NoReportPeriodicity	The action failed because the periodicity is not defined.
ExistingMeasurementID	The action failed because measurement-ID is already used.
Unknown eNB Measurement ID	The action failed because some eNB Measurement-ID is unknown.
Measurement Temporarily not Available	The eNB can temporarily not provide the requested measurement object.
Load Balancing	The reason for mobility settings change is load balancing.
Handover Optimisation	The reason for mobility settings change is handover optimisation.
Value out of allowed range	The action failed because the proposed Handover Trigger parameter change in the eNB ₂ Proposed Mobility Parameters IE is too low or too high.
Multiple E-RAB ID Instances	The action failed because multiple instances of the same E-RAB had
	been provided to the eNB.
Switch Off Ongoing	The reason for the action is an ongoing switch off i.e. the concerned cell will be switched off after offloading and not be available. It aides the
	will be switched off after offloading and not be available. It aides the receiving eNB in taking subsequent actions, e.g. selecting the target cell
	for subsequent handovers.
Not supported QCI value	The action failed because the requested QCI is not supported.
Unspecified	Sent when none of the above cause values applies but still the cause is
•	Radio Network Layer related.
Measurement not Supported For The Object	At least one of the concerned cell(s) does not support the requested measurement.
T _{DCoverall} Expiry	The reason for the action is expiry of timer T _{DCoveral} l.
T _{DCprep} Expiry	The reason for the action is expiry of timer T _{DCprep} .
Action Desirable for Radio Reasons	The reason for requesting the action is radio related. In the current version of this specification applicable for Dual Connectivity
	only.
Reduce Load	Load in the cell(group) served by the requesting node needs to be reduced.
	In the current version of this specification applicable for Dual Connectivity only.
Resource Optimisation	The reason for requesting this action is to improve the load distribution
The second of th	with the neighbour cells.

	In the current version of this specification applicable for Dual Connectivity only.		
Time Critical action	The action is requested for time critical reason i.e. this cause value is reserved to represent all critical cases where radio resources are likely to be dropped if the requested action is not performed. In the current version of this specification applicable for Dual Connectivity only.		
Target not Allowed	Requested action towards the indicated target cell is not allowed for the UE in question. In the current version of this specification applicable for Dual Connectivity only.		
No Radio Resources Available	The cell(s) in the requested node don"t have sufficient radio resources available. In the current version of this specification applicable for Dual Connectivity only.		
Invalid QoS combination	The action was failed because of invalid QoS combination. In the current version of this specification applicable for Dual Connectivity only.		
Encryption Algorithms Not Supported	The requested eNB is unable to support any of the encryption algorithms supported by the UE. In the current version of this specification applicable for Dual Connectivity only.		
Procedure cancelled	The sending node cancelled the procedure due to other urgent actions to be performed. In the current version of this specification applicable for Dual Connectivity only.		
RRM purpose	The procedure is initiated due to node internal RRM purposes. In the current version of this specification applicable for Dual Connectivity only.		
Improve User Bit Rate	The reason for requesting this action is to improve the user bit rate. In the current version of this specification applicable for Dual Connectivity only.		
User Inactivity	The action is requested due to user inactivity on all E-RABs, e.g., S1 is requested to be released in order to optimise the radio resources; or SeNB didn"t see activity on the DRB recently. In the current version of this specification applicable for Dual Connectivity only.		
Radio Connection With UE Lost	The action is requested due to losing the radio connection to the UE. In the current version of this specification applicable for Dual Connectivity only.		
Failure in the Radio Interface Procedure	Radio interface procedure has failed. In the current version of this specification applicable for Dual Connectivity only.		
Bearer Option not Supported	The requested bearer option is not supported by the sending node. In the current version of this specification applicable for Dual Connectivity only.		

Transport Network Layer cause	Meaning
Transport resource unavailable	The required transport resources are not available.
Unspecified	Sent when none of the above cause values applies but still the cause is
	Transport Network Layer related

Protocol cause	Meaning
Abstract Syntax Error (Reject)	The received message included an abstract syntax error and the concerned criticality indicated "reject" (see sub clause 10.3 of TS 36.413 [4]).
Abstract Syntax Error (Ignore and Notify)	The received message included an abstract syntax error and the concerned criticality indicated "ignore and notify" (see sub clause 10.3 of TS 36.413 [4]).
Abstract syntax error (falsely constructed message)	The received message contained IEs or IE groups in wrong order or with too many occurrences (see sub clause 10.3 of TS 36.413 [4]).
Message not Compatible with Receiver State	The received message was not compatible with the receiver state (see sub clause 10.4 of TS 36.413 [4]).
Semantic Error	The received message included a semantic error (see sub clause 10.4 of TS 36.413 [4]).
Transfer Syntax Error	The received message included a transfer syntax error (see sub clause 10.2 of TS 36.413 [4]).
Unspecified	Sent when none of the above cause values applies but still the cause is Protocol related

Miscellaneous cause	Meaning
Control Processing Overload	eNB control processing overload
Hardware Failure	eNB hardware failure
Not enough User Plane Processing	eNB has insufficient user plane processing resources available.
Resources	
O&M Intervention	Operation and Maintenance intervention related to eNB equipment
Unspecified	Sent when none of the above cause values applies and the cause is not related to any of the categories Radio Network Layer, Transport Network Layer or Protocol

9.2.7 Criticality Diagnostics

The *Criticality Diagnostics* IE is sent by the eNB when parts of a received message have not been comprehended or were missing, or if the message contained logical errors. When applicable, it contains information about which IEs were not comprehended or were missing.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Procedure Code	0		INTEGER (0255)	Procedure Code is to be used if Criticality Diagnostics is part of Error Indication procedure, and not within the response message of the same procedure that caused the error.
Triggering Message	0		ENUMERATED(initiatin g message, successful outcome, unsuccessful outcome)	The Triggering Message is used only if the Criticality Diagnostics is part of Error Indication procedure.
Procedure Criticality	0		ENUMERATED(reject, ignore, notify)	This Procedure Criticality is used for reporting the Criticality of the Triggering message (Procedure).
Information Element Criticality Diagnostics		0 <maxnroferror s></maxnroferror 		
>IE Criticality	M		ENUMERATED(reject, ignore, notify)	The IE Criticality is used for reporting the criticality of the triggering IE. The value "ignore" shall not be used.
>IE ID	М		INTEGER (065535)	The IE ID of the not understood or missing IE
>Type Of Error	М		ENUMERATED(not understood, missing,)	

Range bound	Explanation		
maxNrOfErrors	Maximum no. of IE errors allowed to be reported with a single		
	message. The value for maxnooferrors is 256.		

9.2.8 Served Cell Information

This IE contains cell configuration information of a cell that a neighbour eNB may need for the X2 AP interface.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PCI	M		INTEGER (0503,)	Physical Cell ID	_	_
Cell ID	М		ECGI 9.2.14		_	-
TAC	М		OCTET STRING(2)	Tracking Area Code	_	_
Broadcast PLMNs		1 <maxnoof BPLMNs></maxnoof 		Broadcast PLMNs	_	_
>PLMN Identity	М		9.2.4		_	-
CHOICE EUTRA-Mode- Info	M				_	ı
>FDD						
>>FDD Info		1			_	_
>>>UL EARFCN	M		EARFCN 9.2.26	Corresponds to N _{UL} in TS 36.104 [16] for E-UTRA operating bands for which it is defined; ignored for E-UTRA operating bands for which N _{UL} is not defined	_	1
>>>DL EARFCN	М		EARFCN 9.2.26	Corresponds to N _{DL} in TS 36.104 [16]	_	_
>>>UL Transmission Bandwidth	M		Transmission Bandwidth 9.2.27	Same as DL Transmission Bandwidth in this release; ignored in case UL EARFCN value is ignored	-	-
>>>DL Transmission Bandwidth	М		Transmission Bandwidth 9.2.27		_	-
>>>UL EARFCN Extension	0		EARFCN Extension 9.2.65	If this IE is present, the value signalled in the <i>UL EARFCN</i> IE is ignored.	YES	reject
>>>DL EARFCN Extension	0		EARFCN Extension 9.2.65	If this IE is present, the value signalled in the DL EARFCN IE is ignored.	YES	reject
>>>Offset of NB-IoT Channel Number to DL EARFCN	0		Offset of NB-IoT Channel Number to EARFCN 9.2.93	Corresponds to M _{DL} in TS 36.104 [16]	YES	reject
>>>Offset of NB-IoT Channel Number to UL EARFCN	0		Offset of NB-IoT Channel Number to EARFCN 9.2.93	Corresponds to M _{UL} in TS 36.104 [16]	YES	reject
>TDD					_	_
>>TDD Info	1	1			_	_
>>>EARFCN	M		9.2.26	Corresponds to N _{DL} /N _{UL} in TS 36.104 [16]	_	_
>>>Transmission	M		Transmission	30.101[10]	_	_

	T	Т	T. D. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	T	T T	
Bandwidth			Bandwidth 9.2.27			
>>>Subframe Assignment	M		ENUMERATED (sa0, sa1, sa2, sa3, sa4, sa5, sa6,)	Uplink-downlink subframe configuration information defined in TS 36.211 [10]	-	-
>>>Special Subframe Info		1		Special subframe configuration information defined in TS 36.211 [10]	-	-
>>>Special Subframe Patterns	M		ENUMERATED (ssp0, ssp1, ssp2, ssp3, ssp4, ssp5, ssp6, ssp7, ssp8,)		_	-
>>>Cyclic Prefix DL	M		ENUMERATED (Normal, Extended,)		-	-
>>>Cyclic Prefix UL	М		ENUMERATED (Normal, Extended,)		-	-
>>>Additional Special Subframe Info	0			Special subframe configuration information defined in TS 36.211 [10]. Only for newly defined configuration of special subframe from Release 11.	YES	ignore
>>>>Additional Special Subframe Patterns	M		ENUMERATED (ssp0, ssp1, ssp2, ssp3, ssp4, ssp5, ssp6, ssp7, ssp8, ssp9,)		_	-
>>>Cyclic Prefix DL	М		ENUMERATED (Normal, Extended,)		_	-
>>>Cyclic Prefix UL	M		ENUMERATED (Normal, Extended,)		-	_
>>>EARFCN Extension	0		9.2.65	If this IE is present, the value signalled in the <i>EARFCN</i> IE is ignored.	YES	reject
Number of Antenna Ports	0		9.2.43		YES	ignore
PRACH Configuration	0		PRACH Configuration 9.2.50		YES	ignore
MBSFN Subframe Info		0 <maxnoof MBSFN></maxnoof 		MBSFN subframe defined in TS 36.331 [9]	GLOBAL	ignore
>Radioframe Allocation Period	M		ENUMERATED (n1, n2, n4, n8, n16, n32,)		-	_
>Radioframe Allocation Offset	M		INTEGER (07,)		_	_

>Subframe Allocation	М		9.2.51		_	_
CSG ID	0		9.2.53		YES	ignore
MBMS Service Area Identity List		0 <maxnoof MBMSServic eArealdentiti es ></maxnoof 		Supported MBMS Service Area Identities in the cell	GLOBAL	ignore
>MBMS Service Area Identity			OCTET STRING(2)	MBMS Service Area Identities as defined in TS 23.003 [29]		
MultibandInfoList	0		9.2.60		YES	ignore
FreqBandIndicatorPriority	0		ENUMERATED (not- broadcasted, broadcasted,)	This IE indicates that the eNodeB supports FreqBandIndica tionPriority, and whether FreqBandIndica torPriority is broadcasted in SIB 1 (see TS 36.331 [9])	YES	ignore

Range bound	Explanation
maxnoofBPLMNs	Maximum no. of Broadcast PLMN Ids. Value is 6.
maxnoofMBSFN	Maximum no. of MBSFN frame allocation with different offset. Value
	is 8.
maxnoofMBMSServiceArealdentities	Maximum no. of MBMS Service Area Identities. Value is 256.

9.2.9 E-RAB Level QoS Parameters

This IE defines the QoS to be applied to an E-RAB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
QCI	M		INTEGER (0255)	QoS Class Identifier defined in TS 23.401 [12]. Logical range and coding specified in TS 23.203 [13].	-	_
Allocation and Retention Priority	М		9.2.31		_	_
GBR QoS Information	0		9.2.10	This IE applies to GBR bearers only and shall be ignored otherwise.	_	_

9.2.10 GBR QoS Information

This IE indicates the maximum and guaranteed bit rates of a GBR E-RAB for downlink and uplink.

NOTE: The SeNB regards the *GBR QoS Information* IE as an E-RAB level parameter also for E-RABs configured with the split bearer option, although for the split bearer option the bitrates signalled by the MeNB are typically not equal to the bitrates signalled by the MME for that E-RAB (see TS 36.300 [15]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
E-RAB Maximum Bit Rate Downlink	М		Bit Rate 9.2.11	Maximum Bit Rate in DL (i.e. from EPC to E-UTRAN) for the bearer. Details in TS 23.401 [12].	-	-
E-RAB Maximum Bit Rate Uplink	M		Bit Rate 9.2.11	Maximum Bit Rate in UL (i.e. from E-UTRAN to EPC) for the bearer. Details in TS 23.401 [12].	-	-
E-RAB Guaranteed Bit Rate Downlink	М		Bit Rate 9.2.11	Guaranteed Bit Rate (provided that there is data to deliver) in DL (i.e. from EPC to E-UTRAN) for the bearer. Details in TS 23.401 [12].	_	-
E-RAB Guaranteed Bit Rate Uplink	M		Bit Rate 9.2.11	Guaranteed Bit Rate (provided that there is data to deliver) in UL (i.e. from E-UTRAN to EPC) for the bearer. Details in TS 23.401 [12].	_	-

9.2.11 Bit Rate

This IE indicates the number of bits delivered by E-UTRAN in UL or to E-UTRAN in DL within a period of time, divided by the duration of the period. It is used, for example, to indicate the maximum or guaranteed bit rate for a GBR E-RAB, or an aggregated maximum bit rate.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Bit Rate	М		INTEGER (010,000,000,000)	The unit is: bit/s

9.2.12 UE Aggregate Maximum Bit Rate

On Handover Aggregate Maximum Bitrate is transferred to the target eNB. In Dual Connectivity, UE Aggregate Maximum Bit Rate is split into MeNB UE Aggregate Maximum Bit Rate and SeNB UE Aggregate Maximum Bit Rate which are enforced by MeNB and SeNB respectively as specified in TS 36.300 [15]. The UE Aggregate Maximum Bitrate is applicable for all Non-GBR bearers per UE which is defined for the Downlink and the Uplink direction and provided by the MME to the eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
UE Aggregate Maximum Bit	M		Bit Rate		_	_
Rate Downlink			9.2.11			
UE Aggregate Maximum Bit	M		Bit Rate		_	-
Rate Uplink			9.2.11			

9.2.13 Message Type

The Message Type IE uniquely identifies the message being sent. It is mandatory for all messages.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Procedure Code	M		INTEGER (0255)	
Type of Message	М		CHOICE (Initiating Message, Successful Outcome, Unsuccessful Outcome,)	

9.2.14 ECGI

The E-UTRAN Cell Global Identifier (ECGI) is used to globally identify a cell (see TS 36.401 [2]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PLMN Identity	M		9.2.4		_	_
E-UTRAN Cell Identifier	М		BIT STRING (28)	The leftmost bits of the E-UTRAN Cell Identifier IE value correspond to the value of the eNB ID IE contained in the Global eNB ID IE (defined in section 9.2.22) identifying the eNB that controls the cell.	-	-

9.2.15 COUNT Value

This information element indicates the 12 bit PDCP sequence number and the corresponding 20 bit Hyper frame number.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDCP-SN	M		INTEGER		_	_
			(04095)			
HFN	M		INTEGER		_	_
			(01048575)			

9.2.16 GUMMEI

This information element indicates the globally unique MME identity.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
GU Group Id	M		9.2.20		-	-
MME code	М		OCTET STRING (1)		_	_

9.2.17 UL Interference Overload Indication

This IE provides, per PRB, a report on interference overload. The interaction between the indication of UL Interference Overload and UL High Interference is implementation specific.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UL Interference Overload Indication List		1 <maxnoofprbs ></maxnoofprbs 		
>UL Interference Overload Indication	M		ENUMERATED (high interference, medium interference, low interference,)	Each PRB is identified by its position in the list: the first element in the list corresponds to PRB 0, the second to PRB 1, etc.

Range bound	Explanation		
maxnoofPRBs	Maximum no. Physical Resource Blocks. Value is 110.		

9.2.18 UL High Interference Indication

This IE provides, per PRB, a 2 level report on interference sensitivity. The interaction between the indication of UL Overload and UL High Interference is implementation specific.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
HII	M		BIT STRING (1110,)	Each position in the bitmap represents a PRB (first bit=PRB 0 and so on), for which value ""1" indicates "high interference sensitivity" and value "0" indicates "low interference sensitivity". The maximum number of Physical Resource Blocks is 110.

9.2.19 Relative Narrowband Tx Power (RNTP)

This IE provides an indication on DL power restriction per PRB or per subframe per PRB (Enhanced RNTP) in a cell and other information needed by a neighbour eNB for interference aware scheduling.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
RNTP Per PRB	M		BIT STRING (6110,)	Each position in the bitmap represents a n _{PRB} value (i.e. first bit=PRB 0 and so on), for which the bit value represents <i>RNTP</i> (n _{PRB}), defined in TS 36.213 [11]. Value 0 indicates "Tx not exceeding RNTP threshold". Value 1 indicates "no promise on the Tx power is given". The IE is ignored if the <i>Enhanced RNTP</i> IE is included.	_	_
RNTP Threshold	M		ENUMERATE D (-∞, -11, -10, -9, -8, -7, -6, - 5, -4, -3, -2, -1, 0, 1, 2, 3,)	RNTP _{threshold} is defined in TS 36.213 [11].	-	-
Number Of Cell-specific Antenna Ports	M		ENUMERATE D (1, 2, 4,)	P (number of antenna ports for cell-specific reference signals) defined in TS 36.211 [10]	-	-
P_B	M		INTEGER (03,)	P _B is defined in TS 36.213 [11].	_	_
PDCCH Interference Impact	M		INTEGER (04,)	Measured by Predicted Number Of Occupied PDCCH OFDM Symbols (see TS 36.211 [10]). Value 0 means "no prediction is available".	_	_
Enhanced RNTP	O M		BIT STRING	Fach position in the	YES	ignore
>Enhanced RNTP Bitmap	IVI		(128800,)	Each position in the bitmap represents a PRB in a subframe; value '00' indicates "Tx not exceeding RNTP Threshold", value '01' indicates "Tx not exceeding RNTP High Power Threshold", value '11' indicates that "no promise on the Tx power is given". Value "10" is ignored by the receiver'. Each position is applicable only in positions corresponding to DL subframes. The first 2 bits correspond to PRB 0 of the first subframe for which the IE is valid, the following 2 bits correspond to PRB 1 of the first		

				subframe for which the IE is valid, and so on. The bit string may span across multiple contiguous subframes (maximum 40). The length of the bit string is an integer multiple of $2 \times N_{\rm RB}^{\rm DL}$. $N_{\rm RB}^{\rm DL}$ is defined in TS 36.211 [10]. The Enhanced RNTP pattern is continuously repeated.	
>RNTP High Power Threshold	М		ENUMERATE D (-∞, -11, -10, -9, -8, -7, -6, - 5, -4, -3, -2, -1, 0, 1, 2, 3,)	Defined as the RNTP _{threshold} in TS 36.213 [11].	
>Enhanced RNTP Start Time		01			
>>Start SFN	М		INTEGER (01023,)	SFN of the radio frame containing the first subframe when the <i>Enhanced RNTP</i> IE is valid.	
>>Start Subframe Number	M		INTEGER (09,)	Subframe number, within the radio frame indicated by the <i>Start SFN</i> IE, of the first subframe when the <i>Enhanced RNTP</i> IE is valid.	

9.2.20 GU Group Id

The GU Group Id IE is the globally unique group id corresponding to a pool area.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PLMN Id	M		PLMN Identity 9.2.4		_	-
MME Group Id	М		OCTET STRING(2)		_	-

9.2.21 Location Reporting Information

This information element indicates how the location information should be reported.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Event	M		ENUMERATED		_	_
			(Change of serving cell,)			
Report Area	М		ENUMERATED		-	-
			(ECGI,)			

9.2.22 Global eNB ID

This IE is used to globally identify an eNB (see TS 36.401 [2]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PLMN Identity	M		9.2.4		_	_
CHOICE eNB ID	M				_	_
>Macro eNB ID	М		BIT STRING (20)	Equal to the 20 leftmost bits of the value of the <i>E-UTRAN Cell Identifier</i> IE contained in the <i>ECGI</i> IE (see section 9.2.14) identifying each cell controlled by the eNB	-	_
>Home eNB ID	М		BIT STRING (28)	Equal to the value of the <i>E-UTRAN Cell Identifier</i> IE contained in the <i>ECGI</i> IE (see section 9.2.14) identifying the cell controlled by the eNB	-	_

9.2.23 E-RAB ID

This IE uniquely identifies an E-RAB for a UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
E-RAB ID	М		INTEGER	
			(015,)	

9.2.24 eNB UE X2AP ID

This information element, combined with the eNB UE X2AP ID Extension when present regardless its value, uniquely identifies an UE over the X2 interface within an eNB.

The usage of this IE is defined in TS 36.401 [2].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
eNB UE X2AP ID	M		INTEGER	
			(04095)	

9.2.25 Subscriber Profile ID for RAT/Frequency priority

The Subscriber Profile ID IE for RAT/Frequency Selection Priority is used to define camp priorities in Idle mode and to control inter-RAT/inter-frequency handover in Active mode (TS 36.300 [15]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Subscriber Profile ID for RAT/Frequency Priority	М		INTEGER (1256)	

9.2.26 EARFCN

The E-UTRA Absolute Radio Frequency Channel Number defines the carrier frequency used in a cell for a given direction (UL or DL) in FDD or for both UL and DL directions in TDD.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
EARFCN	M		INTEGER	The relation between EARFCN
			(0maxEARFCN)	and carrier frequency (in MHz)
				are defined in TS 36.104 [16].

Range bound	Explanation
maxEARFCN	Maximum value of EARFCNs. Value is 65535.

9.2.27 Transmission Bandwidth

The *Transmission Bandwidth* IE is used to indicate the UL or DL transmission bandwidth expressed in units of resource blocks " N_{RB} " (TS 36.104 [16]). The values bw1, bw6, bw15, bw25, bw50, bw75, bw100 correspond to the number of resource blocks ' N_{RB} ' 6, 15, 25, 50, 75, 100.

IE/Group Name	Presence	Range	IE Type and	Semantics Description
			Reference	
Transmission Bandwidth	M		ENUMERATED (bw6,	
			bw15, bw25, bw50,	
			bw75, bw100,, bw1)	

9.2.28 E-RAB List

The IE contains a list of E-RAB identities with a cause value. It is used for example to indicate not admitted bearers.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
E-RAB List Item		1 <maxnoofbeare rs=""></maxnoofbeare>			EACH	ignore
>E-RAB ID	M		9.2.23		_	_
>Cause	M		9.2.6		_	_

Range bound	Explanation
maxnoofBearers	Maximum no. of E-RABs. Value is 256.

9.2.29 UE Security Capabilities

The UE Security Capabilities IE defines the supported algorithms for encryption and integrity protection in the UE.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Encryption Algorithms	M		BIT STRING (16,)	Each position in the bitmap represents an encryption algorithm: "all bits equal to 0" - UE supports no other algorithm than EEA0 'first bit' - 128-EEA1, 'second bit' - 128-EEA2, 'third bit' - 128-EEA3, other bits reserved for future use. Value "1" indicates support and value '0' indicates no support of the algorithm. Algorithms are defined in TS 33.401 [18].
Integrity Protection Algorithms	M		BIT STRING (16,)	Each position in the bitmap represents an integrity protection algorithm: all bits equal to 0" - UE supports no other algorithm than EIA0 (TS 33.401 [18]) 'first bit' - 128-EIA1, 'second bit' - 128-EIA2, 'third bit' - 128-EIA3, other bits reserved for future use. Value "1" indicates support and value '0' indicates no support of the algorithm. Algorithms are defined in TS 33.401 [18].

9.2.30 AS Security Information

The AS Security Information IE is used to generate the key material to be used for AS security with the UE.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Key eNodeB Star	М		BIT STRING (256)	KeNB* defined in TS 33.401 [18]. If the target cell belongs to multiple frequency bands, the source eNB selects the DL-EARFCN for KeNB* calculation as specified in section 10.3 of TS 36.331 [9].
Next Hop Chaining Count	M		INTEGER (07)	Next Hop Chaining Count (NCC) defined in TS 33.401 [18]

9.2.31 Allocation and Retention Priority

This IE specifies the relative importance compared to other E-RABs for allocation and retention of the E-UTRAN Radio Access Bearer.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Priority Level	М		INTEGER (015)	Desc.: This IE should be understood as 'priority of allocation and retention' (see TS 23.401 [12]). Usage: Value 15 means 'no priority'. Values between 1 and 14 are ordered in decreasing order of priority, i.e. 1 is the highest and 14 the lowest. Value 0 shall be treated as a logical error if received.
Pre-emption Capability	M		ENUMERATED(sh all not trigger pre- emption, may trigger pre-emption)	Descr.: This IE indicates the preemption capability of the request on other E-RABs Usage: The E-RAB shall not pre-empt other E-RABs or, the E-RAB may pre-empt other E-RABs The Pre-emption Capability indicator applies to the allocation of resources for an E-RAB and as such it provides the trigger to the pre-emption procedures/processes of the eNB.
Pre-emption Vulnerability	M		ENUMERATED(not pre-emptable, pre-emptable)	Desc.: This IE indicates the vulnerability of the E-RAB to preemption of other E-RABs. Usage: The E-RAB shall not be pre-empted by other E-RABs or the E-RAB may be pre-empted by other RABs. Pre-emption Vulnerability indicator applies for the entire duration of the E-RAB, unless modified, and as such indicates whether the E-RAB is a target of the pre-emption procedures/processes of the eNB.

9.2.32 Time To Wait

This IE defines the minimum allowed waiting times.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Time To Wait	M		ENUMERATED(1s,	
			2s, 5s, 10s, 20s,	
			60s,)	

9.2.33 SRVCC Operation Possible

The IE indicates that both the UE and the MME are SRVCC-capable. E-UTRAN behaviour on reception of this is specified in TS 23.216 [20].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
SRVCC Operation Possible	М		ENUMERATED(Po ssible,)	
			SSIDIE,)	

9.2.34 Hardware Load Indicator

The Hardware Load Indicator IE indicates the status of the Hardware Load experienced by the cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL Hardware Load Indicator	M		Load Indicator	
			9.2.36	
UL Hardware Load Indicator	M		Load Indicator	
			9.2.36	

9.2.35 S1 TNL Load Indicator

The S1 TNL Load Indicator IE indicates the status of the S1 Transport Network Load experienced by the cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL S1TNL Load Indicator	M		Load Indicator	
			9.2.36	
UL S1TNL Load Indicator	M		Load Indicator	
			9.2.36	

9.2.36 Load Indicator

The Load Indicator IE indicates the status of Load.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Load Indicator	M		ENUMERATED (LowLoad,	
			MediumLoad, HighLoad, Overload,)	

9.2.37 Radio Resource Status

The *Radio Resource Status* IE indicates the usage of the PRBs for all traffic in Downlink and Uplink (TS 36.314 [22], TS 23.203 [13]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL GBR PRB usage	M		INTEGER (0100)	
UL GBR PRB usage	M		INTEGER (0100)	
DL non-GBR PRB usage	M		INTEGER (0100)	
UL non-GBR PRB usage	M		INTEGER (0100)	
DL Total PRB usage	M		INTEGER (0100)	
UL Total PRB usage	M		INTEGER (0100)	

9.2.38 UE History Information

The *UE History Information* IE contains information about cells that a UE has been served by in active state prior to the target cell. The overall mechanism is described in TS 36.300 [15].

NOTE: The definition of this IE is aligned with the definition of the *UE History Information* IE in TS 36.413 [4].

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
			reference	description		Criticality
Last Visited Cell List		1 <maxnoofcells< td=""><td></td><td>Most recent</td><td>_</td><td>_</td></maxnoofcells<>		Most recent	_	_
		>		information is		
				added to the top		
				of this list		
>Last Visited Cell	M		9.2.39		_	_
Information						

Range bound	Explanation
maxnoofCells	Maximum number of last visited cell information records that can be
	reported in the IE. Value is 16.

9.2.39 Last Visited Cell Information

The Last Visited Cell Information may contain E-UTRAN or UTRAN or GERAN cell specific information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CHOICE Last Visited Cell	M				-	-
Information						
>E-UTRAN Cell					-	-
>>Last Visited E-UTRAN	M		9.2.40		-	-
Cell Information						
>UTRAN Cell					-	-
>>Last Visited UTRAN	M		OCTET	Defined in TS		
Cell Information			STRING	25.413 [24]		
>GERAN Cell					-	-
>>Last Visited GERAN	M	•	9.2.41		-	-
Cell Information						

9.2.40 Last Visited E-UTRAN Cell Information

The Last Visited E-UTRAN Cell Information contains information about a cell that is to be used for RRM purposes.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Global Cell ID	М		ECGI 9.2.14		-	-
Cell Type	M		9.2.42		-	-
Time UE stayed in Cell	M		INTEGER (04095)	The duration of the time the UE stayed in the cell in seconds. If the UE stays in a cell more than 4095s, this IE is set to 4095.	-	-
Time UE stayed in Cell Enhanced Granularity	0		INTEGER (040950)	The duration of the time the UE stayed in the cell in 1/10 seconds. If the UE stays in a cell more than 4095s, this IE is set to 40950.	YES	ignore
HO Cause Value	0		Cause 9.2.6	The cause for the handover from the E-UTRAN cell.	YES	ignore

9.2.41 Last Visited GERAN Cell Information

The Last Visited Cell Information for GERAN is currently undefined.

NOTE: If in later Releases this is defined, the choice type may be extended with the actual GERAN specific information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CHOICE Last Visited	М				-	-
GERAN Cell Information						
>Undefined	М		NULL		-	-

9.2.42 Cell Type

The cell type provides the cell coverage area.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Cell Size	M		ENUMERATED		-	-
			(verysmall, small,			
			medium, large,)			

9.2.43 Number of Antenna Ports

The Number of Antenna Ports IE is used to indicate the number of cell specific antenna ports.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Number of Antenna Ports			ENUMERATED (an1,	an1 = One antenna port
			an2, an4,)	an2 = Two antenna ports
				an4 = Four antenna ports

9.2.44 Composite Available Capacity Group

The *Composite Available Capacity Group* IE indicates the overall available resource level in the cell in Downlink and Uplink.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Composite Available Capacity Downlink	M		Composite Available Capacity 9.2.45	For the Downlink	-	-
Composite Available Capacity Uplink	M		Composite Available Capacity 9.2.45	For the Uplink	-	-

9.2.45 Composite Available Capacity

The *Composite Available Capacity* IE indicates the overall available resource level in the cell in either Downlink or Uplink.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Cell Capacity Class Value	0		9.2.46		-	-
Capacity Value	M		9.2.47	"0" indicates no resource is available, Measured on a linear scale.	-	•

9.2.46 Cell Capacity Class Value

The *Cell Capacity Class Value* IE indicates the value that classifies the cell capacity with regards to the other cells. The *Cell Capacity Class Value* IE only indicates resources that are configured for traffic purposes.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Cell Capacity Class Value	M		INTEGER (1100,)	Value 1 shall indicate the minimum cell capacity, and 100 shall indicate the maximum cell capacity. There should be a linear relation between cell capacity and Cell Capacity Class Value.	-	-

9.2.47 Capacity Value

The *Capacity Value* IE indicates the amount of resources that are available relative to the total E-UTRAN resources. The capacity value should be measured and reported so that the minimum E-UTRAN resource usage of existing services is reserved according to implementation. The *Capacity Value* IE can be weighted according to the ratio of cell capacity class values, if available.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Capacity Value	M		INTEGER (0100)	Value 0 shall indicate no available capacity, and 100 shall indicate maximum available capacity . Capacity Value should be measured on a linear scale.	-	-

9.2.48 Mobility Parameters Information

The *Mobility Parameters Information* IE contains the change of the Handover Trigger as compared to its current value. The Handover Trigger corresponds to the threshold at which a cell initialises the handover preparation procedure towards a specific neighbour cell. Positive value of the change means the handover is proposed to take place later.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Handover Trigger Change	М		INTEGER (- 2020)	The actual value is IE value * 0.5 dB.

9.2.49 Mobility Parameters Modification Range

The Mobility Parameters Modification Range IE contains the range of Handover Trigger Change values permitted by the eNB₂ at the moment the MOBILITY CHANGE FAILURE message is sent.

IE/Group Name	Presence	Range	IE type and	Semantics description
			reference	
Handover Trigger Change	M		INTEGER (-	The actual value is IE
Lower Limit			2020)	value * 0.5 dB.
Handover Trigger Change	М		INTEGER (-	The actual value is IE
Upper Limit			2020)	value * 0.5 dB.

9.2.50 PRACH Configuration

This IE indicates the PRACH resources used in neighbor cell.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
RootSequenceIndex	M		INTEGER	See section 5.7.2. in	_	_
			(0837)	TS 36.211 [10]		
ZeroCorrelationZoneConfigur	M		INTEGER	See section 5.7.2. in	_	_
ation			(015)	TS 36.211 [10]		
HighSpeedFlag	M		BOOLEAN	TRUE corresponds to	_	_
				Restricted set and		
				FALSE to		
				Unrestricted set. See		
				section 5.7.2 in TS		
				36.211 [10]		
PRACH-FrequencyOffset	M		INTEGER	See section 5.7.1 of	_	_
			(094)	TS 36.211 [10]		
PRACH-ConfigurationIndex	0		INTEGER	Mandatory for TDD,	_	_
			(063)	shall not be present		
				for FDD.		
				See section 5.7.1. in		
				TS 36.211 [10]		

9.2.51 Subframe Allocation

The *Subframe Allocation* IE is used to indicate the subframes that are allocated for MBSFN within the radio frame allocation period as defined in TS 36.331 [9].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Subframe	M			
Allocation				
>Oneframe	M		BITSTRING (SIZE(6))	
>Fourframes	M		BITSTRING (SIZE(24))	

9.2.52 CSG Membership Status

This element indicates the membership status of the UE to a particular CSG.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CSG Membership Status	M		ENUMERATED		-	-
			(member, not-			
			member)			

9.2.53 CSG ID

This element indicates the identifier of the Closed Subscriber Group.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CSG ID	M		BIT STRING (SIZE (27))		-	-

9.2.54 ABS Information

This IE provides information about which sub frames the sending eNB is configuring as almost blank subframes and which subset of almost blank subframes are recommended for configuring measurements towards the UE. Almost blank subframes are subframes with reduced power on some physical channels and/or reduced activity.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE ABS Information	M		-	_
>FDD			_	_
>>ABS Pattern Info	M		BIT STRING (SIZE(40))	Each position in the bitmap represents a DL subframe, for which value "1" indicates "ABS" and value "0" indicates "non ABS". The first position of the ABS pattern corresponds to subframe 0 in a radio frame where SFN = 0. The ABS pattern is continuously repeated in all radio frames. The maximum number of subframes is 40.
>>Number Of Cell- specific Antenna Ports	M		ENUMERATED (1, 2, 4,)	P (number of antenna ports for cell-specific reference signals) defined in TS 36.211 [10]
>>Measurement Subset	М		BIT STRING (SIZE(40))	Indicates a subset of the ABS Pattern Info above, and is used to configure specific measurements towards the UE.
>TDD	<u> </u>			_
>>ABS Pattern Info	M		BIT STRING (170,)	Each position in the bitmap represents a subframe. Value "1" indicates "ABS" and value "0" indicates "non ABS" which is applicable only in positions corresponding to the DL direction. The maximum number of subframes depends on UL/DL subframe configuration. The maximum number of subframes is 20 for UL/DL subframe configuration 1~5; 60 for UL/DL subframe configuration 0. UL/DL subframe configuration 6; 70 for UL/DL subframe configuration 0. UL/DL subframe configuration 1TS 36.211 [10]. The first position of the ABS pattern corresponds to subframe 0 in a radio frame where SFN = 0. The ABS pattern is continuously repeated in all radio frames, and restarted each time SFN = 0.
>>Number Of Cell- specific Antenna Ports	M		ENUMERATED (1, 2, 4,)	P (number of antenna ports for cell-specific reference signals) defined in TS 36.211 [10]
>>Measurement Subset	М		BIT STRING (170,)	Indicates a subset of the ABS Pattern Info above, and is used to configure specific measurements towards the UE
>ABS Inactive	M		NULL	Indicates that interference

		coordination by means of
		almost blank sub frames is
		not active

9.2.55 Invoke Indication

This IE provides an indication about which type of information the sending eNB would like the receiving eNB to send back.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Invoke Indication	М		ENUMERATED (ABS Information,, Start NAICS Information, Stop NAICS Information)	-

9.2.56 MDT Configuration

The IE defines the MDT configuration parameters.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
MDT Activation	М		ENUMERATED(Imme diate MDT only, Immediate MDT and Trace,)		-	_
CHOICE Area Scope of MDT	M				_	_
>Cell Based					_	_
>>Cell ID List for MDT		1 <maxno ofCellIDfor MDT></maxno 			_	_
>>>ECGI	M		9.2.14		_	_
>TA Based					_	_
>>TA List for MDT		1 <maxno ofTAforM DT></maxno 			_	-
>>>TAC	M		OCTET STRING (2)	Tracking Area Code. The TAI is derived using the current serving PLMN.	_	_
>PLMN Wide			NULL		_	_
>TAI based						
>>TAI List for MDT		1 <maxno ofTAforM DT></maxno 				
>>>TAC	M		OCTET STRING (2)	Tracking Area Code		
>>>PLMN Identity	M		9.2.4			
Measurements to Activate M1 Reporting Trigger	M		BITSTRING (SIZE(8)) ENUMERATED	Each position in the bitmap indicates a MDT measurement, as defined in TS 37.320 [25]. First Bit = M1, Second Bit = M2, Third Bit = M3, Fourth Bit = M4, Fifth Bit = M5, Sixth Bit = logging of M1 from event triggered measurement reports according to existing RRM configuration. Seventh Bit = M6, Eighth Bit = M7. Value '1' indicates 'activate' and value '0' indicates 'do not activate'. This IE shall be ignored if	_	_
			(periodic, A2event- triggered,, A2event-triggered periodic)	the Measurements to Activate IE has the first bit set to '0'.	_	_
M1 Threshold Event A2	C- ifM1A2trig ger			Included in case of event- triggered or event- triggered periodic reporting for measurement M1	-	_
>CHOICE Threshold	М				_	_
>>RSRP					_	_
>>>Threshold RSRP	М		INTEGER (097)	This IE is defined in TS 36.331 [9].	-	_
>>RSRQ					_	-
>>>Threshold RSRQ	М		INTEGER (034)	This IE is defined in TS 36.331 [9].	-	_
M1 Periodic reporting	C- ifperiodic			Included in case of periodic or event-triggered	_	_

	MDT		periodic reporting for measurement M1		
>Report interval	М	ENUMERATED (ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, min1, min6, min12, min30, min60)	This IE is defined in TS 36.331 [9].	I	1
>Report amount	M	ENUMERATED (1, 2, 4, 8, 16, 32, 64, infinity)	Number of reports	1	-
M3 Configuration	C-ifM3	9.2.61		YES	ignore
M4 Configuration	C-ifM4	 9.2.62		YES	ignore
M5 Configuration	C-ifM5	 9.2.63		YES	ignore
MDT Location Information	0	BITSTRING(SIZE(8))	Each position in the bitmap represents requested location information as defined in TS 37.320 [31]. First Bit = GNSS Second Bit = E-CID information. Other bits are reserved for future use and are ignored if received. Value '1' indicates 'activate' and value '0' indicates 'do not activate'. The eNB shall ignore the first bit unless the Measurements to Activate IE has the first bit or the sixth bit set to '1'.	YES	ignore
Signalling based MDT PLMN List	0	MDT PLMN List 9.2.64		YES	ignore
M6 Configuration	C-ifM6	9.2.87		YES	ignore
M7 Configuration	C-ifM7	9.2.88		YES	ignore

Range bound	Explanation
maxnoofCellIDforMDT	Maximum no. of Cell ID subject for MDT scope. Value is 32.
maxnoofTAforMDT	Maximum no. of TA subject for MDT scope. Value is 8.

Condition	Explanation
ifM1A2trigger	This IE shall be present if the Measurements to Activate IE has the
	first bit set to "1" and the M1 Reporting Trigger IE is set to "A2event-
	triggered" or to 'A2event-triggered periodic'.
ifperiodicMDT	This IE shall be present if the M1 Reporting Trigger IE is set to
	"periodic" or to 'A2event-triggered periodic'.
ifM3	This IE shall be present if the Measurements to Activate IE has the
	third bit set to '1'.
ifM4	This IE shall be present if the Measurements to Activate IE has the
	fourth bit set to '1'.
ifM5	This IE shall be present if the Measurements to Activate IE has the
	fifth bit set to '1'.
ifM6	This IE shall be present if the Measurements to Activate IE has the
	seventh bit set to '1'.
ifM7	This IE shall be present if the Measurements to Activate IE has the
	eighth bit set to '1'.

9.2.57 Void

9.2.58 ABS Status

The ABS Status IE is used to aid the eNB designating ABS to evaluate the need for modification of the ABS pattern.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL ABS status	M		INTEGER (0100)	Percentage of used ABS resources. The numerator of the percentage calculation consists of resource blocks within the ABS indicated in the Usable ABS Pattern Info IE allocated by the eNB2 for DL traffic needing protection by ABS from inter-cell interference for DL scheduling, or allocated by the eNB2 for other reasons (e.g. some control channels). The denominator of the percentage calculation is the total quantity of resource blocks within the ABS indicated in the Usable ABS Pattern Info IE.
CHOICE Usable ABS Information	М		_	-
>FDD			_	_
>>Usable ABS Pattern Info	M		BIT STRING (SIZE(40))	Each position in the bitmap represents a subframe, for which value "1" indicates "ABS that has been designated as protected from inter-cell interference by the eNB ₁ , and available to serve this purpose for DL scheduling in the eNB ₂ " and value "0" is used for all other subframes. The pattern represented by the bitmap is a subset of, or the same as, the corresponding ABS Pattern Info IE conveyed in the LOAD INFORMATION message from the eNB ₁ .
>TDD			_	_
>>Usable ABS Pattern Info	M		BIT STRING (170)	Each position in the bitmap represents a subframe, for which value "1" indicates "ABS that has been designated as protected from inter-cell interference by the eNB ₁ , and available to serve this purpose for DL scheduling in the eNB ₂ " and value "0" is used for all other subframes. The pattern represented by the bitmap is a subset of, or the same as, the corresponding ABS Pattern Info IE conveyed in the LOAD INFORMATION message from the eNB ₁ .

9.2.59 Management Based MDT Allowed

This information element is used by the eNB to allow selection of the UE for management based MDT as described in TS 32.422 [6].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Management Based MDT	M		ENUMERATED	
Allowed			(Allowed,)	

9.2.60 MultibandInfoList

The *MultibandInfoList* IE contains the additional frequency band indicators that a cell belongs to listed in decreasing order of preference, see TS 36.331 [9].

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
BandInfo		1 <maxnoofband s></maxnoofband 			_	_
>FrequencyBandIndicator	M		INTEGER (1 256,)	E-UTRA operating band as defined in TS 36.101 [42, table 5.5-1]	-	-

Range bound	Explanation
maxnoofBands	Maximum number of frequency bands that a cell belongs to. The
	value is 16.

9.2.61 M3 Configuration

This IE defines the parameters for M3 measurement collection.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
M3 Collection Period	M		ENUMERATED	
			(ms100, ms1000,	
			ms10000,)	

9.2.62 M4 Configuration

This IE defines the parameters for M4 measurement collection.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
M4 Collection Period	M		ENUMERATED (ms1024, ms2048, ms5120, ms10240, min1,)	
M4 Links to log	M		ENUMERATED(uplin k, downlink, both-uplink-and-downlink,)	

9.2.63 M5 Configuration

This IE defines the parameters for M5 measurement collection.

IE/Group Name	Presence	Range	IE type and	Semantics description
			reference	
M5 Collection Period	M		ENUMERATED	
			(ms1024, ms2048,	
			ms5120, ms10240,	
			min1,)	
M5 Links to log	M		ENUMERATED(uplin	
			k, downlink, both-	
			uplink-and-downlink,	
)	

9.2.64 MDT PLMN List

The purpose of the MDT PLMN List IE is to provide the list of PLMNs allowed for MDT.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
MDT PLMN List		1 <maxnoof MDTPLMNs ></maxnoof 		
>PLMN Identity	М		9.2.4	

Range bound	Explanation
maxnoofMDTPLMNs	Maximum no. of PLMNs in the MDT PLMN list. Value is 16.

9.2.65 EARFCN Extension

The E-UTRA Absolute Radio Frequency Channel Number Extension defines the carrier frequency used in a cell for a given direction (UL or DL) in FDD or for both UL and DL directions in TDD.

IE/Group Name	Presence	Range	IE Type and	Semantics Description
			Reference	
EARFCN Extension	М		INTEGER (maxEARFCN+1 newmaxEARFCN,)	The relation between EARFCN and carrier frequency (in MHz) are defined in TS 36.104 [16].

Range bound	Explanation
maxEARFCN	Maximum value of EARFCNs. Value is 65535.
newmaxEARFCN	New maximum value of EARFCNs. Value is 262143.

9.2.66 COUNT Value Extended

This information element indicates the 15 bit long PDCP SN and the corresponding 17 bit long Hyper Frame Number.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
PDCP-SN Extended	M		INTEGER		_	_
			(032767)			
HFN Modified	М		INTEGER		_	_
			(0131071)			

9.2.67 Extended UL Interference Overload Info

This IE provides report on interference overload for the set of subframes that are subject to UL-DL subframe reconfiguration. This IE applies to TDD only.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Associated Subframes	M		BITSTRING (SIZE(5))	The set of subframe(s) to which the Extended UL interference overload indication is applicable. The bitmap from the least significant bit position to the most significant bit position represents subframes #{3, 4, 7, 8, 9} in a radio frame. Value "1" in a bit position indicates that the Extended UL interference overload indication is applicable to the corresponding subframe; and value "0" indicates otherwise.
Extended UL Interference Overload Indication	M		UL Interference Overload Indication 9.2.17	

9.2.68 RNL Header

The RNL Header IE indicates the target eNB ID and source eNB ID.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Source eNB ID	М		Global eNB ID 9.2.22		-	-
Target eNB ID	0		Global eNB ID 9.2.22		-	-

9.2.69 Masked IMEISV

This information element contains the IMEISV value with a mask, to identify a terminal model without identifying an individual Mobile Equipment.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Masked IMEISV	М		BIT STRING (SIZE(64))	Coded as the International Mobile station Equipment Identity and Software Version Number (IMEISV) defined in TS 23.003 [29] with the last 4 digits of the SNR masked by setting the corresponding bits to 1.

9.2.70 Expected UE Behaviour

This IE defines the behaviour of a UE with predictable activity and/or mobility behaviour, to assist the eNB in determining the optimum RRC connection time.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Expected UE Activity Behaviour	M		9.2.71	
Expected HO Interval	0		ENUMERATED (sec15, sec30, sec60, sec90, sec120, sec180, long-time,)	Indicates the expected time interval between inter-eNB handovers. If "long-time" is included, the interval between inter-eNB handovers is expected to be longer than 180 seconds.

9.2.71 Expected UE Activity Behaviour

Indicates information about the expected "UE activity behaviour" as defined in TS 23.401 [12].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Expected Activity Period	0		INTEGER (130 40 50 60 80 100 120 150 180 181,)	If this IE is set to "181" the expected activity time is longer than 180 seconds. The remaining values indicate the expected activity time in [seconds].
Expected Idle Period	0		INTEGER (130 40 50 60 80 100 120 150 180 181,)	If this IE is set to "181" the expected idle time is longer than 180 seconds. The remaining values indicate the expected idle time in [seconds].
Source of UE Activity Behaviour Information	0		ENUMERATED (subscription information, statistics,)	If "subscription information" is indicated, the information contained in the Expected Activity Period IE and the Expected Idle Period IE, if present, is derived from subscription information. If "statistics" is indicated, the information contained in the Expected Activity Period IE and the Expected Idle Period IE, if present, is derived from statistical information.

9.2.72 SeNB Security Key

The SeNB Security Key IE is used to apply security in the SeNB as defined in TS 33.401 [18].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
SeNB Security	М		BIT STRING	The S-KeNB which is provided by the MeNB,
Key			(SIZE(256))	see TS 33.401 [18].

9.2.73 SCG Change Indication

The SCG Change Indication IE is either used to request the SeNB to prepare the SCG Change in the SeNB or to request the MeNB to initiate the SCG Change towards the UE (see TS 36.300 [15]).

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
SCG Change	M		ENUMERATED	
Indication			(PDCPCountWrapAround,	
			PSCellChange, other,)	

9.2.74 CoMP Information

This IE provides the list of CoMP hypothesis sets, where each CoMP hypothesis set is the collection of CoMP hypothesis(es) of one or multiple cells and each CoMP hypothesis set is associated with a benefit metric.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CoMP Information Item		1 <maxnoofcomph ypothesisSet></maxnoofcomph 		
>CoMP Hypothesis Set	М		9.2.75	
>Benefit Metric	М		INTEGER (- 101100,)	Value -100 indicates the maximum cost, and 100 indicates the maximum benefit. Value -101 indicates unknown benefit. Values from -100 to 100 should be calculated on a linear scale.
CoMP Information Start Time		01		
>Start SFN	M		INTEGER (01023,)	SFN of the radio frame containing the first subframe when the CoMP Information IE is valid.
>Start Subframe Number	М		INTEGER (09,)	Subframe number, within the radio frame indicated by the <i>Start SFN</i> IE, of the first subframe when the <i>CoMP Information</i> IE is valid.

Range bound	Explanation		
maxnoofCoMPHypothesisSet	Maximum number of CoMP Hypothesis sets. The value is 256.		

9.2.75 CoMP Hypothesis Set

This IE provides a set of CoMP hypotheses. A CoMP hypothesis is hypothetical PRB-specific resource allocation information for a cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CoMP Hypothesis Set Item		1 <maxnoofcom PCells></maxnoofcom 		
>Cell ID	M		ECGI 9.2.14	ID of the cell for which the CoMP Hypothesis IE is applied.
>CoMP Hypothesis	M		BIT STRING (64400,)	Each position in the bitmap represents a PRB in a subframe, for which value '1' indicates "interference protected resource" and value '0' indicates "resource with no utilization constraints," which is applicable only in positions corresponding to the DL direction. The first bit corresponds to PRB 0 of the first subframe for which the IE is valid, the second bit corresponds to PRB 1 of the first subframe for which the IE is valid, and so on. The bit string may span across multiple contiguous subframes. The length of the bit string is an integer (maximum 40) multiple of N_{RB}^{DL} . N_{RB}^{DL} is defined in TS 36.211 [10]. The CoMP hypothesis pattern is continuously repeated.

Range bound	Explanation		
maxnoofCoMPCells	Maximum number of cells in a CoMP hypothesis set. Value is 32.		

9.2.76 RSRP Measurement Report List

This IE provides RSRP measurement reports of UEs served by the sending eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RSRP Measurement Report		1		
Item		<maxuereport></maxuereport>		
>RSRP Measurement		1		
Result		<maxcellreport></maxcellreport>		
>>RSRP Cell ID	M		ECGI	ID of the cell on which the
			9.2.14	RSRP is measured.
>>RSRP Measured	M		INTEGER	Measured RSRP.
			(097,)	Defined in TS 36.331 [9].
>UE ID	0		BIT STRING	ID assigned by eNB ₂ for
			(SIZE(16))	the UE.

Range bound	Explanation
maxUEReport	Maximum number of UE measurement reports. Value is 128.
maxCellReport	Maximum number of reported cells. The value is 9.

9.2.77 Dynamic DL transmission information

This IE contains assistance information for DL interference mitigation.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE NAICS Information	M			
>NAICS Active				
>>Transmission Modes	0		BIT STRING (SIZE(8))	The set bits indicate some or all transmission modes: 1, 2, 3, 4, 6, 8, 9, 10, as defined in TS 36.213 [23, 7.1]. The first/ leftmost bit is for transmission mode 1, the second bit is for transmission mode 2, and so on.
>>P_B	0		INTEGER (03)	See TS 36.213 [23, Table 5.2-1]
>>P_A_list		0 <maxnoofpa></maxnoofpa>		-
>>>P_A	M		ENUMERATED (dB-6, dB- 4dot77, dB-3, dB-1dot77, dB0, dB1, dB2, dB3,)	See P _A TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB- 4dot77 corresponds to - 4.77 dB etc.
>NAICS Inactive			NULL	

Range bound	Explanation		
maxnoofPA	Maximum no of P _A values that can be configured. Value is 3.		

9.2.78 ProSe Authorized

This IE provides information on the authorization status of the UE for ProSe service(s).

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
ProSe Direct Discovery	0		ENUMERATED (authorized, not authorized,)	Indicates whether the UE is authorized for ProSe Direct Discovery	-	-
ProSe Direct Communication	0		ENUMERATED (authorized, not authorized,)	Indicates whether the UE is authorized for ProSe Direct Communication	-	-
ProSe UE-to- Network Relaying	0		ENUMERATED (authorized, not authorized,)	Indicates whether the UE is authorized to act as ProSe UE-to-Network Relay	YES	ignore

9.2.79 CSI Report

This IE provides CSI reports of UEs served by the cell for which the information is provided.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CSI Report per Cell		1 <maxuereport></maxuereport>		
>UE ID	M		BIT STRING (SIZE(16))	ID assigned by eNB ₂ for the UE.
>CSI Report per CSI Process		1 <maxcsiprocess ></maxcsiprocess 		
>>CSI Process Configuration Index	M		INTEGER (17,)	Indicates one of the possible CSI Process configurations in the serving cell.
>>CSI Report per CSI Process Item		1 <maxcsireport></maxcsireport>		
>>>RI	M		INTEGER (18,)	The RI corresponding to the CQI being reported for this CSI process item. Value defined in TS 36.213 [11].
>>>Wideband CQI	M		9.2.80	
>>>Subband Size	M		ENUMERATED (2, 3, 4, 6, 8,)	Corresponds to a value of subband size k defined in TS 36.213 [11] for the system bandwidth $N_{\rm RB}^{\rm DL}$.
>>>Subband CQI List		0 <maxsubband></maxsubband>		
>>>Subband CQI	М		9.2.81	
>>>Subband Index	M		INTEGER (027,)	

Range bound	Explanation
maxUEReport	Maximum number of UE. Value is 128.
maxCSIProcess	Maximum number of CSI processes per UE. The value is 4.
maxCSIReport	Maximum number of CSI Reports per CSI Process. The value is 2.
maxSubband	Maximum number of subbands. The value is 14.

9.2.80 Wideband CQI

This IE indicates the Wideband CQI as defined in TS 36.213 [11].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Wideband CQI Codeword	М		INTEGER (015,)	Value defined in TS 36.213
0				[11].
CHOICE Wideband CQI	0			
Codeword 1				
>4-bit CQI	М		INTEGER (015,)	Value defined in TS 36.213
				[11].
>3-bit spatial differential	М		INTEGER (07,)	Value defined in TS 36.213
CQI				[11].

9.2.81 Subband CQI

This IE indicates the Subband CQI as defined in TS 36.213 [11].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Subband CQI	М			
Codeword 0				
>4-bit CQI	M		INTEGER (015,)	Value defined in TS 36.213 [11].
>2-bit Subband differential CQI	M		INTEGER (03,)	Value defined in TS 36.213 [11].
>2-bit differential CQI	М		INTEGER (03,)	Value defined in TS 36.213 [11].
CHOICE Subband CQI Codeword 1	0			
>4-bit CQI	М		INTEGER (015,)	Value defined in TS 36.213 [11].
>3-bit spatial differential CQI	М		INTEGER (07,)	Value defined in TS 36.213 [11].
>2-bit Subband differential CQI	М		INTEGER (03,)	Value defined in TS 36.213 [11].
>2-bit differential CQI	М		INTEGER (03,)	Value defined in TS 36.213 [11].

9.2.82 COUNT Value for PDCP SN Length 18

This information element indicates the 18 bit long PDCP SN and the corresponding 14 bit long Hyper Frame Number.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDCP-SN Length 18	M		INTEGER		_	_
			(0262143)			
HFN for PDCP-SN	M		INTEGER		_	_
Length 18			(016383)			

9.2.83 LHN ID

The LHN ID IE is used to indicate the LHN ID of the eNB, as defined in TS 23.003 [21].

IE/Group Name	Presence Range		IE Type and Reference	Semantics Description
Local Home Network ID	M		OCTET STRING (SIZE (32256))	Identifies the Local
				Home Network.

9.2.84 Correlation ID

This information element is the GTP Tunnel Endpoint Identifier or GRE key to be used for the user plane transport between eNB and the L-GW described in TS 23.401 [12].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Correlation ID	M		OCTET STRING	
			(SIZE(4))	

9.2.85 UE Context Kept Indicator

This IE indicates that the UE Context at the SeNB is kept in case of inter-MeNB handover without SeNB Change procedure, as specified in TS 36.300 [15].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Context Kept Indicator	M		ENUMERATED (True,)	

9.2.86 eNB UE X2AP ID Extension

This information element combined with the eNB UE X2AP ID uniquely identifies an UE over the X2 interface within an eNB. If the setup of an UE associated signalling connection was initiated including the eNB UE X2AP ID Extension, the eNB UE X2AP ID Extension shall be used by both peers for the life-time of the respective UE-associated signalling connection.

The usage of this IE is defined in TS 36.401 [2].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
eNB UE X2AP ID Extension	М		INTEGER (04095,)	

9.2.87 M6 Configuration

This IE defines the parameters for M6 measurement collection.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
M6 Report Interval	M		ENUMERATED (ms1024, ms2048, ms5120, ms10240,)	
M6 Delay Threshold	C-ifUL		ENUMERATED (ms30, ms40, ms50, ms60, ms70, ms80, ms90, ms100, ms150, ms300, ms500, ms750,)	
M6 Links to log	М		ENUMERATED(uplin k, downlink, both-uplink-and-downlink,)	

Condition	Explanation
ifUL	This IE shall be present if the M6 Links to log IE is set to 'uplink' or to
	'both-uplink-and-downlink'.

9.2.88 M7 Configuration

This IE defines the parameters for M7 measurement collection.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
M7 Collection Period	M		INTEGER (160,)	Unit: minutes
M7 Links to log	M		ENUMERATED(uplin k, downlink, both-uplink-and-downlink,)	

9.2.89 Tunnel Information

The Tunnel Information IE indicates the transport layer address and UDP port number.

IE/Group Name	Presence	Range	IE type and	Semantics description
			reference	
Transport Layer Address	M		BIT STRING	eNB"s Transport Layer
			(1160,)	Address.
UDP Port Numbers	0		OCTET	UDP Port Numbers if
			STRING	NAT/NAPT is deployed in the
			(SIZE(2))	BBF access network.

9.2.90 X2 Benefit Value

The X2 Benefit Value IE indicates the quantified benefit of the signalling connection.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
X2 Benefit Value	M		INTEGER (18,)	Value 1 indicates low benefit,
				and 8 indicates high benefit.

9.2.91 Resume ID

The Resume ID IE is used to address a suspended UE Context within an eNB.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Resume ID	М			
>Resume ID not truncated				
>>Resume ID not truncated	М		BIT STRING (SIZE (40))	40 bit Resume Resume Identity contained in the RRCConnection ResumeRequest message (TS 36.331 [9]). The 20 most significant bits refer to the eNB ID of the eNB that allocated the Resume ID, the 20 least significant bits identify the UE Context stored at the eNB that allocated the Resume ID.
>Resume ID truncated				
>>Resume ID truncated	M		BIT STRING (SIZE (24))	24 bit Resume Identity contained in the RRCConnection ResumeRequest message (TS 36.331 [9]). The 12 most significant bits refer to the 12 least significant bits of the eNB ID of the eNB that allocated the Resume ID. The 12 least significant bits refer to the 12 least significant bits refer to the 12 least significant bits that identify the UE Context stored at the eNB that allocated the Resume ID.

9.2.92 Bearer Type

This IE is used to support Non-IP data as specified in TS 23.401 [11].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Bearer Type	М		ENUMERATED (non IP,)	

9.2.93 Offset of NB-IoT Channel Number to EARFCN

This IE is used to indicate the offset of the NB-IoT Channel Number to the EARFCN (TS 36.104 [16]).

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Offset of NB-IoT Channel Number to DL EARFCN	М		ENUMERATED (-10,- 9,-8,-7,-6,-5,-4,-3,-2,-1,- 0.5,0,1,2,3,4,5,6,7,8,9, .)	

9.3 Message and Information Element Abstract Syntax (with ASN.1)

9.3.1 General

X2AP ASN.1 definition conforms to ITU-T Rec. X.680 [27] and ITU-T Rec. X.681 [28].

Sub clause 9.3 presents the Abstract Syntax of the X2AP protocol with ASN.1. In case there is contradiction between the ASN.1 definition in this sub clause and the tabular format in sub clause 9.1 and 9.2, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional elements, in which the tabular format shall take precedence.

The ASN.1 definition specifies the structure and content of X2AP messages. X2AP messages can contain any IEs specified in the object set definitions for that message without the order or number of occurrence being restricted by ASN.1. However, for this version of the standard, a sending entity shall construct an X2AP message according to the PDU definitions module and with the following additional rules:

- IEs shall be ordered (in an IE container) in the order they appear in object set definitions.
- Object set definitions specify how many times IEs may appear. An IE shall appear exactly once if the presence field in an object has value "mandatory". An IE may appear at most once if the presence field in an object has value "optional" or "conditional". If in a tabular format there is multiplicity specified for an IE (i.e. an IE list) then in the corresponding ASN.1 definition the list definition is separated into two parts. The first part defines an IE container list in which the list elements reside. The second part defines list elements. The IE container list appears as an IE of its own. For this version of the standard an IE container list may contain only one kind of list elements.

NOTE: In the above, "IE" means an IE in the object set with an explicit ID. If one IE needs to appear more than once in one object set, then the different occurrences have different IE IDs.

If an X2AP message that is not constructed as defined above is received, this shall be considered as Abstract Syntax Error, and the message shall be handled as defined for Abstract Syntax Error in clause 10.

9.3.2 Usage of Private Message Mechanism for Non-standard Use

The private message mechanism for non-standard use may be used:

- for special operator (and/or vendor) specific features considered not to be part of the basic functionality, i.e. the functionality required for a complete and high-quality specification in order to guarantee multivendor inter-operability.
- by vendors for research purposes, e.g. to implement and evaluate new algorithms/features before such features are proposed for standardisation.

The private message mechanism shall not be used for basic functionality. Such functionality shall be standardised.

9.3.3 Elementary Procedure Definitions

__ ****************************

```
-- Elementary Procedure definitions
__ **********************
X2AP-PDU-Descriptions {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) x2ap (2) version1 (1) x2ap-PDU-Descriptions (0) }
DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
  *****************
-- IE parameter types from other modules.
__ *******************
IMPORTS
   Criticality,
   ProcedureCode
FROM X2AP-CommonDataTypes
   CellActivationRequest,
   CellActivationResponse,
   CellActivationFailure,
   ENBConfigurationUpdate,
   ENBConfigurationUpdateAcknowledge,
   ENBConfigurationUpdateFailure,
   ErrorIndication,
   HandoverCancel,
   HandoverReport,
   HandoverPreparationFailure,
   HandoverRequest,
   HandoverRequestAcknowledge,
   LoadInformation,
   PrivateMessage,
   ResetRequest,
   ResetResponse,
   ResourceStatusFailure,
   ResourceStatusRequest,
   ResourceStatusResponse,
   ResourceStatusUpdate,
   RLFIndication.
   SNStatusTransfer,
   UEContextRelease,
   X2SetupFailure,
   X2SetupRequest,
   X2SetupResponse,
   MobilityChangeRequest,
   MobilityChangeAcknowledge,
   MobilityChangeFailure,
```

```
X2Release,
    X2APMessageTransfer,
    SeNBAdditionRequest,
    SeNBAdditionRequestAcknowledge,
    SeNBAdditionRequestReject,
    SeNBReconfigurationComplete,
    SeNBModificationRequest,
    SeNBModificationRequestAcknowledge,
    SeNBModificationRequestReject,
    SeNBModificationRequired,
    SeNBModificationConfirm,
    SeNBModificationRefuse,
    SeNBReleaseRequest,
    SeNBReleaseRequired,
    SeNBReleaseConfirm,
    SeNBCounterCheckRequest,
    X2RemovalFailure,
    X2RemovalRequest,
    X2RemovalResponse,
    RetrieveUEContextRequest,
    RetrieveUEContextResponse,
    RetrieveUEContextFailure
FROM X2AP-PDU-Contents
    id-cellActivation.
    id-eNBConfigurationUpdate,
    id-errorIndication,
    id-handoverCancel,
    id-handoverReport,
    id-handoverPreparation,
    id-loadIndication.
    id-privateMessage,
    id-reset.
    id-resourceStatusReporting,
    id-resourceStatusReportingInitiation,
    id-rLFIndication,
    id-snStatusTransfer,
    id-uEContextRelease,
    id-x2Setup,
    id-mobilitySettingsChange,
    id-x2Release,
    id-x2APMessageTransfer,
    id-seNBAdditionPreparation,
    id-seNBReconfigurationCompletion,
    id-meNBinitiatedSeNBModificationPreparation,
    id-seNBinitiatedSeNBModification,
    id-meNBinitiatedSeNBRelease,
    id-seNBinitiatedSeNBRelease,
    id-seNBCounterCheck,
    id-x2Removal,
    id-retrieveUEContext
```

```
FROM X2AP-Constants;
     ********************
-- Interface Elementary Procedure Class
  X2AP-ELEMENTARY-PROCEDURE ::= CLASS {
   &InitiatingMessage
   &SuccessfulOutcome
                                OPTIONAL,
   &UnsuccessfulOutcome
                                    OPTIONAL,
   &procedureCode
                         ProcedureCode UNIOUE
   &criticality
                         Criticality
                                        DEFAULT ignore
WITH SYNTAX {
                         &InitiatingMessage
   INITIATING MESSAGE
                         &SuccessfulOutcome]
   [SUCCESSFUL OUTCOME
                             &UnsuccessfulOutcome]
   [UNSUCCESSFUL OUTCOME
   PROCEDURE CODE
                         &procedureCode
   [CRITICALITY
                         &criticality]
            *************
-- Interface PDU Definition
    ******************
X2AP-PDU ::= CHOICE {
   initiatingMessage
                     InitiatingMessage,
   successfulOutcome
                     SuccessfulOutcome,
   unsuccessfulOutcome UnsuccessfulOutcome,
   . . .
InitiatingMessage ::= SEQUENCE
   procedureCode X2AP-ELEMENTARY-PROCEDURE.&procedureCode
                                                              ({X2AP-ELEMENTARY-PROCEDURES}),
   criticality
                  X2AP-ELEMENTARY-PROCEDURE.&criticality
                                                              ({X2AP-ELEMENTARY-PROCEDURES}{@procedureCode}),
                                                              ({X2AP-ELEMENTARY-PROCEDURES} {@procedureCode})
   value
                  X2AP-ELEMENTARY-PROCEDURE.&InitiatingMessage
SuccessfulOutcome ::= SEQUENCE {
   procedureCode X2AP-ELEMENTARY-PROCEDURE.&procedureCode
                                                              ({X2AP-ELEMENTARY-PROCEDURES}),
                                                              ({X2AP-ELEMENTARY-PROCEDURES}{@procedureCode}),
   criticality
                  X2AP-ELEMENTARY-PROCEDURE.&criticality
                                                              ({X2AP-ELEMENTARY-PROCEDURES}{@procedureCode})
   value
                  X2AP-ELEMENTARY-PROCEDURE.&SuccessfulOutcome
UnsuccessfulOutcome ::= SEQUENCE {
                                                              ({X2AP-ELEMENTARY-PROCEDURES}),
   procedureCode X2AP-ELEMENTARY-PROCEDURE.&procedureCode
   criticality
                  X2AP-ELEMENTARY-PROCEDURE.&criticality
                                                              ({X2AP-ELEMENTARY-PROCEDURES}{@procedureCode}),
   value
                  X2AP-ELEMENTARY-PROCEDURE.&UnsuccessfulOutcome
                                                             ({X2AP-ELEMENTARY-PROCEDURES}{@procedureCode})
```

```
-- Interface Elementary Procedure List
__ ********************
X2AP-ELEMENTARY-PROCEDURES X2AP-ELEMENTARY-PROCEDURE ::= {
   X2AP-ELEMENTARY-PROCEDURES-CLASS-1
   X2AP-ELEMENTARY-PROCEDURES-CLASS-2
X2AP-ELEMENTARY-PROCEDURES-CLASS-1 X2AP-ELEMENTARY-PROCEDURE ::=
   handoverPreparation
   reset
   x2Setup
   resourceStatusReportingInitiation
   eNBConfigurationUpdate
   mobilitySettingsChange
   cellActivation
   seNBAdditionPreparation
   meNBinitiatedSeNBModificationPreparation
   seNBinitiatedSeNBModification
   seNBinitiatedSeNBRelease
   x2Removal
   retrieveUEContext,
X2AP-ELEMENTARY-PROCEDURES-CLASS-2 X2AP-ELEMENTARY-PROCEDURE ::=
   snStatusTransfer
   uEContextRelease
   handoverCancel
   errorIndication
   resourceStatusReporting
   loadIndication
   privateMessage
   rLFIndication
   handoverReport
   x2Release
   x2APMessageTransfer
   seNBReconfigurationCompletion
   meNBinitiatedSeNBRelease
   seNBCounterCheck,
  -- Interface Elementary Procedures
__ **********************
```

```
handoverPreparation X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            HandoverRequest
    SUCCESSFUL OUTCOME
                            HandoverRequestAcknowledge
    UNSUCCESSFUL OUTCOME
                            HandoverPreparationFailure
                            id-handoverPreparation
    PROCEDURE CODE
    CRITICALITY
                            reject
snStatusTransfer X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            SNStatusTransfer
                            id-snStatusTransfer
    PROCEDURE CODE
    CRITICALITY
                            ignore
uEContextRelease X2AP-ELEMENTARY-PROCEDURE ::= {
                            UEContextRelease
    INITIATING MESSAGE
                            id-uEContextRelease
    PROCEDURE CODE
    CRITICALITY
                            ignore
handoverCancel X2AP-ELEMENTARY-PROCEDURE ::= {
                            HandoverCancel
    INITIATING MESSAGE
    PROCEDURE CODE
                            id-handoverCancel
    CRITICALITY
                            ignore
handoverReport X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            HandoverReport
    PROCEDURE CODE
                            id-handoverReport
    CRITICALITY
                            ignore
errorIndication X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            ErrorIndication
    PROCEDURE CODE
                            id-errorIndication
                            ignore
    CRITICALITY
reset X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            ResetRequest
                            ResetResponse
    SUCCESSFUL OUTCOME
    PROCEDURE CODE
                            id-reset
    CRITICALITY
                            reject
x2Setup X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            X2SetupRequest
    SUCCESSFUL OUTCOME
                            X2SetupResponse
                            X2SetupFailure
    UNSUCCESSFUL OUTCOME
    PROCEDURE CODE
                            id-x2Setup
    CRITICALITY
                            reject
```

```
loadIndication X2AP-ELEMENTARY-PROCEDURE ::= {
                            LoadInformation
    INITIATING MESSAGE
    PROCEDURE CODE
                            id-loadIndication
    CRITICALITY
                            ignore
eNBConfigurationUpdate
                            X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            ENBConfigurationUpdate
    SUCCESSFUL OUTCOME
                            ENBConfigurationUpdateAcknowledge
                            ENBConfigurationUpdateFailure
    UNSUCCESSFUL OUTCOME
                            id-eNBConfigurationUpdate
    PROCEDURE CODE
    CRITICALITY
                            reject
resourceStatusReportingInitiation
                                    X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                                    ResourceStatusRequest
                                    ResourceStatusResponse
    SUCCESSFUL OUTCOME
                                    ResourceStatusFailure
    UNSUCCESSFUL OUTCOME
    PROCEDURE CODE
                                    id-resourceStatusReportingInitiation
    CRITICALITY
                                    reject
resourceStatusReporting X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            ResourceStatusUpdate
    PROCEDURE CODE
                            id-resourceStatusReporting
    CRITICALITY
                            ignore
rLFIndication X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            RLFIndication
    PROCEDURE CODE
                            id-rLFIndication
    CRITICALITY
                            ignore
                        X2AP-ELEMENTARY-PROCEDURE ::= {
privateMessage
    INITIATING MESSAGE
                            PrivateMessage
    PROCEDURE CODE
                            id-privateMessage
    CRITICALITY
                            ignore
mobilitySettingsChange X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            MobilityChangeRequest
    SUCCESSFUL OUTCOME
                            MobilityChangeAcknowledge
                            MobilityChangeFailure
    UNSUCCESSFUL OUTCOME
                            id-mobilitySettingsChange
    PROCEDURE CODE
    CRITICALITY
                            reject
cellactivation X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            CellActivationRequest
    SUCCESSFUL OUTCOME
                            CellActivationResponse
                            CellActivationFailure
    UNSUCCESSFUL OUTCOME
```

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```
id-cellActivation
    PROCEDURE CODE
    CRITICALITY
                            reject
x2Release X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            X2Release
    PROCEDURE CODE
                            id-x2Release
    CRITICALITY
                            reject
x2APMessageTransfer X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            X2APMessageTransfer
    PROCEDURE CODE
                            id-x2APMessageTransfer
    CRITICALITY
                            reject
seNBAdditionPreparation X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            SeNBAdditionRequest
                            SeNBAdditionRequestAcknowledge
    SUCCESSFUL OUTCOME
                            SeNBAdditionRequestReject
    UNSUCCESSFUL OUTCOME
    PROCEDURE CODE
                            id-seNBAdditionPreparation
    CRITICALITY
                            reject
senBReconfigurationCompletion X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            SeNBReconfigurationComplete
    PROCEDURE CODE
                            id-seNBReconfigurationCompletion
    CRITICALITY
                            ignore
meNBinitiatedSeNBModificationPreparation
                                            X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            SeNBModificationRequest
    SUCCESSFUL OUTCOME
                            SeNBModificationRequestAcknowledge
    UNSUCCESSFUL OUTCOME
                            SeNBModificationRequestReject
                            id-meNBinitiatedSeNBModificationPreparation
    PROCEDURE CODE
    CRITICALITY
                            reject
seNBinitiatedSeNBModification X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            SeNBModificationRequired
                            SeNBModificationConfirm
    SUCCESSFUL OUTCOME
                            SeNBModificationRefuse
    UNSUCCESSFUL OUTCOME
                            id-seNBinitiatedSeNBModification
    PROCEDURE CODE
    CRITICALITY
                            reject
meNBinitiatedSeNBRelease
                            X2AP-ELEMENTARY-PROCEDURE ::=
    INITIATING MESSAGE
                            SeNBReleaseRequest
    PROCEDURE CODE
                            id-meNBinitiatedSeNBRelease
    CRITICALITY
                            ignore
seNBinitiatedSeNBRelease
                            X2AP-ELEMENTARY-PROCEDURE ::=
    INITIATING MESSAGE
                            SeNBReleaseRequired
```

```
SeNBReleaseConfirm
    SUCCESSFUL OUTCOME
    PROCEDURE CODE
                            id-seNBinitiatedSeNBRelease
    CRITICALITY
                            reject
                    X2AP-ELEMENTARY-PROCEDURE ::= {
seNBCounterCheck
                            SeNBCounterCheckRequest
    INITIATING MESSAGE
                            id-seNBCounterCheck
    PROCEDURE CODE
    CRITICALITY
                           reject
x2Removal X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            X2RemovalRequest
    SUCCESSFUL OUTCOME
                            X2RemovalResponse
                           X2RemovalFailure
    UNSUCCESSFUL OUTCOME
    PROCEDURE CODE
                            id-x2Removal
    CRITICALITY
                            reject
retrieveUEContext X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            RetrieveUEContextRequest
                            RetrieveUEContextResponse
    SUCCESSFUL OUTCOME
                           RetrieveUEContextFailure
    UNSUCCESSFUL OUTCOME
    PROCEDURE CODE
                            id-retrieveUEContext
    CRITICALITY
                            reject
END
```

9.3.4 PDU Definitions

```
ABS-Status,
AS-SecurityInformation,
BearerType,
Cause,
CompositeAvailableCapacityGroup,
Correlation-ID,
COUNTvalue.
CellReportingIndicator,
CriticalityDiagnostics,
CRNTI,
CSGMembershipStatus,
CSG-Id,
DeactivationIndication,
DL-Forwarding,
DynamicDLTransmissionInformation,
ECGI,
E-RAB-ID,
E-RAB-Level-OoS-Parameters,
E-RAB-List,
EUTRANTraceID,
GlobalENB-ID,
GTPtunnelEndpoint,
GUGroupIDList,
GUMMEI,
HandoverReportType,
HandoverRestrictionList,
Masked-IMEISV,
InvokeIndication,
LocationReportingInformation,
MDT-Configuration,
ManagementBasedMDTallowed,
MDTPLMNList,
Neighbour-Information,
PCI,
PDCP-SN,
PLMN-Identity,
ReceiveStatusofULPDCPSDUs,
Registration-Reguest,
RelativeNarrowbandTxPower,
RadioResourceStatus,
RRCConnReestabIndicator,
RRCConnSetupIndicator,
UE-RLF-Report-Container,
RRC-Context,
ServedCell-Information,
ServedCells,
ShortMAC-I,
SRVCCOperationPossible,
SubscriberProfileIDforRFP,
TargetCellInUTRAN,
TargeteNBtoSource-eNBTransparentContainer,
TimeToWait,
TraceActivation,
TraceDepth,
```

```
TransportLayerAddress,
    UEAggregateMaximumBitRate,
    UE-HistoryInformation,
   UE-HistoryInformationFromTheUE,
   UE-S1AP-ID.
   UESecurityCapabilities,
   UE-X2AP-ID,
   UL-HighInterferenceIndicationInfo,
    UL-InterferenceOverloadIndication.
    HWLoadIndicator,
    S1TNLLoadIndicator,
   Measurement-ID,
    ReportCharacteristics,
   MobilityParametersInformation,
   MobilityParametersModificationRange,
    ReceiveStatusOfULPDCPSDUsExtended,
    COUNTValueExtended,
    SubframeAssignment,
    ExtendedULInterferenceOverloadInfo,
    ExpectedUEBehaviour,
    SeNBSecurityKey,
    MeNBtoSeNBContainer,
    SeNBtoMeNBContainer,
    SCGChangeIndication,
    CoMPInformation,
    ReportingPeriodicityRSRPMR,
    RSRPMRList,
    UE-RLF-Report-Container-for-extended-bands,
    ProSeAuthorized,
    CoverageModificationList,
    ReportingPeriodicityCSIR,
    CSIReportList,
    ReceiveStatusOfULPDCPSDUsPDCP-SNlength18,
    COUNTvaluePDCP-SNlength18,
    LHN-ID,
    UE-ContextKeptIndicator,
    UE-X2AP-ID-Extension.
    SIPTOBearerDeactivationIndication,
    TunnelInformation,
    X2BenefitValue,
    ResumeID,
    EUTRANCellIdentifier
FROM X2AP-IEs
    PrivateIE-Container{},
    ProtocolExtensionContainer{},
    ProtocolIE-Container{},
    ProtocolIE-ContainerList{},
    ProtocolIE-ContainerPair{},
    ProtocolIE-ContainerPairList{},
    ProtocolIE-Single-Container{},
    X2AP-PRIVATE-IES,
    X2AP-PROTOCOL-EXTENSION,
```

```
X2AP-PROTOCOL-IES,
    X2AP-PROTOCOL-IES-PAIR
FROM X2AP-Containers
    id-ABSInformation.
    id-ActivatedCellList,
    id-BearerType,
    id-Cause,
    id-CellInformation,
    id-CellInformation-Item,
    id-CellMeasurementResult,
    id-CellMeasurementResult-Item,
    id-CellToReport,
    id-CellToReport-Item,
    id-CompositeAvailableCapacityGroup,
    id-CriticalityDiagnostics,
    id-DeactivationIndication,
    id-DynamicDLTransmissionInformation,
    id-E-RABs-Admitted-Item,
    id-E-RABs-Admitted-List,
    id-E-RABs-NotAdmitted-List,
    id-E-RABs-SubjectToStatusTransfer-List,
    id-E-RABs-SubjectToStatusTransfer-Item,
    id-E-RABs-ToBeSetup-Item,
    id-GlobalENB-ID,
    id-GUGroupIDList,
    id-GUGroupIDToAddList,
    id-GUGroupIDToDeleteList,
    id-GUMMEI-ID,
    id-Masked-IMEISV,
    id-InvokeIndication,
    id-New-eNB-UE-X2AP-ID,
    id-Old-eNB-UE-X2AP-ID,
    id-Registration-Request,
    id-ReportingPeriodicity,
    id-ServedCells,
    id-ServedCellsToActivate,
    id-ServedCellsToAdd,
    id-ServedCellsToModify,
    id-ServedCellsToDelete,
    id-SRVCCOperationPossible,
    id-TargetCell-ID,
    id-TargeteNBtoSource-eNBTransparentContainer,
    id-TimeToWait,
    id-TraceActivation,
    id-UE-ContextInformation,
    id-UE-HistorvInformation,
    id-UE-X2AP-ID,
    id-Measurement-ID,
    id-ReportCharacteristics,
    id-ENB1-Measurement-ID,
    id-ENB2-Measurement-ID,
    id-ENB1-Cell-ID,
    id-ENB2-Cell-ID,
```

```
id-ENB2-Proposed-Mobility-Parameters,
id-ENB1-Mobility-Parameters,
id-ENB2-Mobility-Parameters-Modification-Range.
id-FailureCellPCI.
id-Re-establishmentCellECGI.
id-FailureCellCRNTI,
id-ShortMAC-I.
id-SourceCellECGI,
id-FailureCellECGI,
id-HandoverReportType,
id-UE-RLF-Report-Container,
id-PartialSuccessIndicator,
id-MeasurementInitiationResult-List,
id-MeasurementInitiationResult-Item,
id-MeasurementFailureCause-Item,
id-CompleteFailureCauseInformation-List,
id-CompleteFailureCauseInformation-Item,
id-CSGMembershipStatus,
id-CSG-Id,
id-MDTConfiguration,
id-ManagementBasedMDTallowed,
id-ABS-Status,
id-RRCConnSetupIndicator,
id-RRCConnReestabIndicator,
id-TargetCellInUTRAN,
id-MobilityInformation,
id-SourceCellCRNTI,
id-ManagementBasedMDTPLMNList,
id-ReceiveStatusOfULPDCPSDUsExtended,
id-ULCOUNTValueExtended,
id-DLCOUNTValueExtended,
id-IntendedULDLConfiguration,
id-ExtendedULInterferenceOverloadInfo,
id-RNL-Header,
id-x2APMessage,
id-UE-HistoryInformationFromTheUE,
id-ExpectedUEBehaviour,
id-MeNB-UE-X2AP-ID,
id-SeNB-UE-X2AP-ID,
id-UE-SecurityCapabilities,
id-SeNBSecurityKey,
id-SeNBUEAggregateMaximumBitRate,
id-ServingPLMN,
id-E-RABs-ToBeAdded-List,
id-E-RABs-ToBeAdded-Item,
id-MeNBtoSeNBContainer,
id-E-RABs-Admitted-ToBeAdded-List,
id-E-RABs-Admitted-ToBeAdded-Item,
id-SeNBtoMeNBContainer,
id-ResponseInformationSeNBReconfComp,
id-UE-ContextInformationSeNBModReg,
id-E-RABs-ToBeAdded-ModRegItem,
id-E-RABs-ToBeModified-ModReqItem,
id-E-RABs-ToBeReleased-ModReqItem,
```

```
id-E-RABs-Admitted-ToBeAdded-ModAckList,
    id-E-RABs-Admitted-ToBeModified-ModAckList.
    id-E-RABs-Admitted-ToBeReleased-ModAckList.
    id-E-RABs-Admitted-ToBeAdded-ModAckItem,
    id-E-RABs-Admitted-ToBeModified-ModAckItem.
    id-E-RABs-Admitted-ToBeReleased-ModAckItem,
    id-SCGChangeIndication,
    id-E-RABs-ToBeReleased-ModRegd,
    id-E-RABs-ToBeReleased-ModRegdItem,
    id-E-RABs-ToBeReleased-List-RelReg.
    id-E-RABs-ToBeReleased-RelRegItem,
    id-E-RABs-ToBeReleased-List-RelConf,
    id-E-RABs-ToBeReleased-RelConfItem,
    id-E-RABs-SubjectToCounterCheck-List,
    id-E-RABs-SubjectToCounterCheckItem,
    id-CoMPInformation,
    id-ReportingPeriodicityRSRPMR,
    id-RSRPMRList,
    id-UE-RLF-Report-Container-for-extended-bands,
    id-ProSeAuthorized,
    id-CoverageModificationList,
    id-ReportingPeriodicityCSIR,
    id-CSIReportList,
    id-ReceiveStatusOfULPDCPSDUsPDCP-SNlength18.
    id-ULCOUNTValuePDCP-SNlength18,
    id-DLCOUNTValuePDCP-SNlength18,
    id-LHN-ID,
    id-Correlation-ID,
    id-SIPTO-Correlation-ID,
    id-UE-ContextReferenceAtSeNB,
    id-UE-ContextKeptIndicator,
    id-New-eNB-UE-X2AP-ID-Extension,
    id-Old-eNB-UE-X2AP-ID-Extension.
    id-MeNB-UE-X2AP-ID-Extension,
    id-SeNB-UE-X2AP-ID-Extension,
    id-SIPTO-BearerDeactivationIndication.
    id-Tunnel-Information-for-BBF,
    id-SIPTO-L-GW-TransportLayerAddress,
    id-GW-TransportLayerAddress,
    id-X2RemovalThreshold,
    id-CellReportingIndicator,
    id-resumeID.
    id-UE-ContextInformationRetrieve,
    id-E-RABs-ToBeSetupRetrieve-Item,
    id-NewEUTRANCellIdentifier,
    maxCellineNB,
    maxnoofBearers,
    maxnoofPDCP-SN,
    maxFailedMeasObjects,
    maxnoofCellIDforMDT,
    maxnoofTAforMDT
FROM X2AP-Constants;
```

```
*******************
-- HANDOVER REQUEST
   ****************
HandoverRequest ::= SEQUENCE {
   protocolIEs
                       ProtocolIE-Container
                                              {{HandoverRequest-IEs}},
HandoverRequest-IES X2AP-PROTOCOL-IES ::= {
     ID id-Old-eNB-UE-X2AP-ID
                                                                                                  PRESENCE mandatory}
                                          CRITICALITY reject TYPE UE-X2AP-ID
     ID id-Cause
                                          CRITICALITY ignore TYPE Cause
                                                                                                  PRESENCE mandatory }
     ID id-TargetCell-ID
                                          CRITICALITY reject TYPE ECGI
                                                                                                  PRESENCE mandatory }
     ID id-GUMMEI-ID
                                          CRITICALITY reject TYPE GUMMEI
                                                                                                  PRESENCE mandatory }
     ID id-UE-ContextInformation
                                          CRITICALITY reject TYPE UE-ContextInformation
                                                                                                  PRESENCE mandatory }
     ID id-UE-HistoryInformation
                                          CRITICALITY ignore TYPE UE-HistoryInformation
                                                                                                  PRESENCE mandatory }
     ID id-TraceActivation
                                          CRITICALITY ignore TYPE TraceActivation
                                                                                                  PRESENCE optional}
     ID id-SRVCCOperationPossible
                                          CRITICALITY ignore TYPE SRVCCOperationPossible
                                                                                                  PRESENCE optional}
     ID id-CSGMembershipStatus
                                          CRITICALITY reject TYPE CSGMembershipStatus
                                                                                                  PRESENCE optional}
                                          CRITICALITY ignore TYPE MobilityInformation
                                                                                                  PRESENCE optional}
     ID id-MobilityInformation
     ID id-Masked-IMEISV
                                          CRITICALITY ignore TYPE Masked-IMEISV
                                                                                                  PRESENCE optional }
     ID id-UE-HistoryInformationFromTheUE
                                                                                                 PRESENCE optional
                                          CRITICALITY ignore TYPE UE-HistoryInformationFromTheUE
                                                                                                  PRESENCE optional}
     ID id-ExpectedUEBehaviour
                                          CRITICALITY ignore TYPE ExpectedUEBehaviour
     ID id-ProSeAuthorized
                                          CRITICALITY ignore TYPE ProSeAuthorized
                                                                                                  PRESENCE optional}
     ID id-UE-ContextReferenceAtSeNB
                                          CRITICALITY ignore TYPE UE-ContextReferenceAtSeNB
                                                                                                  PRESENCE optional }
     ID id-Old-eNB-UE-X2AP-ID-Extension
                                          CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                                  PRESENCE optional },
UE-ContextInformation ::= SEQUENCE {
   mME-UE-S1AP-ID
                                       UE-S1AP-ID,
   uESecurityCapabilities
                                      UESecurityCapabilities,
    aS-SecurityInformation
                                      AS-SecurityInformation,
    uEaggregateMaximumBitRate
                                      UEAggregateMaximumBitRate,
    subscriberProfileIDforRFP
                                       SubscriberProfileIDforRFP
                                                                      OPTIONAL,
    e-RABs-ToBeSetup-List
                                       E-RABs-ToBeSetup-List,
                                      RRC-Context,
    rRC-Context
    handoverRestrictionList
                                       HandoverRestrictionList
                                                                  OPTIONAL,
    locationReportingInformation
                                      LocationReportingInformation
                                                                      OPTIONAL,
                                       ProtocolExtensionContainer { {UE-ContextInformation-ExtIEs} } OPTIONAL,
    iE-Extensions
UE-ContextInformation-ExtIES X2AP-PROTOCOL-EXTENSION ::= {
 ID id-ManagementBasedMDTallowed CRITICALITY ignore EXTENSION ManagementBasedMDTallowed
                                                                                             PRESENCE optional } |
{ ID id-ManagementBasedMDTPLMNList CRITICALITY ignore EXTENSION MDTPLMNList
                                                                                             PRESENCE optional },
E-RABs-ToBeSetup-List ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeSetup-ItemIEs} }
                          X2AP-PROTOCOL-IES ::= {
E-RABs-ToBeSetup-ItemIEs
```

```
{ ID id-E-RABs-ToBeSetup-Item
                                   CRITICALITY ignore
                                                         TYPE E-RABs-ToBeSetup-Item PRESENCE mandatory },
E-RABs-ToBeSetup-Item ::= SEQUENCE
   e-RAB-ID
                              E-RAB-ID
   e-RAB-Level-OoS-Parameters
                                  E-RAB-Level-Oos-Parameters,
                                  DL-Forwarding
   dL-Forwarding
                                                                                              OPTIONAL,
   uL-GTPtunnelEndpoint
                                  GTPtunnelEndpoint,
                                  ProtocolExtensionContainer { {E-RABs-ToBeSetup-ItemExtIEs} } OPTIONAL,
   iE-Extensions
E-RABs-ToBeSetup-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
                                                                         PRESENCE optional },
    { ID id-BearerType
                          CRITICALITY reject EXTENSION BearerType
MobilityInformation ::= BIT STRING (SIZE(32))
UE-ContextReferenceAtSeNB ::= SEQUENCE {
    source-GlobalSeNB-ID
                              GlobalENB-ID,
   seNB-UE-X2AP-ID
                              UE-X2AP-ID,
    seNB-UE-X2AP-ID-Extension UE-X2AP-ID-Extension,
   iE-Extensions
                              ProtocolExtensionContainer { {UE-ContextReferenceAtSeNB-ItemExtIEs} } OPTIONAL,
UE-ContextReferenceAtSeNB-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::=
   *****************
-- HANDOVER REQUEST ACKNOWLEDGE
  ****************
HandoverRequestAcknowledge ::= SEOUENCE {
   protocolIEs
                   ProtocolIE-Container
                                          {{HandoverRequestAcknowledge-IEs}},
    . . .
HandoverRequestAcknowledge-IEs X2AP-PROTOCOL-IES ::= {
     ID id-Old-eNB-UE-X2AP-ID
                                                      CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                                                         PRESENCE mandatory
     ID id-New-eNB-UE-X2AP-ID
                                                      CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                                                         PRESENCE mandatory }
     ID id-E-RABs-Admitted-List
                                                      CRITICALITY ignore TYPE E-RABs-Admitted-List
                                                                                                                         PRESENCE mandatory}
     ID id-E-RABs-NotAdmitted-List
                                                      CRITICALITY ignore TYPE E-RAB-List
                                                                                                                         PRESENCE optional}
     ID id-TargeteNBtoSource-eNBTransparentContainer
                                                     CRITICALITY ignore TYPE TargeteNBtoSource-eNBTransparentContainer
                                                                                                                         PRESENCE mandatory }
     ID id-CriticalityDiagnostics
                                                      CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                                                         PRESENCE optional }
     ID id-UE-ContextKeptIndicator
                                                                                                                         PRESENCE optional }
                                                      CRITICALITY ignore TYPE UE-ContextKeptIndicator
     ID id-SeNB-UE-X2AP-ID-Extension
                                                      CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                                                         PRESENCE optional }
     ID id-Old-eNB-UE-X2AP-ID-Extension
                                                     CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                                                         PRESENCE optional }
     ID id-New-eNB-UE-X2AP-ID-Extension
                                                     CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                                                         PRESENCE optional },
```

```
E-RABs-Admitted-List
                       ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-Admitted-ItemIEs} }
E-RABs-Admitted-ItemIEs X2AP-PROTOCOL-IES ::= {
   E-RABs-Admitted-Item ::= SEOUENCE {
                        E-RAB-ID,
   e-RAB-ID
   uL-GTP-TunnelEndpoint
                              GTPtunnelEndpoint
                                                                                      OPTIONAL,
   dL-GTP-TunnelEndpoint
                              GTPtunnelEndpoint
                                                                                      OPTIONAL,
   iE-Extensions
                              ProtocolExtensionContainer { {E-RABs-Admitted-Item-ExtIEs} }
                                                                                     OPTIONAL,
E-RABs-Admitted-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
-- HANDOVER PREPARATION FAILURE
HandoverPreparationFailure ::= SEQUENCE {
                 ProtocolIE-Container
                                      {{HandoverPreparationFailure-IEs}},
   protocolIEs
HandoverPreparationFailure-IES X2AP-PROTOCOL-IES ::= {
    ID id-Old-eNB-UE-X2AP-ID
                                     CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                   PRESENCE mandatory}
     ID id-Cause
                                     CRITICALITY ignore TYPE Cause
                                                                                   PRESENCE mandatory}
     ID id-CriticalityDiagnostics
                                     CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                   PRESENCE optional } |
   PRESENCE optional },
-- Handover Report
HandoverReport ::= SEQUENCE {
   protocolIEs
                 ProtocolIE-Container
                                      {{HandoverReport-IEs}},
HandoverReport-IEs X2AP-PROTOCOL-IES ::= {
   { ID id-HandoverReportType
                                                CRITICALITY ignore TYPE HandoverReportType
                                                                                                           PRESENCE mandatory}
```

```
ID id-Cause
                                                       CRITICALITY ignore TYPE Cause
                                                                                                                          PRESENCE mandatory}
     ID id-SourceCellECGI
                                                       CRITICALITY ignore TYPE ECGI
                                                                                                                          PRESENCE mandatory}
     ID id-FailureCellECGI
                                                       CRITICALITY ignore TYPE ECGI
                                                                                                                          PRESENCE mandatory}
     ID id-Re-establishmentCellECGI
                                                       CRITICALITY ignore TYPE ECGI
                                                                                                                          PRESENCE conditional } -
- The IE shall be present if the Handover Report Type IE is set to 'HO to Wrong Cell' --
    { ID id-TargetCellInUTRAN
                                                                                                                          PRESENCE conditional } -
                                                       CRITICALITY ignore TYPE TargetCellInUTRAN
- The IE shall be present if the Handover Report Type IE is set to "InterRAT ping-pong" -- |
     ID id-SourceCellCRNTI
                                                      CRITICALITY ignore TYPE CRNTI
                                                                                                                          PRESENCE optional }
     ID id-MobilityInformation
                                                       CRITICALITY ignore TYPE MobilityInformation
                                                                                                                          PRESENCE optional }
     ID id-UE-RLF-Report-Container
                                                      CRITICALITY ignore TYPE UE-RLF-Report-Container
                                                                                                                          PRESENCE optional }
    ID id-UE-RLF-Report-Container-for-extended-bands CRITICALITY ignore TYPE UE-RLF-Report-Container-for-extended-bands PRESENCE optional
    ****************
-- SN Status Transfer
SNStatusTransfer ::= SEQUENCE {
                                           {{SNStatusTransfer-IEs}},
                   ProtocolIE-Container
   protocolIEs
SNStatusTransfer-IEs X2AP-PROTOCOL-IES ::= {
     ID id-Old-eNB-UE-X2AP-ID
                                                                                                                 PRESENCE mandatory }
                                                   CRITICALITY reject TYPE UE-X2AP-ID
     ID id-New-eNB-UE-X2AP-ID
                                                   CRITICALITY reject TYPE UE-X2AP-ID
                                                                                                                 PRESENCE mandatory }
                                                                                                                 PRESENCE mandatory}
     ID id-E-RABs-SubjectToStatusTransfer-List
                                                   CRITICALITY ignore TYPE E-RABs-SubjectToStatusTransfer-List
     ID id-Old-eNB-UE-X2AP-ID-Extension
                                                                                                                 PRESENCE optional }
                                                   CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                                                 PRESENCE optional },
     ID id-New-eNB-UE-X2AP-ID-Extension
                                                   CRITICALITY reject TYPE UE-X2AP-ID-Extension
E-RABs-SubjectToStatusTransfer-List ::= SEOUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { { E-RABs-SubjectToStatusTransfer-
ItemIEs} }
E-RABs-SubjectToStatusTransfer-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-SubjectToStatusTransfer-Item CRITICALITY ignore TYPE E-RABs-SubjectToStatusTransfer-Item PRESENCE mandatory }
E-RABs-SubjectToStatusTransfer-Item ::= SEQUENCE {
   e-RAB-ID
                                           E-RAB-ID,
   receiveStatusofULPDCPSDUs
                                           ReceiveStatusofULPDCPSDUs
                                                                              OPTIONAL,
                                   COUNTvalue,
   uL-COUNTvalue
   dL-COUNTvalue
                                   COUNTvalue,
   iE-Extensions
                                           ProtocolExtensionContainer { {E-RABs-SubjectToStatusTransfer-ItemExtIEs} } OPTIONAL,
E-RABs-SubjectToStatusTransfer-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
     ID id-ReceiveStatusOfULPDCPSDUsExtended
                                                      CRITICALITY ignore EXTENSION ReceiveStatusOfULPDCPSDUsExtended
                                                                                                                             PRESENCE optional }
     ID id-ULCOUNTValueExtended
                                                                                                                             PRESENCE optional}
                                                      CRITICALITY ignore EXTENSION COUNTValueExtended
```

```
ID id-DLCOUNTValueExtended
                                               CRITICALITY ignore EXTENSION COUNTValueExtended
                                                                                                            PRESENCE optional }
     ID id-ReceiveStatusOfULPDCPSDUsPDCP-SNlength18
                                               CRITICALITY ignore EXTENSION ReceiveStatusOfULPDCPSDUsPDCP-SNlength18 PRESENCE optional
     ID id-ULCOUNTValuePDCP-SNlength18
                                               CRITICALITY ignore EXTENSION COUNTvaluePDCP-SNlength18
                                                                                                            PRESENCE optional}
    ID id-DLCOUNTValuePDCP-SNlength18
                                               CRITICALITY ignore EXTENSION COUNTvaluePDCP-SNlength18
                                                                                                            PRESENCE optional },
   -- UE Context Release
__ *******************
UEContextRelease ::= SEOUENCE {
   protocolIEs
                ProtocolIE-Container
                                     {{UEContextRelease-IEs}},
UEContextRelease-IEs X2AP-PROTOCOL-IES ::= {
     ID id-Old-eNB-UE-X2AP-ID
                                                                                             PRESENCE mandatory }
                                        CRITICALITY reject TYPE UE-X2AP-ID
     ID id-New-eNB-UE-X2AP-ID
                                        CRITICALITY reject TYPE UE-X2AP-ID
                                                                                             PRESENCE mandatory }
                                                                                             PRESENCE optional }
     ID id-Old-eNB-UE-X2AP-ID-Extension
                                        CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                             PRESENCE optional }
    ID id-New-eNB-UE-X2AP-ID-Extension
                                        CRITICALITY reject TYPE UE-X2AP-ID-Extension
   PRESENCE optional },
  ******************
-- HANDOVER CANCEL
  *****************
HandoverCancel ::= SEOUENCE {
   protocolIEs
                ProtocolIE-Container
                                     {{HandoverCancel-IEs}},
HandoverCancel-IES X2AP-PROTOCOL-IES ::= {
     ID id-Old-eNB-UE-X2AP-ID
                                        CRITICALITY reject TYPE UE-X2AP-ID
                                                                                   PRESENCE mandatory |
     ID id-New-eNB-UE-X2AP-ID
                                        CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                   PRESENCE optional}
     ID id-Cause
                                        CRITICALITY ignore TYPE Cause
                                                                                   PRESENCE mandatory |
    ID id-Old-eNB-UE-X2AP-ID-Extension
                                                                                   PRESENCE optional } |
                                        CRITICALITY reject TYPE UE-X2AP-ID-Extension
   { ID id-New-eNB-UE-X2AP-ID-Extension
                                        CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                   PRESENCE optional },
-- ERROR INDICATION
```

```
ErrorIndication ::= SEQUENCE {
   protocolIEs
                 ProtocolIE-Container
                                      {{ErrorIndication-IEs}},
ErrorIndication-IEs X2AP-PROTOCOL-IES ::= {
     ID id-Old-eNB-UE-X2AP-ID
                                          CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                      PRESENCE optional}
     ID id-New-eNB-UE-X2AP-ID
                                          CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                      PRESENCE optional}
    ID id-Cause
                                          CRITICALITY ignore TYPE Cause
                                                                                      PRESENCE optional}
                                          CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional
     ID id-CriticalityDiagnostics
     ID id-Old-eNB-UE-X2AP-ID-Extension
                                                                                      PRESENCE optional }
                                          CRITICALITY ignore TYPE UE-X2AP-ID-Extension
   { ID id-New-eNB-UE-X2AP-ID-Extension
                                          CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                      PRESENCE optional },
-- Reset Request
__ ********************************
ResetRequest ::= SEQUENCE {
                                      {{ResetRequest-IEs}},
   protocolIEs
                 ProtocolIE-Container
   . . .
ResetRequest-IEs X2AP-PROTOCOL-IES ::= {
   { ID id-Cause
                           CRITICALITY ignore TYPE Cause
                                                                  PRESENCE mandatory },
   . . .
  *****************
-- Reset Response
__ *********************
ResetResponse ::= SEQUENCE {
                 ProtocolIE-Container
                                      {{ResetResponse-IEs}},
   protocolIEs
   . . .
ResetResponse-IEs X2AP-PROTOCOL-IES ::= {
   { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                 PRESENCE optional },
   . . .
  ******************
-- X2 SETUP REQUEST
__ ********************************
X2SetupRequest ::= SEQUENCE {
```

```
{{X2SetupRequest-IEs}},
   protocolIEs
                  ProtocolIE-Container
X2SetupRequest-IEs X2AP-PROTOCOL-IES ::= {
     ID id-GlobalENB-ID
                                                                              PRESENCE mandatory } |
                                 CRITICALITY reject TYPE GlobalENB-ID
     ID id-ServedCells
                                 CRITICALITY reject TYPE ServedCells
                                                                              PRESENCE mandatory
     ID id-GUGroupIDList
                                 CRITICALITY reject TYPE GUGroupIDList
                                                                              PRESENCE optional } |
    ID id-LHN-ID
                                 CRITICALITY ignore TYPE LHN-ID
                                                                              PRESENCE optional },
  *****************
-- X2 SETUP RESPONSE
X2SetupResponse ::= SEQUENCE {
                                         {{X2SetupResponse-IEs}},
   protocolIEs
                  ProtocolIE-Container
X2SetupResponse-IEs X2AP-PROTOCOL-IES ::= {
     ID id-GlobalENB-ID
                                                                                 PRESENCE mandatory }
                                     CRITICALITY reject TYPE GlobalENB-ID
     ID id-ServedCells
                                     CRITICALITY reject TYPE ServedCells
                                                                                 PRESENCE mandatory }
     ID id-GUGroupIDList
                                                                                 PRESENCE optional}
                                     CRITICALITY reject TYPE GUGroupIDList
     ID id-CriticalityDiagnostics
                                     CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional }
                                     CRITICALITY ignore TYPE LHN-ID
                                                                                 PRESENCE optional },
     ID id-LHN-ID
   -- X2 SETUP FAILURE
X2SetupFailure ::= SEQUENCE {
   protocolIEs
                  ProtocolIE-Container
                                        {{X2SetupFailure-IEs}},
   . . .
X2SetupFailure-IEs X2AP-PROTOCOL-IES ::= {
     ID id-Cause
                                 CRITICALITY ignore
                                                       TYPE Cause
                                                                                          PRESENCE mandatory}
     ID id-TimeToWait
                                 CRITICALITY ignore
                                                       TYPE TimeToWait
                                                                                          PRESENCE optional |
    { ID id-CriticalityDiagnostics CRITICALITY ignore
                                                                                          PRESENCE optional },
                                                       TYPE CriticalityDiagnostics
```

```
***********************
-- LOAD INFORMATION
__ **********************
LoadInformation ::= SEOUENCE {
                 ProtocolIE-Container
                                      {{LoadInformation-IEs}},
   protocolIEs
   . . .
LoadInformation-IES X2AP-PROTOCOL-IES ::= {
   { ID id-CellInformation
                                   CRITICALITY ignore TYPE CellInformation-List
                                                                                 PRESENCE mandatory },
   . . .
CellInformation-List ::= SEOUENCE (SIZE (1..maxCellineNB)) OF ProtocolIE-Single-Container { {CellInformation-ItemIEs} }
CellInformation-ItemIEs X2AP-PROTOCOL-IES ::= {
   CellInformation-Item ::= SEQUENCE
   cell-ID
   ul-InterferenceOverloadIndication
                                      UL-InterferenceOverloadIndication
                                                                                              OPTIONAL,
                                      UL-HighInterferenceIndicationInfo
   ul-HighInterferenceIndicationInfo
                                                                                              OPTIONAL,
   relativeNarrowbandTxPower
                                      RelativeNarrowbandTxPower
                                                                                              OPTIONAL,
                                      ProtocolExtensionContainer { {CellInformation-Item-ExtIEs} }
   iE-Extensions
                                                                                              OPTIONAL,
CellInformation-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
 ID id-ABSInformation
                                      CRITICALITY ignore EXTENSION ABSInformation
                                                                                                PRESENCE optional }
 ID id-InvokeIndication
                                      CRITICALITY ignore EXTENSION InvokeIndication
                                                                                                PRESENCE optional
 ID id-IntendedULDLConfiguration
                                                                                                PRESENCE optional
                                      CRITICALITY ignore EXTENSION SubframeAssignment
 ID id-ExtendedULInterferenceOverloadInfo CRITICALITY ignore EXTENSION ExtendedULInterferenceOverloadInfo PRESENCE optional
 ID id-CoMPInformation
                                      CRITICALITY ignore EXTENSION Compinformation
                                                                                                PRESENCE optional }
                                                                                                PRESENCE optional },
 ID id-DynamicDLTransmissionInformation
                                      CRITICALITY ignore EXTENSION DynamicDLTransmissionInformation
-- ENB CONFIGURATION UPDATE
  *****************
ENBConfigurationUpdate ::= SEQUENCE {
   protocolIEs
                 ProtocolIE-Container
                                       {{ENBConfigurationUpdate-IEs}},
```

```
ENBConfigurationUpdate-IEs X2AP-PROTOCOL-IES ::= {
     ID id-ServedCellsToAdd
                                    CRITICALITY reject TYPE ServedCells
                                                                                       PRESENCE optional }
    ID id-ServedCellsToModify
ID id-ServedCellsToDelete
ID id-GUGroupIDToAddList
ID id-GUGroupIDToDeleteList
                                    CRITICALITY reject TYPE ServedCellsToModify
                                                                                       PRESENCE optional }
                                    CRITICALITY reject TYPE Old-ECGIs
                                                                                       PRESENCE optional }
                                                                                       PRESENCE optional }
                                    CRITICALITY reject TYPE GUGroupIDList
                                    CRITICALITY reject TYPE GUGroupIDList
                                                                                       PRESENCE optional }
    PRESENCE optional },
ServedCellsToModify::= SEQUENCE (SIZE (1..maxCellineNB)) OF ServedCellsToModify-Item
ServedCellsToModify-Item::= SEOUENCE {
   old-ecgi
   servedCellInfo
                                ServedCell-Information,
   neighbour-Info
                                Neighbour-Information
                                                              OPTIONAL,
   iE-Extensions
                                ProtocolExtensionContainer { { ServedCellsToModify-Item-ExtIEs} } OPTIONAL,
   . . .
ServedCellsToModify-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
{ ID id-DeactivationIndication
                                    CRITICALITY ignore EXTENSION DeactivationIndication
                                                                                              PRESENCE optional },
   . . .
Old-ECGIS::= SEOUENCE (SIZE (1..maxCellineNB)) OF ECGI
-- ENB CONFIGURATION UPDATE ACKNOWLEDGE
__ *********************
ENBConfigurationUpdateAcknowledge ::= SEQUENCE {
   protocolIEs
                  ProtocolIE-Container
                                       {{ENBConfigurationUpdateAcknowledge-IEs}},
   . . .
ENBConfigurationUpdateAcknowledge-IES X2AP-PROTOCOL-IES ::= {
   { ID id-CriticalityDiagnostics
                                    CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                       PRESENCE optional },
  -- ENB CONFIGURATION UPDATE FAIURE
  *****************
ENBConfigurationUpdateFailure ::= SEQUENCE {
   protocolIEs
                  ProtocolIE-Container
                                        {{ENBConfigurationUpdateFailure-IEs}},
   . . .
```

```
ENBConfigurationUpdateFailure-IES X2AP-PROTOCOL-IES ::= {
     ID id-Cause
                                    CRITICALITY ignore TYPE Cause
                                                                                   PRESENCE mandatory}
     ID id-TimeToWait
                                    CRITICALITY ignore TYPE TimeToWait
                                                                                   PRESENCE optional |
    ID id-CriticalityDiagnostics
                                    CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                   PRESENCE optional },
  *****************
-- Resource Status Request
     ******************
ResourceStatusRequest ::= SEOUENCE {
                                        {{ResourceStatusRequest-IEs}},
   protocolIEs
                  ProtocolIE-Container
ResourceStatusRequest-IEs X2AP-PROTOCOL-IES ::= {
     ID id-ENB1-Measurement-ID
                                    CRITICALITY reject TYPE Measurement-ID
                                                                                       PRESENCE mandatory}
                                                                                       PRESENCE conditional \ | -- The IE shall be present if
     ID id-ENB2-Measurement-ID
                                    CRITICALITY ignore TYPE Measurement-ID
the Registration Request IE is set to 'Stop', 'Partial stop' or to 'Add'--
     ID id-Registration-Reguest
                                    CRITICALITY reject TYPE Registration-Request
                                                                                       PRESENCE mandatory}
     ID id-ReportCharacteristics
                                    CRITICALITY reject TYPE ReportCharacteristics
                                                                                       PRESENCE optional }
     ID id-CellToReport
                                    CRITICALITY ignore TYPE CellToReport-List
                                                                                       PRESENCE mandatory |
     ID id-ReportingPeriodicity
                                    CRITICALITY ignore TYPE ReportingPeriodicity
                                                                                       PRESENCE optional }
     ID id-PartialSuccessIndicator
                                    CRITICALITY ignore TYPE PartialSuccessIndicator
                                                                                       PRESENCE optional }
     ID id-ReportingPeriodicityRSRPMR CRITICALITY ignore TYPE ReportingPeriodicityRSRPMR
                                                                                       PRESENCE optional}
    ID id-ReportingPeriodicityCSIR
                                    CRITICALITY ignore TYPE ReportingPeriodicityCSIR
                                                                                       PRESENCE optional },
   . . .
                     ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ProtocolIE-Single-Container { {CellToReport-ItemIEs} }
CellToReport-List
CellToReport-ItemIEs X2AP-PROTOCOL-IES ::= {
   CellToReport-Item ::= SEQUENCE {
   cell-ID
   iE-Extensions
                                       ProtocolExtensionContainer { {CellToReport-Item-ExtIEs} } OPTIONAL,
CellToReport-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
```

```
ReportingPeriodicity ::= ENUMERATED {
   one-thousand-ms.
   two-thousand-ms.
   five-thousand-ms,
   ten-thousand-ms,
PartialSuccessIndicator ::= ENUMERATED {
   partial-success-allowed,
-- Resource Status Response
__ ***********************
ResourceStatusResponse ::= SEQUENCE
   protocolIEs
                 ProtocolIE-Container
                                      {{ResourceStatusResponse-IEs}},
   . . .
ResourceStatusResponse-IEs X2AP-PROTOCOL-IES ::= {
     ID id-ENB1-Measurement-ID
                                                                                           PRESENCE mandatory}
                                         CRITICALITY reject TYPE Measurement-ID
     ID id-ENB2-Measurement-ID
                                                                                           PRESENCE mandatory}
                                         CRITICALITY reject TYPE Measurement-ID
     ID id-CriticalityDiagnostics
                                         CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                           PRESENCE optional }
   MeasurementInitiationResult-List ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ProtocolIE-Single-Container { { MeasurementInitiationResult-ItemIEs} }
MeasurementInitiationResult-ItemIEs X2AP-PROTOCOL-IES ::= {
   { ID id-MeasurementInitiationResult-Item
                                       CRITICALITY ignore TYPE MeasurementInitiationResult-Item PRESENCE mandatory
MeasurementInitiationResult-Item ::= SEOUENCE {
   cell-ID
                                             ECGI,
   measurementFailureCause-List
                                            MeasurementFailureCause-List
                                                                        OPTIONAL.
                                            ProtocolExtensionContainer { { MeasurementInitiationResult-Item-ExtIEs} } OPTIONAL,
   iE-Extensions
MeasurementInitiationResult-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
MeasurementFailureCause-List ::= SEQUENCE (SIZE (1..maxFailedMeasObjects)) OF ProtocolIE-Single-Container { { MeasurementFailureCause-ItemIEs} }
MeasurementFailureCause-ItemIEs X2AP-PROTOCOL-IES ::= {
   PRESENCE mandatory }
```

```
MeasurementFailureCause-Item ::= SEOUENCE {
   measurementFailedReportCharacteristics
                                              ReportCharacteristics,
   cause
                                              Cause,
                                              ProtocolExtensionContainer { { MeasurementFailureCause-Item-ExtIEs} } OPTIONAL,
   iE-Extensions
MeasurementFailureCause-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  -- Resource Status Failure
ResourceStatusFailure ::= SEOUENCE {
   protocolIEs
                 ProtocolIE-Container
                                       {{ResourceStatusFailure-IEs}},
   . . .
ResourceStatusFailure-IEs X2AP-PROTOCOL-IES ::= {
     ID id-ENB1-Measurement-ID
                                              CRITICALITY reject TYPE Measurement-ID
                                                                                                       PRESENCE mandatory }
     ID id-ENB2-Measurement-ID
                                                                                                       PRESENCE mandatory }
                                              CRITICALITY reject TYPE Measurement-ID
     ID id-Cause
                                              CRITICALITY ignore TYPE Cause
                                                                                                       PRESENCE mandatory}
     ID id-CriticalityDiagnostics
                                              CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                                       PRESENCE optional }
   ID id-CompleteFailureCauseInformation-List
                                              CRITICALITY ignore TYPE CompleteFailureCauseInformation-List PRESENCE optional },
   . . .
CompleteFailureCauseInformation-List ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ProtocolIE-Single-Container { {CompleteFailureCauseInformation-
ItemIEs} }
CompleteFailureCauseInformation-ItemIEs X2AP-PROTOCOL-IES ::= {
   CompleteFailureCauseInformation-Item ::= SEQUENCE {
   cell-ID
                                              ECGI,
   measurementFailureCause-List
                                              MeasurementFailureCause-List,
   iE-Extensions
                                              ProtocolExtensionContainer { { CompleteFailureCauseInformation-Item-ExtIEs} } OPTIONAL,
   . . .
CompleteFailureCauseInformation-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
-- Resource Status Update
```

```
ResourceStatusUpdate ::= SEQUENCE {
   protocolIEs
                ProtocolIE-Container
                                        {{ResourceStatusUpdate-IEs}},
ResourceStatusUpdate-IEs X2AP-PROTOCOL-IES ::= {
     PRESENCE mandatory}
     PRESENCE mandatory
   PRESENCE mandatory },
CellMeasurementResult-List ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ProtocolIE-Single-Container { {CellMeasurementResult-ItemIEs} }
CellMeasurementResult-ItemIEs X2AP-PROTOCOL-IES ::= {
   { ID id-CellMeasurementResult-Item CRITICALITY ignore TYPE CellMeasurementResult-Item PRESENCE mandatory}
CellMeasurementResult-Item ::= SEQUENCE {
   cell-ID
   slTNLLoadIndicator
radioResourceStatus
iE-Extensions
                             HWLoadIndicator
                                               OPTIONAL,
                             S1TNLLoadIndicator OPTIONAL,
                            RadioResourceStatus OPTIONAL,
                             ProtocolExtensionContainer { {CellMeasurementResult-Item-ExtIEs} }
                                                                                                OPTIONAL,
CellMeasurementResult-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
     ID id-CompositeAvailableCapacityGroup CRITICALITY ignore EXTENSION CompositeAvailableCapacityGroup
                                                                                                    PRESENCE optional }
     ID id-ABS-Status
                                        CRITICALITY ignore EXTENSION ABS-Status
                                                                                                    PRESENCE optional }
                                    CRITICALITY ignore EXTENSION KSKFMKLISC
CRITICALITY ignore EXTENSION CSIReportList
CRITICALITY ignore EXTENSION CellReportingIndicator
     ID id-RSRPMRList
                                                                                                    PRESENCE optional }
     ID id-CSIReportList
                                                                                                    PRESENCE optional }
   { ID id-CellReportingIndicator
                                                                                                    PRESENCE optional },
-- PRIVATE MESSAGE
PrivateMessage ::= SEOUENCE {
               PrivateIE-Container {{PrivateMessage-IEs}},
   privateIEs
PrivateMessage-IEs X2AP-PRIVATE-IES ::= {
```

```
-- MOBILITY CHANGE REQUEST
__ ********************************
MobilityChangeRequest ::= SEQUENCE {
   protocolIEs
                ProtocolIE-Container
                                    {{MobilityChangeRequest-IEs}},
   . . .
MobilityChangeRequest-IEs X2AP-PROTOCOL-IES ::= {
    ID id-ENB1-Cell-ID
                                       CRITICALITY reject TYPE ECGI
                                                                                             PRESENCE mandatory
    ID id-ENB2-Cell-ID
                                       CRITICALITY reject TYPE ECGI
                                                                                             PRESENCE mandatory}
    ID id-ENB1-Mobility-Parameters CRITICALITY ignore TYPE MobilityParametersInformation
                                                                                             PRESENCE optional }
    PRESENCE mandatory
    ID id-Cause
                                       CRITICALITY reject TYPE Cause
                                                                                             PRESENCE mandatory },
   . . .
  *****************
-- MOBILITY CHANGE ACKNOWLEDGE
MobilityChangeAcknowledge ::= SEQUENCE {
              ProtocolIE-Container
                                    {{MobilityChangeAcknowledge-IEs}},
   protocolIEs
MobilityChangeAcknowledge-IEs X2AP-PROTOCOL-IES ::= {
   PRESENCE mandatory }
                                                                            PRESENCE mandatory }
   { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                            PRESENCE optional },
-- MOBILITY CHANGE FAILURE
MobilityChangeFailure ::= SEQUENCE {
   protocolIEs ProtocolIE-Container {{MobilityChangeFailure-IEs}},
MobilityChangeFailure-IEs X2AP-PROTOCOL-IES ::= {
    ID id-ENB1-Cell-ID
                                                 CRITICALITY ignore TYPE ECGI
                                                                                                       PRESENCE mandatory}
   { ID id-ENB2-Cell-ID
                                                 CRITICALITY ignore TYPE ECGI
                                                                                                       PRESENCE mandatory }
```

```
ID id-Cause
                                                   CRITICALITY ignore TYPE Cause
                                                                                                         PRESENCE mandatory |
     ID id-ENB2-Mobility-Parameters-Modification-Range
                                                  CRITICALITY ignore TYPE MobilityParametersModificationRange
                                                                                                         PRESENCE optional }
                                                                                                         PRESENCE optional).
    ID id-CriticalityDiagnostics
                                                  CRITICALITY ignore TYPE CriticalityDiagnostics
  ********************
-- Radio Link Failure Indication
__ *********************
RLFIndication ::= SEOUENCE {
   protocolIEs
                ProtocolIE-Container
                                     {{RLFIndication-IEs}},
RLFIndication-IEs X2AP-PROTOCOL-IES ::= {
     ID id-FailureCellPCI
                                               CRITICALITY ignore TYPE PCI
                                                                                                           PRESENCE mandatory }
                                                                                                           PRESENCE mandatory
     ID id-Re-establishmentCellECGI
                                               CRITICALITY ignore TYPE ECGI
     ID id-FailureCellCRNTI
                                               CRITICALITY ignore TYPE CRNTI
                                                                                                           PRESENCE mandatory }
     ID id-ShortMAC-I
                                               CRITICALITY ignore TYPE ShortMAC-I
                                                                                                           PRESENCE optional}
    ID id-UE-RLF-Report-Container
                                               CRITICALITY ignore TYPE UE-RLF-Report-Container
                                                                                                           PRESENCE optional}
     ID id-RRCConnSetupIndicator
                                               CRITICALITY reject TYPE RRCConnSetupIndicator
                                                                                                           PRESENCE optional}
     ID id-RRCConnReestabIndicator
                                               CRITICALITY ignore TYPE RRCConnReestabIndicator
                                                                                                           PRESENCE optional }
   PRESENCE optional },
    ****************
-- Cell Activation Request
  ····
CellActivationRequest ::= SEQUENCE {
                                     {{CellActivationRequest-IEs}},
   protocolIEs
                ProtocolIE-Container
CellActivationRequest-IEs X2AP-PROTOCOL-IES ::= {
   { ID id-ServedCellsToActivate CRITICALITY reject TYPE ServedCellsToActivate
                                                                          PRESENCE mandatory },
ServedCellsToActivate::= SEQUENCE (SIZE (1..maxCellineNB)) OF ServedCellsToActivate-Item
ServedCellsToActivate-Item::= SEQUENCE {
   ecgi
                              ProtocolExtensionContainer { { ServedCellsToActivate-Item-ExtIEs} } OPTIONAL,
   iE-Extensions
```

```
ServedCellsToActivate-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
__ **********************
-- Cell Activation Response
  ····
CellActivationResponse ::= SEQUENCE {
                                   {{CellActivationResponse-IEs}},
   protocolIEs
                ProtocolIE-Container
CellActivationResponse-IEs X2AP-PROTOCOL-IES ::= {
   PRESENCE mandatory}
   { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                          PRESENCE optional },
   . . .
ActivatedCellList ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ActivatedCellList-Item
ActivatedCellList-Item::= SEQUENCE {
   ecgi
                                ECGI,
   iE-Extensions
                                ProtocolExtensionContainer { { ActivatedCellList-Item-ExtIEs} } OPTIONAL,
ActivatedCellList-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
__*********************
-- CELL ACTIVATION FAILURE
__ **********************
CellActivationFailure ::= SEQUENCE {
                                  {{CellActivationFailure-IEs}},
   protocolIEs ProtocolIE-Container
CellActivationFailure-IEs X2AP-PROTOCOL-IES ::= {
    ID id-Cause
                                CRITICALITY ignore TYPE Cause
                                                                          PRESENCE mandatory } |
   { ID id-CriticalityDiagnostics
                                CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                          PRESENCE optional },
-- X2 RELEASE
```

```
__ ********************
X2Release ::= SEOUENCE {
   protocolIEs
                ProtocolIE-Container
                                    {{X2Release-IEs}},
X2Release-IEs X2AP-PROTOCOL-IES ::= {
   { ID id-GlobalENB-ID
                              CRITICALITY reject TYPE GlobalENB-ID
                                                                      PRESENCE mandatory },
__ ********************
-- X2AP Message Transfer
__ **********************
X2APMessageTransfer ::= SEQUENCE {
                                    {{X2APMessageTransfer-IEs}},
   protocolIEs
                ProtocolIE-Container
X2APMessageTransfer-IEs X2AP-PROTOCOL-IES ::= {
                                                            PRESENCE mandatory}
    ID id-RNL-Header CRITICALITY reject TYPE RNL-Header
   { ID id-x2APMessage CRITICALITY reject TYPE X2AP-Message
                                                            PRESENCE optional },
   . . .
RNL-Header ::= SEQUENCE {
   source-GlobalENB-ID GlobalENB-ID,
   target-GlobalENB-ID GlobalENB-ID
                                 OPTIONAL,
   iE-Extensions
                                 ProtocolExtensionContainer { { RNL-Header-Item-ExtIEs} } OPTIONAL,
RNL-Header-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
X2AP-Message ::= OCTET STRING
__ ********************
-- SENB ADDITION REQUEST
__ *******************
SeNBAdditionRequest ::= SEQUENCE {
   protocolIEs ProtocolIE-Container
                                    {{SeNBAdditionRequest-IEs}},
SeNBAdditionRequest-IEs X2AP-PROTOCOL-IES ::= {
```

```
ID id-MeNB-UE-X2AP-ID
                                           CRITICALITY reject TYPE UE-X2AP-ID
                                                                                                  PRESENCE mandatory } |
     ID id-UE-SecurityCapabilities
                                           CRITICALITY reject TYPE UESecurityCapabilities
                                                                                                  PRESENCE conditional | |
    -- This IE shall be present if the Bearer Option IE is set to the value 'SCG bearer' --
    { ID id-SeNBSecurityKey
                                           CRITICALITY reject TYPE SeNBSecurityKey
                                                                                                  PRESENCE conditional } |
    -- This IE shall be present if the Bearer Option IE is set to the value 'SCG bearer' --
                                                                                                  PRESENCE mandatory } |
     ID id-SeNBUEAggregateMaximumBitRate
                                          CRITICALITY reject TYPE UEAggregateMaximumBitRate
     ID id-ServingPLMN
                                           CRITICALITY ignore TYPE PLMN-Identity
                                                                                                  PRESENCE optional }
     ID id-E-RABs-ToBeAdded-List
                                                                                                  PRESENCE mandatory
                                           CRITICALITY reject TYPE E-RABs-ToBeAdded-List
     ID id-MeNBtoSeNBContainer
                                           CRITICALITY reject TYPE MeNBtoSeNBContainer
                                                                                                  PRESENCE mandatory }
                                           CRITICALITY reject TYPE CSGMembershipStatus
                                                                                                  PRESENCE optional }
     ID id-CSGMembershipStatus
                                                                                                  PRESENCE optional }
     ID id-SeNB-UE-X2AP-ID
                                           CRITICALITY reject TYPE UE-X2AP-ID
     ID id-SeNB-UE-X2AP-ID-Extension
                                           CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                                  PRESENCE optional}
                                                                                                  PRESENCE optional}
     ID id-ExpectedUEBehaviour
                                           CRITICALITY ignore TYPE ExpectedUEBehaviour
     ID id-MeNB-UE-X2AP-ID-Extension
                                           CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                                  PRESENCE optional },
E-RABs-ToBeAdded-List ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { { E-RABs-ToBeAdded-ItemIEs} }
E-RABs-ToBeAdded-ItemIEs X2AP-PROTOCOL-IES ::= {
    PRESENCE mandatory },
    . . .
E-RABs-ToBeAdded-Item ::= CHOICE {
                   E-RABs-ToBeAdded-Item-SCG-Bearer,
    sCG-Bearer
                 E-RABs-ToBeAdded-Item-Split-Bearer,
    split-Bearer
E-RABs-ToBeAdded-Item-SCG-Bearer ::= SEQUENCE {
   e-RAB-ID
                                   E-RAB-ID,
    e-RAB-Level-QoS-Parameters
                                   E-RAB-Level-OoS-Parameters,
                                   DL-Forwarding
                                                                                                           OPTIONAL,
   dL-Forwarding
    s1-UL-GTPtunnelEndpoint
                                   GTPtunnelEndpoint,
   iE-Extensions
                                   ProtocolExtensionContainer { {E-RABs-ToBeAdded-Item-SCG-BearerExtIEs} }
                                                                                                           OPTIONAL.
E-RABs-ToBeAdded-Item-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
     ID id-Correlation-ID
                                       CRITICALITY ignore EXTENSION Correlation-ID
                                                                                          PRESENCE optional |
    { ID id-SIPTO-Correlation-ID
                                       CRITICALITY ignore EXTENSION Correlation-ID
                                                                                          PRESENCE optional },
    . . .
E-RABs-ToBeAdded-Item-Split-Bearer ::= SEQUENCE {
   e-RAB-ID
                                   E-RAB-ID,
   e-RAB-Level-QoS-Parameters
                                   E-RAB-Level-QoS-Parameters,
   meNB-GTPtunnelEndpoint
                                   GTPtunnelEndpoint,
   iE-Extensions
                                   ProtocolExtensionContainer { {E-RABs-ToBeAdded-Item-Split-BearerExtIEs} } OPTIONAL,
E-RABs-ToBeAdded-Item-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
```

```
SENB ADDITION REQUEST ACKNOWLEDGE
  SeNBAdditionRequestAcknowledge ::= SEQUENCE
                  ProtocolIE-Container
   protocolIEs
                                         {{SeNBAdditionRequestAcknowledge-IEs}},
   . . .
SeNBAdditionRequestAcknowledge-IEs X2AP-PROTOCOL-IES ::= {
     ID id-MeNB-UE-X2AP-ID
                                             CRITICALITY reject TYPE UE-X2AP-ID
                                                                                                 PRESENCE mandatory }
     ID id-SeNB-UE-X2AP-ID
                                             CRITICALITY reject TYPE UE-X2AP-ID
                                                                                                 PRESENCE mandatory
     ID id-E-RABs-Admitted-ToBeAdded-List
                                             CRITICALITY ignore TYPE E-RABs-Admitted-ToBeAdded-List PRESENCE mandatory}
     ID id-E-RABs-NotAdmitted-List
                                             CRITICALITY ignore TYPE E-RAB-List
                                                                                                 PRESENCE optional }
                                             CRITICALITY reject TYPE SeNBtoMeNBContainer
     ID id-SeNBtoMeNBContainer
                                                                                                 PRESENCE mandatory
     ID id-CriticalityDiagnostics
                                             CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                                 PRESENCE optional }
     ID id-GW-TransportLayerAddress
                                             CRITICALITY ignore TYPE TransportLayerAddress
                                                                                                 PRESENCE optional }
     ID id-SIPTO-L-GW-TransportLayerAddress
                                             CRITICALITY ignore TYPE TransportLayerAddress
                                                                                                 PRESENCE optional}
     ID id-MeNB-UE-X2AP-ID-Extension
                                             CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                                 PRESENCE optional}
     ID id-SeNB-UE-X2AP-ID-Extension
                                             CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                                 PRESENCE optional }
     ID id-Tunnel-Information-for-BBF
                                             CRITICALITY ignore TYPE TunnelInformation
                                                                                                 PRESENCE optional },
E-RABs-Admitted-ToBeAdded-List ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-Admitted-ToBeAdded-ItemIEs} }
E-RABs-Admitted-ToBeAdded-ItemIEs X2AP-PROTOCOL-IES ::=
    PRESENCE mandatory}
E-RABs-Admitted-ToBeAdded-Item ::= CHOICE
   sCG-Bearer
                  E-RABs-Admitted-ToBeAdded-Item-SCG-Bearer,
   split-Bearer
                  E-RABs-Admitted-ToBeAdded-Item-Split-Bearer,
E-RABs-Admitted-ToBeAdded-Item-SCG-Bearer ::= SEQUENCE {
   e-RAB-ID
                                         E-RAB-ID,
   s1-DL-GTPtunnelEndpoint
                                         GTPtunnelEndpoint,
   dL-Forwarding-GTPtunnelEndpoint
                                         GTPtunnelEndpoint
                                                                                                               OPTIONAL,
   uL-Forwarding-GTPtunnelEndpoint
                                         GTPtunnelEndpoint
                                                                                                               OPTIONAL,
   iE-Extensions
                                 ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-Item-SCG-BearerExtIEs} }
E-RABs-Admitted-ToBeAdded-Item-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    . . .
```

```
E-RABs-Admitted-ToBeAdded-Item-Split-Bearer ::= SEQUENCE {
   e-RAB-ID
                                 E-RAB-ID.
   seNB-GTPtunnelEndpoint
                                 GTPtunnelEndpoint.
   iE-Extensions
                                 ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-Item-Split-BearerExtIEs} } OPTIONAL,
E-RABs-Admitted-ToBeAdded-Item-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  *****************
-- SENB ADDITION REQUEST REJECT
     ***************
SeNBAdditionRequestReject ::= SEQUENCE {
   protocolIEs
                  ProtocolIE-Container
                                        {{SeNBAdditionRequestReject-IEs}},
SeNBAdditionRequestReject-IEs X2AP-PROTOCOL-IES ::= {
                                        CRITICALITY reject TYPE UE-X2AP-ID
     ID id-MeNB-UE-X2AP-ID
                                                                                        PRESENCE mandatory }
     ID id-SeNB-UE-X2AP-ID
                                        CRITICALITY reject TYPE UE-X2AP-ID
                                                                                        PRESENCE mandatory }
     ID id-Cause
                                        CRITICALITY ignore TYPE Cause
                                                                                        PRESENCE mandatory}
     ID id-CriticalityDiagnostics
                                                                                        PRESENCE optional }
                                        CRITICALITY ignore TYPE CriticalityDiagnostics
     ID id-MeNB-UE-X2AP-ID-Extension
                                        CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                        PRESENCE optional }
     ID id-SeNB-UE-X2AP-ID-Extension
                                        CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                        PRESENCE optional },
  *****************
-- SENB RECONFIGURATION COMPLETE
  *****************
SenbreconfigurationComplete ::= SEQUENCE {
   protocolIEs
                  ProtocolIE-Container
                                        {{SeNBReconfigurationComplete-IEs}},
   . . .
SeNBReconfigurationComplete-IEs X2AP-PROTOCOL-IES ::= {
     ID id-MeNB-UE-X2AP-ID
                                                CRITICALITY reject TYPE UE-X2AP-ID
                                                                                                       PRESENCE mandatory
     ID id-SeNB-UE-X2AP-ID
                                                CRITICALITY reject TYPE UE-X2AP-ID
                                                                                                       PRESENCE mandatory}
     ID id-ResponseInformationSeNBReconfComp
                                                CRITICALITY ignore TYPE ResponseInformationSeNBReconfComp
                                                                                                       PRESENCE mandatory}
     ID id-MeNB-UE-X2AP-ID-Extension
                                                CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                                       PRESENCE optional }
     ID id-SeNB-UE-X2AP-ID-Extension
                                                CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                                       PRESENCE optional },
ResponseInformationSeNBReconfComp ::= CHOICE {
                     ResponseInformationSeNBReconfComp-SuccessItem,
```

```
ResponseInformationSeNBReconfComp-RejectByMeNBItem,
   reject-by-MeNB
ResponseInformationSeNBReconfComp-SuccessItem ::= SEQUENCE
   meNBtoSeNBContainer
                                 MeNBtoSeNBContainer OPTIONAL,
   iE-Extensions
                                 ProtocolExtensionContainer { ResponseInformationSeNBReconfComp-SuccessItemExtIEs} } OPTIONAL,
ResponseInformationSeNBReconfComp-SuccessItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
ResponseInformationSeNBReconfComp-RejectByMeNBItem ::= SEOUENCE {
                                 Cause,
   meNBtoSeNBContainer
                                 MeNBtoSeNBContainer
                                                                                                                       OPTIONAL,
                                 ProtocolExtensionContainer { ResponseInformationSeNBReconfComp-RejectByMeNBItemExtIEs} } OPTIONAL,
   iE-Extensions
   . . .
ResponseInformationSeNBReconfComp-RejectByMeNBItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
     ******************
  SENB MODIFICATION REQUEST
         SenbModificationRequest ::= SEQUENCE {
   protocolIEs
                  ProtocolIE-Container
                                         {{ SeNBModificationRequest-IEs}},
   . . .
SeNBModificationRequest-IEs X2AP-PROTOCOL-IES ::= {
     ID id-MeNB-UE-X2AP-ID
                                            CRITICALITY reject TYPE UE-X2AP-ID
                                                                                                   PRESENCE mandatory
     ID id-SeNB-UE-X2AP-ID
                                            CRITICALITY reject TYPE UE-X2AP-ID
                                                                                                   PRESENCE mandatory
     ID id-Cause
                                            CRITICALITY ignore TYPE Cause
                                                                                                   PRESENCE mandatory
     ID id-SCGChangeIndication
                                            CRITICALITY ignore TYPE SCGChangeIndication
                                                                                                   PRESENCE optional}
     ID id-ServingPLMN
                                            CRITICALITY ignore TYPE PLMN-Identity
                                                                                                   PRESENCE optional }
     ID id-UE-ContextInformationSeNBModReq
                                            CRITICALITY reject TYPE UE-ContextInformationSeNBModReq
                                                                                                   PRESENCE optional }
     ID id-MeNBtoSeNBContainer
                                            CRITICALITY ignore TYPE MeNBtoSeNBContainer
                                                                                                   PRESENCE optional}
     ID id-CSGMembershipStatus
                                            CRITICALITY reject TYPE CSGMembershipStatus
                                                                                                   PRESENCE optional}
     ID id-MeNB-UE-X2AP-ID-Extension
                                            CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                                   PRESENCE optional }
     ID id-SeNB-UE-X2AP-ID-Extension
                                            CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                                   PRESENCE optional }
UE-ContextInformationSeNBModReq ::= SEQUENCE {
   uE-SecurityCapabilities
                                 UESecurityCapabilities
                                                                                                      OPTIONAL,
                                                                                                      OPTIONAL,
   seNB-SecurityKey
                                 SeNBSecurityKey
   OPTIONAL,
```

```
e-RABs-ToBeAdded
                                    E-RABs-ToBeAdded-List-ModReq
                                                                                                              OPTIONAL,
    e-RABs-ToBeModified
                                    E-RABs-ToBeModified-List-ModReg
                                                                                                              OPTIONAL,
    e-RABs-ToBeReleased
                                    E-RABs-ToBeReleased-List-ModReg
                                                                                                              OPTIONAL.
    iE-Extensions
                                    ProtocolExtensionContainer { { UE-ContextInformationSeNBModRegExtIEs} }
                                                                                                              OPTIONAL,
UE-ContextInformationSeNBModRegExtIEs X2AP-PROTOCOL-EXTENSION ::= {
E-RABs-ToBeAdded-List-ModReq ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeAdded-ModReqItemIEs} }
E-RABs-ToBeAdded-ModRegItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeAdded-ModRegItem CRITICALITY ignore TYPE E-RABs-ToBeAdded-ModRegItem
                                                                                                 PRESENCE mandatory },
E-RABs-ToBeAdded-ModRegItem ::= CHOICE {
    sCG-Bearer
                   E-RABs-ToBeAdded-ModRegItem-SCG-Bearer,
    split-Bearer E-RABs-ToBeAdded-ModReqItem-Split-Bearer,
    . . .
E-RABs-ToBeAdded-ModReqItem-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID
                                    E-RAB-ID.
                                    E-RAB-Level-Oos-Parameters,
    e-RAB-Level-OoS-Parameters
   dL-Forwarding
                                    DL-Forwarding
                                                                                                              OPTIONAL,
    s1-UL-GTPtunnelEndpoint
                                    GTPtunnelEndpoint,
                                    ProtocolExtensionContainer { {E-RABs-ToBeAdded-ModRegItem-SCG-BearerExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
E-RABs-ToBeAdded-ModReqItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
     ID id-Correlation-ID
                                        CRITICALITY ignore EXTENSION Correlation-ID
                                                                                             PRESENCE optional |
    { ID id-SIPTO-Correlation-ID
                                        CRITICALITY ignore EXTENSION Correlation-ID
                                                                                             PRESENCE optional },
E-RABs-ToBeAdded-ModRegItem-Split-Bearer ::= SEQUENCE {
    e-RAB-ID
                                    E-RAB-ID,
    e-RAB-Level-OoS-Parameters
                                    E-RAB-Level-OoS-Parameters,
   meNB-GTPtunnelEndpoint
                                    GTPtunnelEndpoint,
                            ProtocolExtensionContainer { {E-RABs-ToBeAdded-ModReqItem-Split-BearerExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
E-RABs-ToBeAdded-ModReqItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
E-RABs-ToBeModified-List-ModReg ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeModified-ModRegItemIEs} }
E-RABs-ToBeModified-ModReqItemIEs X2AP-PROTOCOL-IES ::= {
```

```
PRESENCE mandatory },
E-RABs-ToBeModified-ModRegItem ::= CHOICE {
                 E-RABs-ToBeModified-ModRegItem-SCG-Bearer,
   sCG-Bearer
                E-RABs-ToBeModified-ModRegItem-Split-Bearer,
   split-Bearer
E-RABs-ToBeModified-ModReqItem-SCG-Bearer ::= SEQUENCE {
   e-RAB-ID
                                E-RAB-ID,
   e-RAB-Level-OoS-Parameters
                                E-RAB-Level-OoS-Parameters
                                                                                                   OPTIONAL.
                                GTPtunnelEndpoint
   s1-UL-GTPtunnelEndpoint
                                                                                                   OPTIONAL,
   iE-Extensions
                                ProtocolExtensionContainer { {E-RABs-ToBeModified-ModRegItem-SCG-BearerExtIEs} } OPTIONAL,
E-RABs-ToBeModified-ModReqItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
E-RABs-ToBeModified-ModRegItem-Split-Bearer ::= SEOUENCE {
   e-RAB-ID
                                E-RAB-ID,
   e-RAB-Level-OoS-Parameters
                                E-RAB-Level-OoS-Parameters
                                                                                                        OPTIONAL,
                                GTPtunnelEndpoint
   meNB-GTPtunnelEndpoint
                                                                                                        OPTIONAL,
   iE-Extensions
                                ProtocolExtensionContainer { {E-RABs-ToBeModified-ModRegItem-Split-BearerExtIEs} } OPTIONAL,
E-RABs-ToBeModified-ModReqItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
E-RABs-ToBeReleased-List-ModReg ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeReleased-ModRegItemIEs} }
E-RABs-ToBeReleased-ModRegItemIEs X2AP-PROTOCOL-IES ::= {
   PRESENCE mandatory },
   . . .
E-RABs-ToBeReleased-ModReqItem ::= CHOICE {
                 E-RABs-ToBeReleased-ModReqItem-SCG-Bearer,
   sCG-Bearer
                E-RABs-ToBeReleased-ModRegItem-Split-Bearer,
   split-Bearer
E-RABs-ToBeReleased-ModReqItem-SCG-Bearer ::= SEQUENCE {
   e-RAB-ID
                                E-RAB-ID,
   dL-GTPtunnelEndpoint
                                GTPtunnelEndpoint
                                                                                                   OPTIONAL,
   uL-GTPtunnelEndpoint
                                GTPtunnelEndpoint
                                                                                                   OPTIONAL,
   iE-Extensions
                                ProtocolExtensionContainer { {E-RABs-ToBeReleased-ModReqItem-SCG-BearerExtIEs} } OPTIONAL,
   . . .
```

```
E-RABs-ToBeReleased-ModRegItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
E-RABs-ToBeReleased-ModReqItem-Split-Bearer ::= SEQUENCE {
                                   E-RAB-ID,
    e-RAB-ID
    dL-GTPtunnelEndpoint
                                   GTPtunnelEndpoint
                                                                                                           OPTIONAL.
                                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-ModRegItem-Split-BearerExtIEs} } OPTIONAL,
   iE-Extensions
E-RABs-ToBeReleased-ModRegItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
-- SENB MODIFICATION REQUEST ACKNOWLEDGE
__ *********************
SenbModificationRequestAcknowledge ::= SEOUENCE {
    protocolIEs
                   ProtocolIE-Container
                                          {{SeNBModificationRequestAcknowledge-IEs}},
    . . .
SeNBModificationRequestAcknowledge-IEs X2AP-PROTOCOL-IES ::= {
                                                                                                                       PRESENCE mandatory}
     ID id-MeNB-UE-X2AP-ID
                                                       CRITICALITY ignore TYPE UE-X2AP-ID
     ID id-SeNB-UE-X2AP-ID
                                                       CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                                                       PRESENCE mandatory}
     ID id-E-RABs-Admitted-ToBeAdded-ModAckList
                                                       CRITICALITY ignore TYPE E-RABs-Admitted-ToBeAdded-ModAckList
                                                                                                                       PRESENCE optional }
     ID id-E-RABs-Admitted-ToBeModified-ModAckList
                                                       CRITICALITY ignore TYPE E-RABs-Admitted-ToBeModified-ModAckList PRESENCE optional
                                                      CRITICALITY ignore TYPE E-RABs-Admitted-ToBeReleased-ModAckList PRESENCE optional
     ID id-E-RABs-Admitted-ToBeReleased-ModAckList
     ID id-E-RABs-NotAdmitted-List
                                                       CRITICALITY ignore TYPE E-RAB-List
                                                                                                                       PRESENCE optional }
     ID id-SeNBtoMeNBContainer
                                                      CRITICALITY ignore TYPE SenBtoMenBContainer
                                                                                                                       PRESENCE optional }
     ID id-CriticalityDiagnostics
                                                      CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                                                       PRESENCE optional }
                                                                                                                       PRESENCE optional } |
     ID id-MeNB-UE-X2AP-ID-Extension
                                                      CRITICALITY ignore TYPE UE-X2AP-ID-Extension
    { ID id-SeNB-UE-X2AP-ID-Extension
                                                      CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                                                       PRESENCE optional },
    . . .
E-RABs-Admitted-ToBeAdded-ModAckList ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { E-RABs-Admitted-ToBeAdded-
ModAckItemIEs} }
E-RABs-Admitted-ToBeAdded-ModAckItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-Admitted-ToBeAdded-ModAckItem CRITICALITY ignore TYPE E-RABs-Admitted-ToBeAdded-ModAckItem
                                                                                                                    PRESENCE mandatory }
E-RABs-Admitted-ToBeAdded-ModAckItem ::= CHOICE {
                   E-RABs-Admitted-ToBeAdded-ModAckItem-SCG-Bearer,
    sCG-Bearer
    split-Bearer E-RABs-Admitted-ToBeAdded-ModAckItem-Split-Bearer,
```

```
E-RABs-Admitted-ToBeAdded-ModAckItem-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID
                                            E-RAB-ID.
    s1-DL-GTPtunnelEndpoint
                                            GTPtunnelEndpoint,
    dL-Forwarding-GTPtunnelEndpoint
                                            GTPtunnelEndpoint
                                                                                                                       OPTIONAL.
    uL-Forwarding-GTPtunnelEndpoint
                                            GTPtunnelEndpoint
                                                                                                                       OPTIONAL,
    iE-Extensions
                                    ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-ModAckItem-SCG-BearerExtIEs} } OPTIONAL,
E-RABs-Admitted-ToBeAdded-ModAckItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
E-RABs-Admitted-ToBeAdded-ModAckItem-Split-Bearer ::= SEQUENCE
    e-RAB-ID
                                    E-RAB-ID.
                                    GTPtunnelEndpoint,
    seNB-GTPtunnelEndpoint
                                    ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-ModAckItem-Split-BearerExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
E-RABs-Admitted-ToBeAdded-ModAckItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
E-RABs-Admitted-ToBeModified-ModAckList ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-Admitted-ToBeModified-
ModAckItemIEs} }
E-RABs-Admitted-ToBeModified-ModAckItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-Admitted-ToBeModified-ModAckItem
                                                        CRITICALITY ignore TYPE E-RABs-Admitted-ToBeModified-ModAckItem PRESENCE mandatory
E-RABs-Admitted-ToBeModified-ModAckItem ::= CHOICE
                    E-RABs-Admitted-ToBeModified-ModAckItem-SCG-Bearer,
    split-Bearer E-RABs-Admitted-ToBeModified-ModAckItem-Split-Bearer,
E-RABs-Admitted-ToBeModified-ModAckItem-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID
                                    E-RAB-ID,
    s1-DL-GTPtunnelEndpoint
                                    GTPtunnelEndpoint
                                                                                                                 OPTIONAL,
                                    ProtocolExtensionContainer { {E-RABs-Admitted-ToBeModified-ModAckItem-SCG-BearerExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
E-RABs-Admitted-ToBeModified-ModAckItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
E-RABs-Admitted-ToBeModified-ModAckItem-Split-Bearer ::= SEQUENCE {
                                    E-RAB-ID,
    e-RAB-ID
                                                                                                                       OPTIONAL,
    seNB-GTPtunnelEndpoint
                                    GTPtunnelEndpoint
   iE-Extensions
                                    ProtocolExtensionContainer { {E-RABs-Admitted-ToBeModified-ModAckItem-Split-BearerExtIEs} } OPTIONAL,
```

```
E-RABs-Admitted-ToBeModified-ModAckItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
E-RABs-Admitted-ToBeReleased-ModAckList ::= SEOUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-Admitted-ToBeReleased-
ModAckItemIEs } }
E-RABs-Admitted-ToBeReleased-ModAckItemIEs X2AP-PROTOCOL-IES ::= {
   E-RABs-Admitted-ToReleased-ModAckItem ::= CHOICE {
              E-RABs-Admitted-ToBeReleased-ModAckItem-SCG-Bearer,
   split-Bearer E-RABs-Admitted-ToBeReleased-ModAckItem-Split-Bearer,
E-RABs-Admitted-ToBeReleased-ModAckItem-SCG-Bearer ::= SEQUENCE {
   e-RAB-ID
                            E-RAB-ID,
   iE-Extensions
                            ProtocolExtensionContainer { {E-RABs-Admitted-ToBeReleased-ModAckItem-SCG-BearerExtIEs} } OPTIONAL,
E-RABs-Admitted-ToBeReleased-ModAckItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
E-RABs-Admitted-ToBeReleased-ModAckItem-Split-Bearer ::= SEQUENCE {
   e-RAB-ID
                            E-RAB-ID,
   iE-Extensions
                            ProtocolExtensionContainer { {E-RABs-Admitted-ToBeReleased-ModAckItem-Split-BearerExtIEs} } OPTIONAL,
E-RABs-Admitted-ToBeReleased-ModAckItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    **************
-- SENB MODIFICATION REQUEST REJECT
__ **********************
SenbModificationRequestReject ::= SEQUENCE {
   protocolIEs
                 ProtocolIE-Container
                                      {{SeNBModificationRequestReject-IEs}},
   . . .
SeNBModificationRequestReject-IES X2AP-PROTOCOL-IES ::= {
     ID id-MeNB-UE-X2AP-ID
                                         CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                      PRESENCE mandatory}
     ID id-SeNB-UE-X2AP-ID
                                          CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                      PRESENCE mandatory
     ID id-Cause
                                                                                     PRESENCE mandatory }
                                          CRITICALITY ignore TYPE Cause
    ID id-CriticalityDiagnostics
                                          CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional |
```

```
ID id-MeNB-UE-X2AP-ID-Extension
                                          CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                       PRESENCE optional } |
     ID id-SeNB-UE-X2AP-ID-Extension
                                          CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                       PRESENCE optional },
  -- SENB MODIFICATION REQUIRED
*****************
SenbModificationRequired ::= SEQUENCE {
                                          {{SeNBModificationRequired-IEs}},
   protocolIEs
                ProtocolIE-Container
   . . .
SeNBModificationRequired-IES X2AP-PROTOCOL-IES ::= {
     ID id-MeNB-UE-X2AP-ID
                                                                                            PRESENCE mandatory}
                                          CRITICALITY reject TYPE UE-X2AP-ID
     ID id-SeNB-UE-X2AP-ID
                                          CRITICALITY reject TYPE UE-X2AP-ID
                                                                                            PRESENCE mandatory
     ID id-Cause
                                          CRITICALITY ignore TYPE Cause
                                                                                            PRESENCE mandatory}
     ID id-SCGChangeIndication
                                          CRITICALITY ignore TYPE SCGChangeIndication
                                                                                            PRESENCE optional }
     ID id-E-RABs-ToBeReleased-ModRegd
                                          CRITICALITY ignore TYPE E-RABs-ToBeReleased-ModRegd
                                                                                            PRESENCE optional }
     ID id-SeNBtoMeNBContainer
                                          CRITICALITY ignore TYPE SenBtoMenBContainer
                                                                                            PRESENCE optional }
     ID id-MeNB-UE-X2AP-ID-Extension
                                          CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                            PRESENCE optional }
     ID id-SeNB-UE-X2AP-ID-Extension
                                          CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                            PRESENCE optional },
E-RABs-ToBeReleased-ModReqd ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeReleased-ModReqdItemIEs} }
E-RABs-ToBeReleased-ModRegdItemIEs X2AP-PROTOCOL-IES ::= {
   TYPE E-RABs-ToBeReleased-ModRegdItem PRESENCE mandatory },
   . . .
E-RABs-ToBeReleased-ModRegdItem ::= SEQUENCE
   e-RAB-ID
                                E-RAB-ID,
   cause
                                Cause,
   iE-Extensions
                                ProtocolExtensionContainer { {E-RABs-ToBeReleased-ModRegdItemExtIEs} } OPTIONAL,
E-RABs-ToBeReleased-ModReqdItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ******************
-- SENB MODIFICATION CONFIRM
SenbModificationConfirm ::= SEQUENCE {
```

```
{{SeNBModificationConfirm-IEs}},
                   ProtocolIE-Container
    protocolIEs
SeNBModificationConfirm-IEs X2AP-PROTOCOL-IES ::= {
     ID id-MeNB-UE-X2AP-ID
                                                                                                   PRESENCE mandatory }
                                               CRITICALITY ignore TYPE UE-X2AP-ID
     ID id-SeNB-UE-X2AP-ID
                                               CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                                   PRESENCE mandatory }
                                                                                                   PRESENCE optional }
     ID id-MeNBtoSeNBContainer
                                               CRITICALITY ignore TYPE MeNBtoSeNBContainer
     ID id-CriticalityDiagnostics
                                               CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                                   PRESENCE optional }
                                                                                                   PRESENCE optional)
     ID id-MeNB-UE-X2AP-ID-Extension
                                               CRITICALITY ignore TYPE UE-X2AP-ID-Extension
     ID id-SeNB-UE-X2AP-ID-Extension
                                               CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                                   PRESENCE optional },
    ******************
-- SENB MODIFICATION REFUSE
SeNBModificationRefuse ::= SEQUENCE {
                   ProtocolIE-Container
                                               {{SeNBModificationRefuse-IEs}},
    protocolIEs
SeNBModificationRefuse-IEs X2AP-PROTOCOL-IES ::=
     ID id-MeNB-UE-X2AP-ID
                                                                                                 PRESENCE mandatory}
                                               CRITICALITY ignore TYPE UE-X2AP-ID
     ID id-SeNB-UE-X2AP-ID
                                               CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                                 PRESENCE mandatory }
                                                                                                 PRESENCE mandatory}
     ID id-Cause
                                               CRITICALITY ignore TYPE Cause
     ID id-MeNBtoSeNBContainer
                                                                                                 PRESENCE optional }
                                               CRITICALITY ignore TYPE MeNBtoSeNBContainer
     ID id-CriticalityDiagnostics
                                               CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                                PRESENCE optional }
                                                                                                 PRESENCE optional }
     ID id-MeNB-UE-X2AP-ID-Extension
                                               CRITICALITY ignore TYPE UE-X2AP-ID-Extension
    { ID id-SeNB-UE-X2AP-ID-Extension
                                               CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                                 PRESENCE optional },
-- SENB RELEASE REQUEST
Senbreleaserequest ::= SEQUENCE {
                                               {{SeNBReleaseRequest-IEs}},
    protocolIEs
                   ProtocolIE-Container
    . . .
SeNBReleaseRequest-IEs X2AP-PROTOCOL-IES ::= {
     ID id-MeNB-UE-X2AP-ID
                                               CRITICALITY reject TYPE UE-X2AP-ID
                                                                                                            PRESENCE mandatory }
     ID id-SeNB-UE-X2AP-ID
                                               CRITICALITY reject TYPE UE-X2AP-ID
                                                                                                            PRESENCE optional }
     ID id-Cause
                                               CRITICALITY ignore TYPE Cause
                                                                                                            PRESENCE optional }
     ID id-E-RABs-ToBeReleased-List-RelReg
                                               CRITICALITY ignore TYPE E-RABs-ToBeReleased-List-RelReq
                                                                                                            PRESENCE optional}
     ID id-UE-ContextKeptIndicator
                                               CRITICALITY ignore TYPE UE-ContextKeptIndicator
                                                                                                            PRESENCE optional }
                                                                                                            PRESENCE optional }
     ID id-MeNB-UE-X2AP-ID-Extension
                                               CRITICALITY reject TYPE UE-X2AP-ID-Extension
```

```
PRESENCE optional },
   { ID id-SeNB-UE-X2AP-ID-Extension
                                             CRITICALITY reject TYPE UE-X2AP-ID-Extension
E-RABs-ToBeReleased-List-RelReg ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeReleased-RelRegItemIEs} }
E-RABs-ToBeReleased-RelRegItemIEs X2AP-PROTOCOL-IES ::= {
   { ID id-E-RABs-ToBeReleased-RelRegItem
                                             CRITICALITY ignore TYPE E-RABs-ToBeReleased-RelRegItem PRESENCE mandatory },
E-RABs-ToBeReleased-RelRegItem ::= CHOICE
                  E-RABs-ToBeReleased-RelRegItem-SCG-Bearer,
   split-Bearer E-RABs-ToBeReleased-RelRegItem-Split-Bearer,
   . . .
E-RABs-ToBeReleased-RelRegItem-SCG-Bearer ::= SEQUENCE {
   e-RAB-ID
                                 E-RAB-ID,
   uL-GTPtunnelEndpoint
                                 GTPtunnelEndpoint
                                                                                                       OPTIONAL,
   dL-GTPtunnelEndpoint
                                 GTPtunnelEndpoint
                                                                                                       OPTIONAL,
   iE-Extensions
                                 ProtocolExtensionContainer { {E-RABs-ToBeReleased-RelReqItem-SCG-BearerExtIEs} } OPTIONAL,
E-RABs-ToBeReleased-RelReqItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
E-RABs-ToBeReleased-RelRegItem-Split-Bearer ::= SEOUENCE {
   e-RAB-ID
                                 E-RAB-ID,
   dL-GTPtunnelEndpoint
                                  GTPtunnelEndpoint
                                  ProtocolExtensionContainer { {E-RABs-ToBeReleased-RelRegItem-Split-BearerExtIEs} } OPTIONAL,
   iE-Extensions
   . . .
E-RABs-ToBeReleased-RelReqItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    -- SENB RELEASE REQUIRED
  ******************
Senbreleaserequired ::= SEQUENCE {
   protocolIEs
                ProtocolIE-Container
                                         {{SeNBReleaseRequired-IEs}},
Senbreleaserequired-IEs X2AP-PROTOCOL-IES ::= {
     ID id-MeNB-UE-X2AP-ID
                                         CRITICALITY reject TYPE UE-X2AP-ID
                                                                                          PRESENCE mandatory }
     ID id-SeNB-UE-X2AP-ID
                                         CRITICALITY reject TYPE UE-X2AP-ID
                                                                                          PRESENCE mandatory }
    { ID id-Cause
                                         CRITICALITY ignore TYPE Cause
                                                                                          PRESENCE mandatory }
```

```
ID id-MeNB-UE-X2AP-ID-Extension
                                                                                              PRESENCE optional |
                                           CRITICALITY reject TYPE UE-X2AP-ID-Extension
     ID id-SeNB-UE-X2AP-ID-Extension
                                           CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                              PRESENCE optional },
-- SENB RELEASE CONFIRM
*****************
SenbreleaseConfirm ::= SEQUENCE {
                                           {{SeNBReleaseConfirm-IEs}},
    protocolIEs
                   ProtocolIE-Container
    . . .
SenbreleaseConfirm-IEs X2AP-PROTOCOL-IES ::= {
     ID id-MeNB-UE-X2AP-ID
                                                                                                              PRESENCE mandatory}
                                                   CRITICALITY ignore TYPE UE-X2AP-ID
     ID id-SeNB-UE-X2AP-ID
                                                   CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                                              PRESENCE mandatory
                                                   CRITICALITY ignore TYPE E-RABs-ToBeReleased-List-RelConf
     ID id-E-RABs-ToBeReleased-List-RelConf
                                                                                                              PRESENCE optional }
     ID id-CriticalityDiagnostics
                                                   CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                                              PRESENCE optional}
     ID id-MeNB-UE-X2AP-ID-Extension
                                                   CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                                              PRESENCE optional }
    { ID id-SeNB-UE-X2AP-ID-Extension
                                                   CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                                              PRESENCE optional },
E-RABs-ToBeReleased-List-RelConf ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeReleased-RelConfItemIEs} }
E-RABs-ToBeReleased-RelConfitemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeReleased-RelConfItem
                                               CRITICALITY ignore
                                                                      TYPE E-RABs-ToBeReleased-RelConfItem
                                                                                                              PRESENCE mandatory },
E-RABs-ToBeReleased-RelConfItem ::= CHOICE {
                   E-RABs-ToBeReleased-RelConfItem-SCG-Bearer,
    sCG-Bearer
    split-Bearer E-RABs-ToBeReleased-RelConfItem-Split-Bearer,
    . . .
E-RABs-ToBeReleased-RelConfItem-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID
                                   E-RAB-ID,
    uL-GTPtunnelEndpoint
                                   GTPtunnelEndpoint
                                                                                                           OPTIONAL,
    dL-GTPtunnelEndpoint
                                   GTPtunnelEndpoint
                                                                                                           OPTIONAL,
                                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-RelConfItem-SCG-BearerExtIEs} } OPTIONAL,
    iE-Extensions
E-RABs-ToBeReleased-RelConfitem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::=
E-RABs-ToBeReleased-RelConfItem-Split-Bearer ::= SEQUENCE {
    e-RAB-ID
                                   E-RAB-ID,
    dL-GTPtunnelEndpoint
                                   GTPtunnelEndpoint
                                                                                                   OPTIONAL,
   iE-Extensions
                                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-RelConfItem-Split-BearerExtIEs} } OPTIONAL,
```

```
E-RABs-ToBeReleased-RelConfItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  -- SENB COUNTER CHECK REOUEST
  *****************
SeNBCounterCheckRequest ::= SEOUENCE {
             ProtocolIE-Container
                                 {{SeNBCounterCheckRequest-IEs}},
   protocolIEs
SeNBCounterCheckRequest-IEs X2AP-PROTOCOL-IES ::= {
    ID id-MeNB-UE-X2AP-ID
                                    CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                   PRESENCE mandatory
    ID id-SeNB-UE-X2AP-ID
                                    CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                   PRESENCE mandatory }
    PRESENCE mandatory }
    ID id-MeNB-UE-X2AP-ID-Extension
                              CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                   PRESENCE optional } |
   { ID id-SeNB-UE-X2AP-ID-Extension
                                    CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                   PRESENCE optional },
E-RABs-SubjectToCounterCheck-List ::= SEOUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-SubjectToCounterCheckItemIEs} }
E-RABs-SubjectToCounterCheckItemIEs X2AP-PROTOCOL-IES ::= {
   PRESENCE mandatory },
   . . .
E-RABs-SubjectToCounterCheckItem ::= SEQUENCE {
   e-RAB-ID
                           E-RAB-ID,
  uL-Count
                           INTEGER (0..4294967295),
  dL-Count
                           INTEGER (0..4294967295),
                           ProtocolExtensionContainer { {E-RABs-SubjectToCounterCheckItemExtIEs} } OPTIONAL,
  iE-Extensions
E-RABs-SubjectToCounterCheckItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  -- X2 REMOVAL REQUEST
  *****************
X2RemovalRequest ::= SEOUENCE {
  protocolIEs ProtocolIE-Container
                                 {{X2RemovalRequest-IEs}},
   . . .
```

```
X2RemovalRequest-IEs X2AP-PROTOCOL-IES ::= {
    ID id-GlobalENB-ID
                               CRITICALITY reject TYPE GlobalENB-ID
                                                                    PRESENCE mandatory } |
                               CRITICALITY reject TYPE X2BenefitValue
    ID id-X2RemovalThreshold
                                                                    PRESENCE optional },
       -- X2 REMOVAL RESPONSE
__ *********************
X2RemovalResponse ::= SEOUENCE {
   protocolIEs
             ProtocolIE-Container
                                  {{X2RemovalResponse-IEs}},
   . . .
X2RemovalResponse-IEs X2AP-PROTOCOL-IES ::= {
    ID id-GlobalENB-ID CRITICALITY reject TYPE GlobalENB-ID
                                                                       PRESENCE mandatory}
   ID id-CriticalityDiagnostics
                               CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                       PRESENCE optional },
-- X2 REMOVAL FAILURE
__ **********************
X2RemovalFailure ::= SEQUENCE {
   protocolIEs
               ProtocolIE-Container
                                 {{X2RemovalFailure-IEs}},
X2RemovalFailure-IEs X2AP-PROTOCOL-IES ::= {
   { ID id-Cause
                                                                           PRESENCE mandatory}
                               CRITICALITY ignore TYPE Cause
   { ID id-CriticalityDiagnostics
                               CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                           PRESENCE optional },
  -- RETRIEVE UE CONTEXT REQUEST
  ****************
RetrieveUEContextRequest ::= SEQUENCE {
```

```
{{ RetrieveUEContextRequest-IEs}},
                   ProtocolIE-Container
   protocolIEs
RetrieveUEContextRequest-IEs X2AP-PROTOCOL-IES ::=
                                                                                             PRESENCE mandatory}
     ID id-New-eNB-UE-X2AP-ID
                                              CRITICALITY reject TYPE UE-X2AP-ID
     ID id-SeNB-UE-X2AP-ID-Extension
                                              CRITICALITY reject TYPE UE-X2AP-ID-Extension
                                                                                             PRESENCE optional }
     ID id-resumeID
                                                                                             PRESENCE mandatory
                                              CRITICALITY reject TYPE ResumeID
     TD id-ShortMAC-T
                                              CRITICALITY reject TYPE ShortMAC-I
                                                                                             PRESENCE mandatory}
     ID id-NewEUTRANCellIdentifier
                                                                                             PRESENCE mandatory },
                                              CRITICALITY reject TYPE EUTRANCellIdentifier
   *****************
-- RETRIEVE UE CONTEXT RESPONSE
  *******************
RetrieveUEContextResponse ::= SEOUENCE {
   protocolIEs
                       ProtocolIE-Container
                                               {{ RetrieveUEContextResponse-IEs}},
    . . .
RetrieveUEContextResponse-IEs X2AP-PROTOCOL-IES ::= {
     ID id-New-eNB-UE-X2AP-ID
                                           CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                                  PRESENCE mandatory } |
                                                                                                  PRESENCE optional }
     ID id-New-eNB-UE-X2AP-ID-Extension
                                           CRITICALITY ignore TYPE UE-X2AP-ID-Extension
     ID id-Old-eNB-UE-X2AP-ID
                                           CRITICALITY ignore TYPE UE-X2AP-ID
                                                                                                  PRESENCE mandatory |
     ID id-Old-eNB-UE-X2AP-ID-Extension
                                           CRITICALITY ignore TYPE UE-X2AP-ID-Extension
                                                                                                  PRESENCE optional |
                                                                                                  PRESENCE mandatory
     ID id-GUMMEI-ID
                                           CRITICALITY reject TYPE GUMMEI
     ID id-UE-ContextInformationRetrieve
                                           CRITICALITY reject TYPE UE-ContextInformationRetrieve
                                                                                                  PRESENCE mandatory}
     ID id-TraceActivation
                                           CRITICALITY ignore TYPE TraceActivation
                                                                                                  PRESENCE optional }
     ID id-SRVCCOperationPossible
                                           CRITICALITY ignore TYPE SRVCCOperationPossible
                                                                                                  PRESENCE optional
                                           CRITICALITY ignore TYPE Masked-IMEISV
                                                                                                  PRESENCE optional}
     ID id-Masked-IMEISV
     ID id-ExpectedUEBehaviour
                                           CRITICALITY ignore TYPE ExpectedUEBehaviour
                                                                                                  PRESENCE optional}
     ID id-ProSeAuthorized
                                           CRITICALITY ignore TYPE ProSeAuthorized
                                                                                                  PRESENCE optional }
     ID id-CriticalityDiagnostics
                                           CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                                  PRESENCE optional },
    . . .
UE-ContextInformationRetrieve ::= SEQUENCE
                                       UE-S1AP-ID,
   mME-UE-S1AP-ID
                                       UESecurityCapabilities,
   uESecurityCapabilities
                                       AS-SecurityInformation,
    aS-SecurityInformation
    uEaggregateMaximumBitRate
                                       UEAggregateMaximumBitRate,
    subscriberProfileIDforRFP
                                       SubscriberProfileIDforRFP
                                                                      OPTIONAL,
    e-RABs-ToBeSetup-ListRetrieve
                                       E-RABs-ToBeSetup-ListRetrieve,
   rRC-Context
                                       RRC-Context,
   handoverRestrictionList
                                       HandoverRestrictionList
                                                                      OPTIONAL,
   locationReportingInformation
                                       LocationReportingInformation
                                                                      OPTIONAL,
   managBasedMDTallowed
                                       ManagementBasedMDTallowed
                                                                      OPTIONAL,
   managBasedMDTPLMNList
                                       MDTPLMNList
                                                                      OPTIONAL,
    iE-Extensions
                                       ProtocolExtensionContainer { {UE-ContextInformationRetrieve-ExtIEs} } OPTIONAL,
    . . .
```

```
UE-ContextInformationRetrieve-ExtIES X2AP-PROTOCOL-EXTENSION ::= {
E-RABs-ToBeSetup-ListRetrieve ::= SEOUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeSetupRetrieve-ItemIEs} }
E-RABs-ToBeSetupRetrieve-ItemIEs X2AP-PROTOCOL-IES ::= {
   E-RABs-ToBeSetupRetrieve-Item ::= SEQUENCE {
   e-RAB-Level-OoS-Parameters
                           E-RAB-Level-OoS-Parameters,
   bearerType
                           BearerType OPTIONAL,
                           ProtocolExtensionContainer { {E-RABs-ToBeSetupRetrieve-ItemExtIEs} } OPTIONAL,
   iE-Extensions
E-RABs-ToBeSetupRetrieve-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  *****************
-- RETRIEVE UE CONTEXT FAILURE
       ****************
RetrieveUEContextFailure ::= SEQUENCE {
   protocolIEs
             ProtocolIE-Container
                                  {{ RetrieveUEContextFailure-IEs}},
RetrieveUEContextFailure-IEs X2AP-PROTOCOL-IES ::= {
    ID id-New-eNB-UE-X2AP-ID
                                  CRITICALITY ignore TYPE UE-X2AP-ID
                                                                          PRESENCE mandatory |
    PRESENCE optional } |
    ID id-Cause
                                  CRITICALITY ignore TYPE Cause
                                                                          PRESENCE mandatory}
   { ID id-CriticalityDiagnostics
                                  CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                          PRESENCE optional },
END
```

9.3.5 Information Element definitions

```
X2AP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) x2ap (2) version1 (1) x2ap-IEs (2) }
DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
IMPORTS
    id-E-RAB-Item,
    id-Number-of-Antennaports,
    id-MBSFN-Subframe-Info,
    id-PRACH-Configuration,
    id-CSG-Id,
    id-MDTConfiguration,
    id-SignallingBasedMDTPLMNList,
    id-MultibandInfoList,
    id-FreqBandIndicatorPriority,
    id-NeighbourTAC,
    id-Time-UE-StayedInCell-EnhancedGranularity,
    id-MBMS-Service-Area-List,
    id-HO-cause,
    id-eARFCNExtension,
    id-DL-EARFCNExtension,
    id-UL-EARFCNExtension,
    id-M3Configuration,
    id-M4Configuration,
    id-M5Configuration,
    id-MDT-Location-Info,
    id-AdditionalSpecialSubframe-Info,
    id-UEID,
    id-enhancedRNTP,
    id-ProSeUEtoNetworkRelaying,
    id-M6Configuration,
    id-M7Configuration,
    id-OffsetOfNbiotChannelNumberToDL-EARFCN,
    id-OffsetOfNbiotChannelNumberToUL-EARFCN,
    maxnoofBearers,
    maxCellineNB,
    maxEARFCN,
    maxEARFCNPlusOne,
    newmaxEARFCN,
    maxInterfaces,
    maxnoofBands,
    maxnoofBPLMNs,
    maxnoofCells,
    maxnoofEPLMNs,
    maxnoofEPLMNsPlusOne,
    maxnoofForbLACs,
    maxnoofForbTACs,
    maxnoofNeighbours,
```

```
maxnoofPRBs,
    maxNrOfErrors,
    maxPools.
    maxnoofMBSFN,
    maxnoofTAforMDT.
    maxnoofCellIDforMDT,
    maxnoofMBMSServiceAreaIdentities,
    maxnoofMDTPLMNs,
    maxnoofCoMPHypothesisSet,
    maxnoofCoMPCells,
    maxUEReport,
    maxCellReport,
    maxnoofPA,
    maxCSIProcess,
    maxCSIReport,
    maxSubband
FROM X2AP-Constants
    Criticality,
    ProcedureCode,
    ProtocolIE-ID,
    TriggeringMessage
FROM X2AP-CommonDataTypes
    ProtocolExtensionContainer{},
    ProtocolIE-Single-Container{},
    X2AP-PROTOCOL-EXTENSION,
    X2AP-PROTOCOL-IES
FROM X2AP-Containers;
-- A
ABSInformation ::= CHOICE {
    fdd
                        ABSInformationFDD,
    tdd
                        ABSInformationTDD,
    abs-inactive
                        NULL,
ABSInformationFDD ::= SEQUENCE {
    abs-pattern-info
                                         BIT STRING (SIZE(40)),
    numberOfCellSpecificAntennaPorts
                                         ENUMERATED {one, two, four, ...},
                                         BIT STRING (SIZE(40)),
    measurement-subset
                                         ProtocolExtensionContainer { { ABSInformationFDD-ExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
ABSInformationFDD-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
ABSInformationTDD ::= SEQUENCE {
```

```
abs-pattern-info
                                        BIT STRING (SIZE(1..70, ...)),
    numberOfCellSpecificAntennaPorts
                                        ENUMERATED {one, two, four, ...},
    measurement-subset
                                        BIT STRING (SIZE(1..70, ...)),
    iE-Extensions
                                        ProtocolExtensionContainer { { ABSInformationTDD-ExtIEs} } OPTIONAL,
ABSInformationTDD-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
ABS-Status ::= SEQUENCE {
    dL-ABS-status
                                                 DL-ABS-status,
    usableABSInformation
                                                 UsableABSInformation,
    iE-Extensions
                                                 ProtocolExtensionContainer { {ABS-Status-ExtIEs} } OPTIONAL,
ABS-Status-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
AdditionalSpecialSubframe-Info ::=
                                        SEQUENCE -
    additionalspecialSubframePatterns
                                             Additional Special Subframe Patterns,
                                             CyclicPrefixDL,
    cyclicPrefixDL
    cyclicPrefixUL
                                             CyclicPrefixUL,
    iE-Extensions
                                             ProtocolExtensionContainer { { AdditionalSpecialSubframe-Info-ExtIEs} } OPTIONAL,
AdditionalSpecialSubframe-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
AdditionalSpecialSubframePatterns ::= ENUMERATED {
    ssp0,
    ssp1,
    ssp2,
    ssp3,
    ssp4,
    ssp5,
    ssp6,
    ssp7,
    ssp8,
    ssp9,
AllocationAndRetentionPriority ::= SEQUENCE
    priorityLevel
                                PriorityLevel,
                                Pre-emptionCapability,
    pre-emptionCapability
    pre-emptionVulnerability
                                Pre-emptionVulnerability,
    iE-Extensions
                                ProtocolExtensionContainer { {AllocationAndRetentionPriority-ExtIEs} } OPTIONAL,
    . . .
```

```
AllocationAndRetentionPriority-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
AreaScopeOfMDT ::= CHOICE {
    cellBased
                                CellBasedMDT,
    tABased
                                TABasedMDT,
    pLMNWide
                                NULL,
                                TAIBasedMDT
    tAIBased
AS-SecurityInformation ::= SEQUENCE {
    key-eNodeB-star
                        Key-eNodeB-Star,
    nextHopChainingCount
                                    NextHopChainingCount,
    iE-Extensions
                                        ProtocolExtensionContainer { { AS-SecurityInformation-ExtIEs} } OPTIONAL,
    . . .
AS-SecurityInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
-- B
BearerType ::= ENUMERATED {
    non-IP,
    . . .
BenefitMetric ::= INTEGER (-101..100, ...)
BitRate ::= INTEGER (0..1000000000)
BroadcastPLMNs-Item ::= SEQUENCE (SIZE(1..maxnoofBPLMNs)) OF PLMN-Identity
-- C
CapacityValue ::= INTEGER (0..100)
Cause ::= CHOICE {
    radioNetwork
                        CauseRadioNetwork,
    transport
                        CauseTransport,
    protocol
                        CauseProtocol,
    misc
                        CauseMisc,
    . . .
CauseMisc ::= ENUMERATED {
    control-processing-overload,
    hardware-failure,
```

```
om-intervention,
    not-enough-user-plane-processing-resources,
    unspecified,
CauseProtocol ::= ENUMERATED {
    transfer-syntax-error,
    abstract-syntax-error-reject,
    abstract-syntax-error-ignore-and-notify,
    message-not-compatible-with-receiver-state,
    semantic-error,
    unspecified,
    abstract-syntax-error-falsely-constructed-message,
CauseRadioNetwork ::= ENUMERATED {
    handover-desirable-for-radio-reasons,
    time-critical-handover,
    resource-optimisation-handover,
    reduce-load-in-serving-cell,
    partial-handover,
    unknown-new-eNB-UE-X2AP-ID,
    unknown-old-eNB-UE-X2AP-ID,
    unknown-pair-of-UE-X2AP-ID,
    ho-target-not-allowed,
    tx2relocoverall-expiry,
    trelocprep-expiry,
    cell-not-available,
    no-radio-resources-available-in-target-cell,
    invalid-MME-GroupID,
    unknown-MME-Code,
    encryption-and-or-integrity-protection-algorithms-not-supported,
    reportCharacteristicsEmpty,
    noReportPeriodicity,
    existingMeasurementID,
    unknown-eNB-Measurement-ID,
    measurement-temporarily-not-available,
    unspecified,
    load-balancing,
    handover-optimisation,
    value-out-of-allowed-range,
    multiple-E-RAB-ID-instances,
    switch-off-ongoing,
    not-supported-QCI-value,
    measurement-not-supported-for-the-object,
    tDCoverall-expiry,
    tDCprep-expiry,
    action-desirable-for-radio-reasons,
    reduce-load,
    resource-optimisation,
    time-critical-action,
```

```
target-not-allowed,
    no-radio-resources-available,
    invalid-OoS-combination,
    encryption-algorithms-not-aupported,
    procedure-cancelled,
    rRM-purpose,
    improve-user-bit-rate,
    user-inactivity,
    radio-connection-with-UE-lost,
    failure-in-the-radio-interface-procedure,
    bearer-option-not-supported
CauseTransport ::= ENUMERATED {
    transport-resource-unavailable,
    unspecified,
CellBasedMDT::= SEQUENCE {
    cellIdListforMDT
                        CellIdListforMDT,
                        ProtocolExtensionContainer { {CellBasedMDT-ExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
CellBasedMDT-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
CellCapacityClassValue ::= INTEGER (1..100, ...)
CellDeploymentStatusIndicator ::= ENUMERATED {pre-change-notification, ...}
CellIdListforMDT ::= SEQUENCE (SIZE(1..maxnoofCellIDforMDT)) OF ECGI
CellReplacingInfo ::= SEQUENCE {
    replacingCellsList
                                    ReplacingCellsList,
    iE-Extensions
                                    ProtocolExtensionContainer { { CellReplacingInfo-ExtIEs}}
                                                                                                 OPTIONAL,
    . . .
CellReplacingInfo-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
CellReportingIndicator ::= ENUMERATED {stop-request, ... }
Cell-Size ::= ENUMERATED {verysmall, small, medium, large, ... }
CellType ::= SEQUENCE {
    cell-Size
                                    Cell-Size,
    iE-Extensions
                                    ProtocolExtensionContainer { { CellType-ExtIEs}}
                                                                                         OPTIONAL,
```

```
CellType-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
CoMPHypothesisSet ::= SEOUENCE (SIZE(1...maxnoofCoMPCells)) OF CoMPHypothesisSetItem
CoMPHypothesisSetItem ::= SEQUENCE {
    coMPCellID
    coMPHypothesis
                                    BIT STRING (SIZE(6..4400, ...)),
                                    ProtocolExtensionContainer { { CoMPHypothesisSetItem-ExtIEs} } OPTIONAL,
   iE-Extensions
    . . .
COMPHypothesisSetItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
CoMPInformation ::= SEQUENCE {
    coMPInformationItem
                                            CoMPInformationItem,
    coMPInformationStartTime
                                            CoMPInformationStartTime,
                                            ProtocolExtensionContainer { { CoMPInformation-ExtIEs} } OPTIONAL,
   iE-Extensions
CoMPInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
CoMPInformationItem ::= SEQUENCE (SIZE(1..maxnoofCoMPHypothesisSet)) OF
    SEQUENCE {
                                            CoMPHypothesisSet,
       coMPHypothesisSet
                                            BenefitMetric,
       benefitMetric
                                            ProtocolExtensionContainer { { COMPInformationItem-ExtIEs} } OPTIONAL,
       iE-Extensions
CoMPInformationItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
CoMPInformationStartTime ::= SEQUENCE (SIZE(0..1)) OF
    SEQUENCE {
       startSFN
                                            INTEGER (0..1023, ...),
       startSubframeNumber
                                            INTEGER (0..9, ...),
                                            ProtocolExtensionContainer { { CoMPInformationStartTime-ExtIEs} } OPTIONAL,
       iE-Extensions
CompinformationStartTime-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
```

```
CompositeAvailableCapacity ::= SEQUENCE {
    cellCapacityClassValue
                                                     CellCapacityClassValue
                                                                                         OPTIONAL.
    capacityValue
                                                     CapacityValue,
    iE-Extensions
                                                     ProtocolExtensionContainer { { CompositeAvailableCapacity-ExtIEs} } OPTIONAL,
CompositeAvailableCapacity-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
CompositeAvailableCapacityGroup ::= SEQUENCE {
    dL-CompositeAvailableCapacity
                                                     CompositeAvailableCapacity,
    uL-CompositeAvailableCapacity
                                                     CompositeAvailableCapacity,
    iE-Extensions
                                                     ProtocolExtensionContainer { { CompositeAvailableCapacityGroup-ExtIEs} } OPTIONAL,
    . . .
CompositeAvailableCapacityGroup-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
Correlation-ID ::= OCTET STRING (SIZE (4))
COUNTvalue ::= SEQUENCE {
    pDCP-SN
                            PDCP-SN,
   hFN
                            HFN,
                            ProtocolExtensionContainer { { COUNTvalue-ExtIEs} } OPTIONAL,
    iE-Extensions
COUNTvalue-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
COUNTValueExtended ::= SEQUENCE {
    pDCP-SNExtended
                            PDCP-SNExtended,
   hFNModified
                            HFNModified,
    iE-Extensions
                            ProtocolExtensionContainer { { COUNTValueExtended-ExtIEs} } OPTIONAL,
    . . .
COUNTValueExtended-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
COUNTvaluePDCP-SNlength18 ::= SEQUENCE {
    pDCP-SNlength18
                            PDCP-SNlength18,
   hFNforPDCP-SNlength18 HFNforPDCP-SNlength18,
                            ProtocolExtensionContainer { { COUNTvaluePDCP-SNlength18-ExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
```

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```
COUNTvaluePDCP-SNlength18-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
CoverageModificationList ::= SEOUENCE (SIZE (1..maxCellineNB)) OF CoverageModification-Item
CoverageModification-Item ::= SEQUENCE {
    eCGI
    coverageState
                                    INTEGER (0..15, ...),
    cellDeploymentStatusIndicator CellDeploymentStatusIndicator
                                                                            OPTIONAL,
    cellReplacingInfo
                                    CellReplacingInfo
                                                                            OPTIONAL,
-- Included in case the Cell Deployment Status Indicator IE is present
CriticalityDiagnostics ::= SEQUENCE {
    procedureCode
                                    ProcedureCode
                                                                                                          OPTIONAL,
    triggeringMessage
                                    TriggeringMessage
                                                                                                          OPTIONAL,
    procedureCriticality
                                    Criticality
                                                                                                          OPTIONAL,
    iEsCriticalityDiagnostics
                                    CriticalityDiagnostics-IE-List
                                                                                                          OPTIONAL,
    iE-Extensions
                                    ProtocolExtensionContainer { {CriticalityDiagnostics-ExtIEs} }
                                                                                                          OPTIONAL,
CriticalityDiagnostics-ExtIES X2AP-PROTOCOL-EXTENSION ::= {
CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE (1..maxNrOfErrors)) OF
    SEQUENCE {
       iECriticality
                                Criticality,
       iE-ID
                                ProtocolIE-ID,
       typeOfError
                                TypeOfError,
                                ProtocolExtensionContainer { {CriticalityDiagnostics-IE-List-ExtIEs} } OPTIONAL,
       iE-Extensions
CriticalityDiagnostics-IE-List-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
CRNTI ::= BIT STRING (SIZE (16))
CSGMembershipStatus ::= ENUMERATED {
    member,
    not-member
CSG-Id ::= BIT STRING (SIZE (27))
CSIReportList ::= SEQUENCE (SIZE(1..maxUEReport)) OF
    SEQUENCE {
       uEID
                                        UEID,
```

```
CSIReportPerCSIProcess,
        cSIReportPerCSIProcess
       iE-Extensions
                                        ProtocolExtensionContainer { { CSIReportList-ExtIEs} } OPTIONAL,
CSIReportList-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
CSIReportPerCSIProcess ::= SEQUENCE (SIZE(1.. maxCSIProcess)) OF
    SEQUENCE {
        cSIProcessConfigurationIndex
                                        INTEGER (1..7, ...),
        cSIReportPerCSIProcessItem
                                        CSIReportPerCSIProcessItem,
       iE-Extensions
                                        ProtocolExtensionContainer { { CSIReportPerCSIProcess-ExtIEs} } OPTIONAL,
CSIReportPerCSIProcess-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
CSIReportPerCSIProcessItem ::= SEQUENCE (SIZE(1.. maxCSIReport)) OF
    SEQUENCE {
       rI
                                        INTEGER (1..8, ...),
       widebandCQI
                                        WidebandCQI,
        subbandSize
                                        SubbandSize,
        subbandCOIList
                                        SubbandCOIList OPTIONAL,
                                        ProtocolExtensionContainer { { CSIReportPerCSIProcessItem-ExtIEs} } OPTIONAL,
       iE-Extensions
CSIReportPerCSIProcessItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
CyclicPrefixDL ::= ENUMERATED {
   normal,
    extended,
CyclicPrefixUL ::= ENUMERATED {
    normal,
    extended,
DeactivationIndication::= ENUMERATED {
    deactivated,
```

```
DL-ABS-status::= INTEGER (0..100)
DL-Forwarding ::= ENUMERATED {
    dL-forwardingProposed,
DL-GBR-PRB-usage::= INTEGER (0..100)
DL-non-GBR-PRB-usage::= INTEGER (0..100)
DL-Total-PRB-usage::= INTEGER (0..100)
DynamicDLTransmissionInformation ::= CHOICE {
    naics-active
                            DynamicNAICSInformation,
                            NULL,
    naics-inactive
DynamicNAICSInformation ::= SEQUENCE {
    transmissionModes
                                        BIT STRING (SIZE(8))
                                                                                                         OPTIONAL,
    pB-information
                                        INTEGER(0..3)
                                                                                                         OPTIONAL,
    pA-list
                                        SEQUENCE (SIZE(0..maxnoofPA)) OF PA-Values,
                                        ProtocolExtensionContainer { {DynamicNAICSInformation-ExtIEs} } OPTIONAL,
    iE-Extensions
DynamicNAICSInformation-ExtlEs X2AP-PROTOCOL-EXTENSION ::= {
EARFCN ::= INTEGER (0..maxEARFCN)
EARFCNExtension ::= INTEGER(maxEARFCNPlusOne..newmaxEARFCN, ...)
ECGI ::= SEQUENCE {
    pLMN-Identity
                                PLMN-Identity,
    eUTRANcellIdentifier
                                EUTRANCellIdentifier,
                                ProtocolExtensionContainer { {ECGI-ExtIEs} } OPTIONAL,
    iE-Extensions
ECGI-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
EnhancedRNTP ::= SEQUENCE {
    enhancedRNTPBitmap
                                BIT STRING (SIZE(12..8800, ...)),
    rNTP-High-Power-Threshold
                                RNTP-Threshold,
    enhancedRNTPStartTime
                                EnhancedRNTPStartTime OPTIONAL,
    iE-Extensions
                                ProtocolExtensionContainer { { EnhancedRNTP-ExtIEs} } OPTIONAL,
```

```
EnhancedRNTP-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
EnhancedRNTPStartTime ::= SEQUENCE {
       startSFN
                  INTEGER (0..1023, ...),
       startSubframeNumber INTEGER (0..9, ...),
       iE-Extensions
                      ProtocolExtensionContainer { { EnhancedRNTPStartTime-ExtIEs} } OPTIONAL,
EnhancedRNTPStartTime-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
ENB-ID ::= CHOICE {
   macro-eNB-ID BIT STRING (SIZE (20)),
   home-eNB-ID BIT STRING (SIZE (28)),
EncryptionAlgorithms ::= BIT STRING (SIZE (16, ...))
EPLMNs ::= SEOUENCE (SIZE(1..maxnoofEPLMNs)) OF PLMN-Identity
E-RAB-ID ::= INTEGER (0..15, ...)
E-RAB-Level-OoS-Parameters ::= SEQUENCE {
    allocationAndRetentionPriority AllocationAndRetentionPriority,
   gbrQosInformation GBR-QosInformation OPTIONAL, iE-Extensions ProtocolExtensionContainer { E-RAB-Level-QoS-Parameters-ExtIEs} } OPTIONAL,
   iE-Extensions
E-RAB-Level-OoS-Parameters-ExtIES X2AP-PROTOCOL-EXTENSION ::= {
E-RAB-List ::= SEQUENCE (SIZE(1.. maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RAB-ItemIEs} }
E-RAB-ItemIEs X2AP-PROTOCOL-IES ::= {
   TYPE E-RAB-Item
                                                                 PRESENCE mandatory },
   . . .
E-RAB-Item ::= SEQUENCE {
   e-RAB-ID
                          E-RAB-ID,
    cause
   iE-Extensions
                              ProtocolExtensionContainer { {E-RAB-Item-ExtIEs} } OPTIONAL,
```

```
E-RAB-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
EUTRA-Mode-Info ::= CHOICE {
    fDD
           FDD-Info,
    +DD
           TDD-Info,
    . . .
EUTRANCellIdentifier ::= BIT STRING (SIZE (28))
EUTRANTraceID
                    ::= OCTET STRING (SIZE (8))
EventType ::= ENUMERATED{
    change-of-serving-cell,
    . . .
ExpectedUEBehaviour ::= SEQUENCE {
    expectedActivity
                            ExpectedUEActivityBehaviour OPTIONAL,
    expectedHOInterval
                            ExpectedHOInterval
                                                        OPTIONAL,
    iE-Extensions
                            ProtocolExtensionContainer { { ExpectedUEBehaviour-ExtIEs} } OPTIONAL,
ExpectedUEBehaviour-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
ExpectedUEActivityBehaviour ::= SEQUENCE {
    expectedActivityPeriod
                                            ExpectedActivityPeriod
                                                                                     OPTIONAL,
    expectedIdlePeriod
                                            ExpectedIdlePeriod
                                                                                     OPTIONAL,
    sourceofUEActivityBehaviourInformation SourceOfUEActivityBehaviourInformation OPTIONAL,
                        ProtocolExtensionContainer { { ExpectedUEActivityBehaviour-ExtIEs} } OPTIONAL,
ExpectedUEActivityBehaviour-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
ExpectedActivityPeriod ::= INTEGER (1..30|40|50|60|80|100|120|150|180|181,...)
ExpectedIdlePeriod ::= INTEGER (1..30|40|50|60|80|100|120|150|180|181,...)
ExpectedHOInterval ::= ENUMERATED {
    sec15, sec30, sec60, sec90, sec120, sec180, long-time,
ExtendedULInterferenceOverloadInfo ::= SEQUENCE {
```

```
associatedSubframes
                                         BIT STRING (SIZE (5)),
   extended-ul-InterferenceOverloadIndication UL-InterferenceOverloadIndication,
   iE-Extensions
                                         ProtocolExtensionContainer { { ExtendedULInterferenceOverloadInfo-ExtIEs} } OPTIONAL,
ExtendedULInterferenceOverloadInfo-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
-- F
FDD-Info ::= SEOUENCE {
   uL-EARFCN
                               EARFCN,
   dL-EARFCN
                               EARFCN.
   uL-Transmission-Bandwidth
                               Transmission-Bandwidth,
   dL-Transmission-Bandwidth
                               Transmission-Bandwidth,
   iE-Extensions
                           ProtocolExtensionContainer { {FDD-Info-ExtIEs} } OPTIONAL,
   . . .
FDD-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
                              CRITICALITY reject EXTENSION EARFCNExtension
     ID id-UL-EARFCNExtension
                                                                           PRESENCE optional}
     ID id-DL-EARFCNExtension
                              CRITICALITY reject EXTENSION EARFCNExtension
                                                                           PRESENCE optional}
     PRESENCE optional |
   PRESENCE optional },
ForbiddenInterRATs ::= ENUMERATED {
   all,
   geran,
   utran,
   cdma2000,
   . . . ,
   geranandutran,
   cdma2000andutran
ForbiddenTAs ::= SEQUENCE (SIZE(1.. maxnoofEPLMNsPlusOne)) OF ForbiddenTAs-Item
ForbiddenTAs-Item ::= SEQUENCE {
   pLMN-Identity
                    PLMN-Identity,
   forbiddenTACs
                    ForbiddenTACs,
   iE-Extensions
                    ProtocolExtensionContainer { {ForbiddenTAs-Item-ExtIEs} } OPTIONAL,
ForbiddenTAs-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
ForbiddenTACs ::= SEQUENCE (SIZE(1..maxnoofForbTACs)) OF TAC
```

```
ForbiddenLAs ::= SEOUENCE (SIZE(1..maxnoofEPLMNsPlusOne)) OF ForbiddenLAs-Item
ForbiddenLAs-Item ::= SEQUENCE {
    pLMN-Identity
                        PLMN-Identity,
    forbiddenLACs
                        ForbiddenLACs,
    iE-Extensions
                        ProtocolExtensionContainer { {ForbiddenLAs-Item-ExtIEs} } OPTIONAL,
ForbiddenLAs-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
ForbiddenLACs ::= SEOUENCE (SIZE(1..maxnoofForbLACs)) OF LAC
Fourframes ::= BIT STRING (SIZE (24))
FregBandIndicator ::= INTEGER (1..256, ...)
FreqBandIndicatorPriority ::= ENUMERATED {
    not-broadcasted,
    broadcasted,
    . . .
GBR-OosInformation ::= SEQUENCE {
    e-RAB-MaximumBitrateDL
                                    BitRate,
    e-RAB-MaximumBitrateUL
                                    BitRate,
    e-RAB-GuaranteedBitrateDL
                                    BitRate,
    e-RAB-GuaranteedBitrateUL
                                    BitRate,
                                    ProtocolExtensionContainer { GBR-QosInformation-ExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
GBR-OosInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
GlobalENB-ID ::= SEQUENCE {
                            PLMN-Identity,
    pLMN-Identity
    eNB-ID
                            ENB-ID,
    iE-Extensions
                            ProtocolExtensionContainer { GlobalENB-ID-ExtIEs} } OPTIONAL,
GlobalENB-ID-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
GTPtunnelEndpoint ::= SEQUENCE {
    transportLayerAddress
                                    TransportLayerAddress,
```

```
gTP-TEID
                                    GTP-TEI,
   iE-Extensions
                                    ProtocolExtensionContainer { GTPtunnelEndpoint-ExtIEs} } OPTIONAL,
GTPtunnelEndpoint-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
GTP-TEI
                       ::= OCTET STRING (SIZE (4))
GUGroupIDList
                    ::= SEQUENCE (SIZE (1..maxPools)) OF GU-Group-ID
                    ::= SEQUENCE {
GU-Group-ID
    pLMN-Identity
                       PLMN-Identity,
   mME-Group-ID
                        MME-Group-ID,
                        ProtocolExtensionContainer { {GU-Group-ID-ExtIEs} } OPTIONAL,
   iE-Extensions
    . . .
GU-Group-ID-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
GUMMEI
                ::= SEOUENCE {
    qU-Group-ID
                    GU-Group-ID,
    mME-Code
                        MME-Code,
                                    ProtocolExtensionContainer { GUMMEI-ExtIEs} } OPTIONAL,
    iE-Extensions
GUMMEI-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
-- H
HandoverReportType ::= ENUMERATED {
    hoTooEarly,
   hoToWrongCell,
    interRATpingpong
HandoverRestrictionList ::= SEQUENCE {
    servingPLMN
                                PLMN-Identity,
    equivalentPLMNs
                                EPLMNs
                                                                                                   OPTIONAL,
    forbiddenTAs
                                ForbiddenTAs
                                                                                                  OPTIONAL,
    forbiddenLAs
                                ForbiddenLAs
                                                                                                  OPTIONAL,
```

```
forbiddenInterRATs
                                ForbiddenInterRATs
                                                                                                   OPTIONAL,
    iE-Extensions
                                ProtocolExtensionContainer { {HandoverRestrictionList-ExtIEs} }
                                                                                                  OPTIONAL,
HandoverRestrictionList-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
HFN ::= INTEGER (0..1048575)
HFNModified ::= INTEGER (0..131071)
HFNforPDCP-SNlength18 ::= INTEGER (0..16383)
HWLoadIndicator ::= SEQUENCE {
    dLHWLoadIndicator
                                LoadIndicator,
    uLHWLoadIndicator
                                LoadIndicator,
                                ProtocolExtensionContainer { { HWLoadIndicator-ExtIEs} } OPTIONAL,
    iE-Extensions
HWLoadIndicator-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
-- I
IntegrityProtectionAlgorithms ::= BIT STRING (SIZE (16, ...))
InterfacesToTrace ::= BIT STRING (SIZE (8))
InvokeIndication ::= ENUMERATED{
    abs-information,
   naics-information-start,
    naics-information-stop
-- J
Key-eNodeB-Star ::= BIT STRING (SIZE(256))
-- L
LAC
                    ::= OCTET STRING (SIZE (2)) --(EXCEPT ('0000'H|'FFFE'H))
LastVisitedCell-Item ::= CHOICE {
                                    LastVisitedEUTRANCellInformation,
    e-UTRAN-Cell
    uTRAN-Cell
                                    LastVisitedUTRANCellInformation,
    gERAN-Cell
                                    LastVisitedGERANCellInformation,
    . . .
```

```
LastVisitedEUTRANCellInformation ::= SEOUENCE {
   global-Cell-ID
   cellType
                                CellType,
                                Time-UE-StayedInCell,
   time-UE-StayedInCell
   iE-Extensions
                                ProtocolExtensionContainer { { LastVisitedEUTRANCellInformation-ExtIEs} } OPTIONAL,
LastVisitedEUTRANCellInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
-- Extension for Rel-11 to support enhanced granularity for time UE stayed in cell --
     { ID id-HO-cause
                                                  CRITICALITY ignore EXTENSION Cause
                                                                                                   PRESENCE optional },
   . . .
LastVisitedGERANCellInformation ::= CHOICE {
   undefined
LastVisitedUTRANCellInformation ::= OCTET STRING
LHN-ID ::= OCTET STRING(SIZE (32..256))
Links-to-log ::= ENUMERATED {uplink, downlink, both-uplink-and-downlink, ...}
LoadIndicator ::= ENUMERATED {
   lowLoad,
   mediumLoad,
   highLoad,
   overLoad,
LocationReportingInformation ::= SEQUENCE {
   eventType
                  EventType,
   reportArea
                  ReportArea,
   iE-Extensions
                     ProtocolExtensionContainer { {LocationReportingInformation-ExtIEs} } OPTIONAL,
LocationReportingInformation-ExtlEs X2AP-PROTOCOL-EXTENSION ::={
-- M
M1PeriodicReporting ::= SEQUENCE {
   reportInterval
                             ReportIntervalMDT,
   reportAmount
                             ReportAmountMDT,
   iE-Extensions
                             ProtocolExtensionContainer { { MlPeriodicReporting-ExtIEs} } OPTIONAL,
   . . .
```

```
M1PeriodicReporting-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
MlReportingTrigger::= ENUMERATED{
   periodic,
   a2eventtriggered,
   a2eventtriggered-periodic
M1ThresholdEventA2 ::= SEOUENCE {
   measurementThreshold
                              MeasurementThresholdA2,
   iE-Extensions
                              ProtocolExtensionContainer { { MlThresholdEventA2-ExtIEs} } OPTIONAL,
M1ThresholdEventA2-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
M3Configuration ::= SEQUENCE {
   m3period
   iE-Extensions
                      ProtocolExtensionContainer { { M3Configuration-ExtIEs} } OPTIONAL,
M3Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
   . . .
M3period ::= ENUMERATED {ms100, ms1000, ms10000, ... }
M4Configuration ::= SEQUENCE {
   m4period
                     M4period,
   m4-links-to-log Links-to-log,
                      iE-Extensions
    . . .
M4Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
M4period ::= ENUMERATED {ms1024, ms2048, ms5120, ms10240, min1, ... }
M5Configuration ::= SEQUENCE
   m5period
                      M5period,
   m5-links-to-log
                     Links-to-log,
   iE-Extensions
                      ProtocolExtensionContainer { { M5Configuration-ExtIEs} } OPTIONAL,
    . . .
```

```
M5Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
M5period ::= ENUMERATED {ms1024, ms2048, ms5120, ms10240, min1, ... }
M6Configuration ::= SEQUENCE {
    m6report-interval M6report-interval,
    m6delay-threshold M6delay-threshold OPTIONAL,
-- This IE shall be present if the M6 Links to log IE is set to 'uplink' or to 'both-uplink-and-downlink' --
    m6-links-to-log
                       Links-to-log,
   iE-Extensions
                       ProtocolExtensionContainer { { M6Configuration-ExtIEs} } OPTIONAL,
M6Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
M6report-interval ::= ENUMERATED { ms1024, ms2048, ms5120, ms10240, ... }
M6delay-threshold ::= ENUMERATED { ms30, ms40, ms50, ms60, ms70, ms80, ms90, ms100, ms150, ms300, ms500, ms750, ... }
M7Configuration ::= SEQUENCE {
    m7period
                       M7period,
   m7-links-to-log
                       Links-to-log,
                       ProtocolExtensionContainer { { M7Configuration-ExtIEs} } OPTIONAL,
   iE-Extensions
M7Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
M7period ::= INTEGER(1..60, ...)
ManagementBasedMDTallowed ::= ENUMERATED {allowed, ...}
Masked-IMEISV ::= BIT STRING (SIZE (64))
                   ::= ENUMERATED {
MDT-Activation
    immediate-MDT-only,
    immediate-MDT-and-Trace,
MDT-Configuration ::= SEQUENCE
    mdt-Activation
                                MDT-Activation,
    areaScopeOfMDT
                                AreaScopeOfMDT,
    measurementsToActivate
                                MeasurementsToActivate,
    mlreportingTrigger
                                MlReportingTrigger,
    m1thresholdeventA2
                                M1ThresholdEventA2
                                                            OPTIONAL,
```

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```
-- Included in case of event-triggered, or event-triggered periodic reporting for measurement M1
    mlperiodicReporting
                               MlPeriodicReporting
                                                           OPTIONAL.
-- Included in case of periodic, or event-triggered periodic reporting for measurement M1
                               ProtocolExtensionContainer { { MDT-Configuration-ExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
MDT-Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    {ID id-M3Configuration
                                       CRITICALITY ignore EXTENSION M3Configuration
                                                                                            PRESENCE conditional}
    ID id-M4Configuration
                                       CRITICALITY ignore EXTENSION M4Configuration
                                                                                            PRESENCE conditional }
    ID id-M5Configuration
                                       CRITICALITY ignore EXTENSION M5Configuration
                                                                                            PRESENCE conditional)
    ID id-MDT-Location-Info
                                       CRITICALITY ignore EXTENSION MDT-Location-Info
                                                                                            PRESENCE optional } |
    ID id-SignallingBasedMDTPLMNList CRITICALITY ignore EXTENSION MDTPLMNList
                                                                                            PRESENCE optional }
                                                                                            PRESENCE conditional } |
    ID id-M6Configuration
                                       CRITICALITY ignore EXTENSION M6Configuration
    {ID id-M7Configuration
                                       CRITICALITY ignore EXTENSION M7Configuration
                                                                                            PRESENCE conditional },
MDTPLMNList ::= SEQUENCE (SIZE(1..maxnoofMDTPLMNs)) OF PLMN-Identity
MDT-Location-Info ::= BIT STRING (SIZE (8))
Measurement-ID ::= INTEGER (1..4095, ...)
MeasurementsToActivate::= BIT STRING (SIZE (8))
MeasurementThresholdA2 ::= CHOICE {
    threshold-RSRP
                               Threshold-RSRP,
    threshold-RSRO
                               Threshold-RSRO,
MeNBtoSeNBContainer ::= OCTET STRING
MME-Group-ID
               ::= OCTET STRING (SIZE (2))
MME-Code
               ::= OCTET STRING (SIZE (1))
MBMS-Service-Area-Identity-List ::= SEOUENCE (SIZE(1.. maxnoofMBMSServiceAreaIdentities)) OF MBMS-Service-Area-Identity
MBMS-Service-Area-Identity ::= OCTET STRING (SIZE (2))
MBSFN-Subframe-Infolist::= SEQUENCE (SIZE(1.. maxnoofMBSFN)) OF MBSFN-Subframe-Info
MBSFN-Subframe-Info ::= SEOUENCE {
    radioframeAllocationPeriod
                                    RadioframeAllocationPeriod,
    radioframeAllocationOffset
                                    RadioframeAllocationOffset,
    subframeAllocation
                                    SubframeAllocation,
    iE-Extensions
                           ProtocolExtensionContainer { { MBSFN-Subframe-Info-ExtIEs } }
MBSFN-Subframe-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
```

```
MobilityParametersModificationRange ::= SEOUENCE {
    handoverTriggerChangeLowerLimit
                                        INTEGER (-20..20),
    handoverTriggerChangeUpperLimit
                                        INTEGER (-20..20),
MobilityParametersInformation ::= SEQUENCE {
    handoverTriggerChange
                                  INTEGER (-20..20),
MultibandInfoList ::= SEQUENCE (SIZE(1..maxnoofBands)) OF BandInfo
BandInfo ::= SEQUENCE {
    fregBandIndicator
                            FregBandIndicator,
                            ProtocolExtensionContainer { { BandInfo-ExtIEs } } OPTIONAL,
    iE-Extensions
BandInfo-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
Neighbour-Information ::= SEQUENCE (SIZE (0..maxnoofNeighbours)) OF SEQUENCE {
                                ECGI,
    pCI
                                PCI,
    eARFCN
                                EARFCN,
    iE-Extensions
                         ProtocolExtensionContainer { {Neighbour-Information-ExtIEs} } OPTIONAL,
Neighbour-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
     ID id-NeighbourTAC
                                CRITICALITY ignore EXTENSION TAC
                                                                                PRESENCE optional } |
    ID id-eARFCNExtension
                                CRITICALITY reject EXTENSION EARFCNExtension PRESENCE optional },
    . . .
NextHopChainingCount ::= INTEGER (0..7)
Number-of-Antennaports ::= ENUMERATED {
        an1,
        an2,
        an4,
-- 0
OffsetOfNbiotChannelNumberToEARFCN ::= ENUMERATED {
```

```
minusTen,
        minusNine,
        minusEight,
        minusSeven,
        minusSix,
        minusFive,
        minusFour,
        minusThree,
        minusTwo,
        minusOne,
        minusZeroDotFive,
        zero,
        one,
        two,
        three,
        four,
        five,
        six,
        seven,
        eight,
        nine,
        . . .
Oneframe ::= BIT STRING (SIZE (6))
-- P
PA-Values ::= ENUMERATED {
    dB-6,
    dB-4dot77,
    dB-3,
    dB-1dot77,
    dB0,
    dB1,
    dB2,
    dB3,
    . . .
PDCP-SN ::= INTEGER (0..4095)
PDCP-SNExtended ::= INTEGER (0..32767)
PDCP-SNlength18 ::= INTEGER (0..262143)
PCI ::= INTEGER (0..503, ...)
PLMN-Identity ::= OCTET STRING (SIZE(3))
Port-Number ::= OCTET STRING (SIZE (2))
PRACH-Configuration ::= SEQUENCE {
    rootSequenceIndex
                                             INTEGER (0..837),
```

```
zeroCorrelationIndex
                                            INTEGER (0..15),
    highSpeedFlag
                                            BOOLEAN,
    prach-FregOffset
                                            INTEGER (0..94),
    prach-ConfigIndex
                                            INTEGER (0..63)
                                                                 OPTIONAL, -- present for TDD --
    iE-Extensions
                                            ProtocolExtensionContainer { {PRACH-Configuration-ExtIEs} } OPTIONAL,
PRACH-Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
Pre-emptionCapability ::= ENUMERATED {
    shall-not-trigger-pre-emption,
    may-trigger-pre-emption
Pre-emptionVulnerability ::= ENUMERATED {
    not-pre-emptable,
    pre-emptable
PriorityLevel
                            ::= INTEGER { spare (0), highest (1), lowest (14), no-priority (15) } (0..15)
ProSeAuthorized ::= SEQUENCE {
    proSeDirectDiscovery
                                ProSeDirectDiscovery
                                                                 OPTIONAL,
    proSeDirectCommunication
                                ProSeDirectCommunication
                                                                 OPTIONAL,
    iE-Extensions
                                ProtocolExtensionContainer { {ProSeAuthorized-ExtIEs} } OPTIONAL,
ProSeAuthorized-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-ProSeUEtoNetworkRelaying
                                        CRITICALITY ignore EXTENSION ProSeUEtoNetworkRelaying
                                                                                                 PRESENCE optional },
    . . .
ProSeDirectDiscovery ::= ENUMERATED {
    authorized,
    not-authorized,
    . . .
ProSeDirectCommunication ::= ENUMERATED {
    authorized,
    not-authorized,
ProSeUEtoNetworkRelaying ::= ENUMERATED {
    authorized,
    not-authorized,
    . . .
```

```
-- Q
OCI ::= INTEGER (0..255)
-- R
RadioframeAllocationOffset ::= INTEGER (0..7, ...)
RadioframeAllocationPeriod ::= ENUMERATED{
    n1,
    n2,
    n4,
    n8,
    n16,
    n32,
RadioResourceStatus ::= SEQUENCE {
    dL-GBR-PRB-usage
                                                DL-GBR-PRB-usage,
    uL-GBR-PRB-usage
                                                UL-GBR-PRB-usage,
    dL-non-GBR-PRB-usage
                                                DL-non-GBR-PRB-usage,
    uL-non-GBR-PRB-usage
                                                UL-non-GBR-PRB-usage,
    dL-Total-PRB-usage
                                                DL-Total-PRB-usage,
    uL-Total-PRB-usage
                                                UL-Total-PRB-usage,
    iE-Extensions
                                                ProtocolExtensionContainer { {RadioResourceStatus-ExtIEs} } OPTIONAL,
RadioResourceStatus-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
ReceiveStatusofULPDCPSDUs ::= BIT STRING (SIZE(4096))
ReceiveStatusOfULPDCPSDUsExtended ::= BIT STRING (SIZE(1..16384))
ReceiveStatusOfULPDCPSDUsPDCP-SNlength18 ::= BIT STRING (SIZE(1..131072))
Registration-Request
                       ::= ENUMERATED {
    start,
    stop,
    partial-stop,
    add
RelativeNarrowbandTxPower ::= SEQUENCE {
    rNTP-PerPRB
                                        BIT STRING (SIZE(6..110, ...)),
    rNTP-Threshold
                                        RNTP-Threshold,
    numberOfCellSpecificAntennaPorts
                                        ENUMERATED {one, two, four, ...},
    р-В
                                        INTEGER (0..3,...),
```

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pDCCH-InterferenceImpact
                                        INTEGER (0..4,...),
    iE-Extensions
                                        ProtocolExtensionContainer { { RelativeNarrowbandTxPower-ExtIEs} } OPTIONAL,
RelativeNarrowbandTxPower-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-enhancedRNTP
                           CRITICALITY ignore EXTENSION EnhancedRNTP
                                                                             PRESENCE optional },
ReplacingCellsList ::= SEQUENCE (SIZE(0.. maxCellineNB)) OF ReplacingCellsList-Item
ReplacingCellsList-Item ::= SEQUENCE {
    eCGI
                    ECGI,
    . . .
ReportAmountMDT ::= ENUMERATED{r1, r2, r4, r8, r16, r32, r64, rinfinity}
ReportArea ::= ENUMERATED{
    ecgi,
    . . .
ReportCharacteristics ::= BIT STRING (SIZE (32))
ReportingPeriodicityCSIR ::= ENUMERATED {
   ms5,
    ms10,
   ms20,
    ms40,
    ms80,
ReportingPeriodicityRSRPMR ::= ENUMERATED {
    one-hundred-20-ms,
    two-hundred-40-ms,
    four-hundred-80-ms,
    six-hundred-40-ms,
ReportIntervalMDT ::= ENUMERATED {ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, min1, min6, min12, min30, min60}
ResumeID
          ::= CHOICE {
    non-truncated BIT STRING(SIZE(40)),
    truncated
                    BIT STRING(SIZE(24)),
RNTP-Threshold ::= ENUMERATED {
    minusInfinity,
    minusEleven,
```

```
minusTen,
    minusNine,
    minusEight,
    minusSeven,
    minusSix,
    minusFive,
    minusFour,
    minusThree,
    minusTwo,
    minusOne,
    zero,
    one,
    two,
    three,
RRC-Context ::= OCTET STRING
RRCConnReestabIndicator ::= ENUMERATED {
    reconfigurationFailure, handoverFailure, otherFailure, ...
-- The values correspond to the values of ReestablishmentCause reported from the UE in the RRCConnectionReestablishmentRequest, as defined in TS
36.331 [9]
RRCConnSetupIndicator::= ENUMERATED {
    rrcConnSetup,
RSRPMeasurementResult ::= SEQUENCE (SIZE(1..maxCellReport)) OF
    SEQUENCE {
       rSRPCellID
                                        ECGI,
       rSRPMeasured
                                        INTEGER (0..97, ...),
       iE-Extensions
                                        ProtocolExtensionContainer { { RSRPMeasurementResult-ExtIEs} } OPTIONAL,
RSRPMeasurementResult-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
RSRPMRList ::= SEQUENCE (SIZE(1..maxUEReport)) OF
    SEQUENCE {
       rSRPMeasurementResult
                                        RSRPMeasurementResult,
                                        ProtocolExtensionContainer { { RSRPMRList-ExtIEs} } OPTIONAL,
        iE-Extensions
        . . .
RSRPMRList-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
                    CRITICALITY ignore EXTENSION UEID
                                                             PRESENCE optional },
    { ID id-UEID
    . . .
```

```
-- S
S1TNLLoadIndicator ::= SEQUENCE {
    dLS1TNLLoadIndicator
                                    LoadIndicator,
    uLS1TNLLoadIndicator
                                    LoadIndicator.
                                    ProtocolExtensionContainer { { S1TNLLoadIndicator-ExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
S1TNLLoadIndicator-ExtIES X2AP-PROTOCOL-EXTENSION ::= {
SCGChangeIndication ::= ENUMERATED {pDCPCountWrapAround, pSCellChange, other, ...}
SeNBSecurityKey ::= BIT STRING (SIZE(256))
SeNBtoMeNBContainer ::= OCTET STRING
ServedCells ::= SEQUENCE (SIZE (1.. maxCellineNB)) OF SEQUENCE {
    servedCellInfo
                                    ServedCell-Information,
   neighbour-Info
                                    Neighbour-Information
                                                                    OPTIONAL,
                                    ProtocolExtensionContainer { {ServedCell-ExtIEs} } OPTIONAL,
   iE-Extensions
ServedCell-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
ServedCell-Information ::= SEQUENCE {
    pCI
                        PCI,
                        ECGI,
    cellId
    tAC
                       TAC,
                        BroadcastPLMNs-Item,
    broadcastPLMNs
    eUTRA-Mode-Info
                        EUTRA-Mode-Info,
                        ProtocolExtensionContainer { {ServedCell-Information-ExtIEs} } OPTIONAL,
    iE-Extensions
ServedCell-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
     ID id-Number-of-Antennaports
                                        CRITICALITY ignore EXTENSION Number-of-Antennaports
                                                                                                        PRESENCE optional }
     ID id-PRACH-Configuration
                                        CRITICALITY ignore EXTENSION PRACH-Configuration
                                                                                                        PRESENCE optional
     ID id-MBSFN-Subframe-Info
                                        CRITICALITY ignore EXTENSION MBSFN-Subframe-Infolist
                                                                                                        PRESENCE optional}
     ID id-CSG-Id
                                        CRITICALITY ignore EXTENSION CSG-Id
                                                                                                        PRESENCE optional }
     ID id-MBMS-Service-Area-List
                                        CRITICALITY ignore EXTENSION MBMS-Service-Area-Identity-List PRESENCE optional
     ID id-MultibandInfoList
                                        CRITICALITY ignore EXTENSION MultibandInfoList
                                                                                                        PRESENCE optional}
    { ID id-FreqBandIndicatorPriority CRITICALITY ignore EXTENSION FreqBandIndicatorPriority
                                                                                                        PRESENCE optional },
    . . .
SIPTOBearerDeactivationIndication ::= ENUMERATED {
    true,
```

```
ShortMAC-I ::= BIT STRING (SIZE(16))
SourceOfUEActivityBehaviourInformation ::= ENUMERATED {
    subscription-information,
    statistics,
SpecialSubframe-Info ::= SEQUENCE {
    specialSubframePatterns
                                SpecialSubframePatterns,
    cyclicPrefixDL
                                CyclicPrefixDL,
    cyclicPrefixUL
                                CyclicPrefixUL,
    iE-Extensions
                                ProtocolExtensionContainer { { SpecialSubframe-Info-ExtIEs} } OPTIONAL,
SpecialSubframe-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
SpecialSubframePatterns ::= ENUMERATED {
    ssp0,
    ssp1,
    ssp2,
    ssp3,
    ssp4,
    ssp5,
    ssp6,
    ssp7,
    ssp8,
    . . .
SubbandCQI ::= SEQUENCE {
    subbandCOICodeword0
                                SubbandCOICodeword0,
    subbandCQICodeword1
                                SubbandCOICodeword1
                                                         OPTIONAL,
    iE-Extensions
                                ProtocolExtensionContainer { { SubbandCQI-ExtIEs} } OPTIONAL,
SRVCCOperationPossible ::= ENUMERATED {
    possible,
SubbandCQI-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
SubbandCQICodeword0 ::= CHOICE {
    four-bitCOI
                                    INTEGER (0..15, ...),
```

```
two-bitSubbandDifferentialCQI
                                    INTEGER (0..3, ...),
    two-bitDifferentialCOI
                                     INTEGER (0..3, ...),
SubbandCOICodeword1 ::= CHOICE {
    four-bitCOI
                                         INTEGER (0..15, ...),
    three-bitSpatialDifferentialCOI
                                         INTEGER (0..7, ...),
    two-bitSubbandDifferentialCOI
                                         INTEGER (0..3, ...),
    two-bitDifferentialCQI
                                         INTEGER (0..3, ...),
    . . .
SubbandCQIList ::= SEQUENCE (SIZE(1.. maxSubband)) OF SubbandCQIItem
SubbandCOIItem ::= SEOUENCE {
    subbandCOI
                        SubbandCOI,
    subbandIndex
                        INTEGER (0..27,...),
                        ProtocolExtensionContainer { { SubbandCOIItem-ExtIEs} } OPTIONAL,
    iE-Extensions
SubbandCQIItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
SubbandSize ::= ENUMERATED {
    size2,
    size3,
    size4,
    size6,
    size8,
SubscriberProfileIDforRFP ::= INTEGER (1..256)
SubframeAllocation ::= CHOICE {
    oneframe
                                     Oneframe,
    fourframes
                                     Fourframes,
    . . .
SubframeAssignment ::= ENUMERATED {
    sa0,
    sal,
    sa2,
    sa3,
    sa4,
    sa5,
    sa6,
```

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```
-- T
TABasedMDT::= SEQUENCE {
    tAListforMDT
                       TAListforMDT,
   iE-Extensions
                       ProtocolExtensionContainer { {TABasedMDT-ExtIEs} } OPTIONAL,
TABasedMDT-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
TAC ::= OCTET STRING (SIZE (2))
TAIBasedMDT ::= SEQUENCE {
    tAIListforMDT
                           TAIListforMDT,
                           ProtocolExtensionContainer { {TAIBasedMDT-ExtIEs} } OPTIONAL,
   iE-Extensions
TAIBasedMDT-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
TAIListforMDT ::= SEQUENCE (SIZE(1..maxnoofTAforMDT)) OF TAI-Item
TAI-Item ::= SEOUENCE {
    tAC
                        TAC,
   pLMN-Identity
                        PLMN-Identity,
                        ProtocolExtensionContainer { { TAI-Item-ExtIEs} } OPTIONAL,
   iE-Extensions
TAI-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
TAListforMDT ::= SEQUENCE (SIZE(1..maxnoofTAforMDT)) OF TAC
TargetCellInUTRAN ::= OCTET STRING -- This IE is to be encoded according to the UTRAN Cell ID in the Last Visited UTRAN Cell Information IE in TS
25.413 [24]
TargeteNBtoSource-eNBTransparentContainer ::= OCTET STRING
TDD-Info ::= SEOUENCE {
    eARFCN
                                    EARFCN,
    transmission-Bandwidth
                                    Transmission-Bandwidth,
    subframeAssignment
                                   SubframeAssignment,
    specialSubframe-Info
                                        SpecialSubframe-Info,
   iE-Extensions
                               ProtocolExtensionContainer { {TDD-Info-ExtIEs} } OPTIONAL,
TDD-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-AdditionalSpecialSubframe-Info CRITICALITY ignore EXTENSION AdditionalSpecialSubframe-Info PRESENCE optional}
```

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PRESENCE optional },

```
{ ID id-eARFCNExtension
                                         CRITICALITY reject EXTENSION EARFCNExtension
Threshold-RSRP ::= INTEGER(0..97)
Threshold-RSRO ::= INTEGER(0..34)
TimeToWait ::= ENUMERATED {
   vls,
   v2s,
   v5s,
   v10s.
   v20s,
   v60s,
Time-UE-StayedInCell ::= INTEGER (0..4095)
Time-UE-StayedInCell-EnhancedGranularity ::= INTEGER (0..40950)
TraceActivation ::= SEQUENCE {
   eUTRANTraceID
                                  EUTRANTraceID,
   interfacesToTrace
                                 InterfacesToTrace,
   traceDepth
                                 TraceDepth,
   traceCollectionEntityIPAddress TraceCollectionEntityIPAddress,
                                  ProtocolExtensionContainer { TraceActivation-ExtIEs} } OPTIONAL,
   iE-Extensions
TraceActivation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
   PRESENCE optional },
   . . .
TraceCollectionEntityIPAddress ::= BIT STRING (SIZE(1..160, ...))
TraceDepth
               ::= ENUMERATED {
   minimum,
   medium,
   maximum,
   minimumWithoutVendorSpecificExtension,
   mediumWithoutVendorSpecificExtension,
   maximumWithoutVendorSpecificExtension,
Transmission-Bandwidth ::= ENUMERATED {
       bw6,
       bw15,
       bw25,
       bw50,
       bw75,
```

```
bw100,
        . . . ,
        bw1
TransportLayerAddress
                                ::= BIT STRING (SIZE(1..160, ...))
TunnelInformation ::= SEQUENCE {
    transportLayerAddress TransportLayerAddress,
    uDP-Port-Number
                            Port-Number
                                                OPTIONAL,
    iE-Extensions
                            ProtocolExtensionContainer { {Tunnel-Information-ExtIEs} } OPTIONAL,
    . . .
Tunnel-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
TypeOfError ::= ENUMERATED {
    not-understood,
   missing,
    . . .
-- IJ
UEAggregateMaximumBitRate ::= SEQUENCE {
    uEaggregateMaximumBitRateDownlink BitRate,
    uEaggregateMaximumBitRateUplink
                                        BitRate,
                                        ProtocolExtensionContainer { {UEAggregate-MaximumBitrate-ExtIEs} } OPTIONAL,
    iE-Extensions
UEAggregate-MaximumBitrate-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
UE-ContextKeptIndicator ::= ENUMERATED {
    true,
    . . .
UEID ::= BIT STRING (SIZE (16))
UE-HistoryInformation ::= SEQUENCE (SIZE(1..maxnoofCells)) OF LastVisitedCell-Item
UE-HistoryInformationFromTheUE ::= OCTET STRING
-- This IE is a transparent container and shall be encoded as the VisitedCellInfoList field contained in the UEInformationResponse message as
defined in TS 36.331 [9]
UE-S1AP-ID ::= INTEGER (0.. 4294967295)
UE-X2AP-ID ::= INTEGER (0..4095)
```

```
UE-X2AP-ID-Extension ::= INTEGER (0..4095, ...)
UE-RLF-Report-Container::= OCTET STRING
-- This IE is a transparent container and shall be encoded as the RLF-Report-r9 field contained in the UEInformationResponse message as defined in
TS 36.331 [9]
UE-RLF-Report-Container-for-extended-bands ::= OCTET STRING
-- This IE is a transparent container and shall be encoded as the RLF-Report-v9e0 field contained in the UEInformationResponse message as defined
in TS 36.331 [9]
UESecurityCapabilities ::= SEQUENCE {
    encryptionAlgorithms
                                        EncryptionAlgorithms,
    integrityProtectionAlgorithms
                                        IntegrityProtectionAlgorithms,
    iE-Extensions
                                        ProtocolExtensionContainer { { UESecurityCapabilities-ExtIEs} }
                                                                                                           OPTIONAL.
UESecurityCapabilities-ExtIES X2AP-PROTOCOL-EXTENSION ::= {
UL-GBR-PRB-usage::= INTEGER (0..100)
UL-HighInterferenceIndicationInfo ::= SEQUENCE (SIZE(1..maxCellineNB)) OF UL-HighInterferenceIndicationInfo-Item
UL-HighInterferenceIndicationInfo-Item ::= SEOUENCE {
    target-Cell-ID
                                    ECGI,
    ul-interferenceindication
                                    UL-HighInterferenceIndication,
    iE-Extensions
                                    ProtocolExtensionContainer { { UL-HighInterferenceIndicationInfo-Item-ExtIEs} } OPTIONAL,
    . . .
UL-HighInterferenceIndicationInfo-Item-ExtIES X2AP-PROTOCOL-EXTENSION ::= {
UL-HighInterferenceIndication ::= BIT STRING (SIZE(1..110, ...))
UL-InterferenceOverloadIndication ::= SEOUENCE (SIZE(1..maxnoofPRBs)) OF UL-InterferenceOverloadIndication-Item
UL-InterferenceOverloadIndication-Item ::= ENUMERATED {
    high-interference,
    medium-interference,
   low-interference,
UL-non-GBR-PRB-usage::= INTEGER (0..100)
UL-Total-PRB-usage::= INTEGER (0..100)
UsableABSInformation ::= CHOICE {
    fdd
                        UsableABSInformationFDD
```

```
UsableABSInformationTDD,
    tdd
UsableABSInformationFDD ::= SEQUENCE {
    usable-abs-pattern-info
                                        BIT STRING (SIZE(40)),
    iE-Extensions
                                        ProtocolExtensionContainer { { UsableABSInformationFDD-ExtIEs} } OPTIONAL,
UsableABSInformationFDD-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
UsableABSInformationTDD ::= SEQUENCE {
    usaable-abs-pattern-info
                                        BIT STRING (SIZE(1..70, ...)),
                                        ProtocolExtensionContainer { { UsableABSInformationTDD-ExtIEs} } OPTIONAL,
    iE-Extensions
UsableABSInformationTDD-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
WidebandCOI ::= SEOUENCE {
    widebandCQICodeword0
                                INTEGER (0..15, ...),
    widebandCQICodeword1
                                WidebandCQICodeword1
                                                            OPTIONAL,
    iE-Extensions
                                ProtocolExtensionContainer { { WidebandCQI-ExtIEs} } OPTIONAL,
    . . .
WidebandCQI-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
WidebandCOICodeword1::= CHOICE {
    four-bitCOI
                                            INTEGER (0..15, ...),
    three-bitSpatialDifferentialCQI
                                            INTEGER (0..7, ...),
-- X
X2BenefitValue ::= INTEGER (1..8, ...)
-- Y
-- Z
END
```

9.3.6 Common definitions

```
******************
-- Common definitions
__ ********************
X2AP-CommonDataTypes {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) x2ap (2) version1 (1) x2ap-CommonDataTypes (3) }
DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
       *****************
-- Extension constants
__ ********************
maxPrivateIEs
                                     INTEGER ::= 65535
maxProtocolExtensions
                                     INTEGER ::= 65535
maxProtocolIEs
                                     INTEGER ::= 65535
__ *********************
-- Common Data Types
__ *********************
            ::= ENUMERATED { reject, ignore, notify }
Criticality
            ::= ENUMERATED { optional, conditional, mandatory }
Presence
PrivateIE-ID ::= CHOICE {
   local
                  INTEGER (0.. maxPrivateIEs),
                  OBJECT IDENTIFIER
   qlobal
ProcedureCode
            ::= INTEGER (0..255)
             ::= INTEGER (0..maxProtocolIEs)
ProtocolIE-ID
TriggeringMessage ::= ENUMERATED { initiating-message, successful-outcome, unsuccessful-outcome}
END
```

9.3.7 Constant definitions

```
-- Constant definitions
****************
X2AP-Constants {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) x2ap (2) version1 (1) x2ap-Constants (4) }
DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
TMPORTS
   ProcedureCode,
   ProtocolIE-ID
FROM X2AP-CommonDataTypes;
   *****************
-- Elementary Procedures
__ ********************************
id-handoverPreparation
                                                            ProcedureCode ::= 0
id-handoverCancel
                                                            ProcedureCode ::= 1
id-loadIndication
                                                            ProcedureCode ::= 2
id-errorIndication
                                                            ProcedureCode ::= 3
id-snStatusTransfer
                                                            ProcedureCode ::= 4
id-uEContextRelease
                                                            ProcedureCode ::= 5
id-x2Setup
                                                            ProcedureCode ::= 6
                                                            ProcedureCode ::= 7
id-reset
id-eNBConfigurationUpdate
                                                            ProcedureCode ::= 8
                                                            ProcedureCode ::= 9
id-resourceStatusReportingInitiation
id-resourceStatusReporting
                                                            ProcedureCode ::= 10
id-privateMessage
                                                            ProcedureCode ::= 11
id-mobilitySettingsChange
                                                            ProcedureCode ::= 12
                                                            ProcedureCode ::= 13
id-rLFIndication
                                                            ProcedureCode ::= 14
id-handoverReport
id-cellActivation
                                                            ProcedureCode ::= 15
id-x2Release
                                                            ProcedureCode ::= 16
id-x2APMessageTransfer
                                                            ProcedureCode ::= 17
id-x2Removal
                                                            ProcedureCode ::= 18
                                                            ProcedureCode ::= 19
id-seNBAdditionPreparation
id-seNBReconfigurationCompletion
                                                            ProcedureCode ::= 20
id-meNBinitiatedSeNBModificationPreparation
                                                            ProcedureCode ::= 21
id-seNBinitiatedSeNBModification
                                                            ProcedureCode ::= 22
id-meNBinitiatedSeNBRelease
                                                            ProcedureCode ::= 23
id-seNBinitiatedSeNBRelease
                                                            ProcedureCode ::= 24
id-seNBCounterCheck
                                                            ProcedureCode ::= 25
```

id-retrieveUEContext ProcedureCode ::= 26

```
__ ********************
-- Lists
__ **********************
                                       INTEGER ::= 65535
maxEARFCN
maxEARFCNPlusOne
                                       INTEGER ::= 65536
newmaxEARFCN
                                       INTEGER ::= 262143
maxInterfaces
                                       INTEGER ::= 16
maxCellineNB
                                       INTEGER ::= 256
maxnoofBands
                                       INTEGER ::= 16
maxnoofBearers
                                       INTEGER ::= 256
maxNrOfErrors
                                       INTEGER ::= 256
maxnoofPDCP-SN
                                       INTEGER ::= 16
                                       INTEGER ::= 15
maxnoofEPLMNs
maxnoofEPLMNsPlusOne
                                       INTEGER ::= 16
maxnoofForbLACs
                                       INTEGER ::= 4096
                                       INTEGER ::= 4096
maxnoofForbTACs
maxnoofBPLMNs
                                       INTEGER ::= 6
                                       INTEGER ::= 512
maxnoofNeighbours
maxnoofPRBs
                                       INTEGER ::= 110
maxPools
                                       INTEGER ::= 16
maxnoofCells
                                       INTEGER ::= 16
maxnoofMBSFN
                                       INTEGER ::= 8
maxFailedMeasObjects
                                       INTEGER ::= 32
maxnoofCellIDforMDT
                                       INTEGER ::= 32
maxnoofTAforMDT
                                       INTEGER ::= 8
maxnoofMBMSServiceAreaIdentities
                                       INTEGER ::= 256
maxnoofMDTPLMNs
                                       INTEGER ::= 16
maxnoofCoMPHypothesisSet
                                       INTEGER ::= 256
maxnoofCoMPCells
                                       INTEGER ::= 32
maxUEReport
                                       INTEGER ::= 128
maxCellReport
                                       INTEGER ::= 9
maxnoofPA
                                       INTEGER ::= 3
maxCSIProcess
                                       INTEGER ::= 4
maxCSIReport
                                       INTEGER ::= 2
maxSubband
                                       INTEGER ::= 14
__ **********************
-- IEs
__ *******************
id-E-RABs-Admitted-Item
                                                                    ProtocolIE-ID ::= 0
id-E-RABs-Admitted-List
                                                                    ProtocolIE-ID ::= 1
id-E-RAB-Item
                                                                    ProtocolIE-ID ::= 2
id-E-RABs-NotAdmitted-List
                                                                    ProtocolIE-ID ::= 3
id-E-RABs-ToBeSetup-Item
                                                                    ProtocolIE-ID ::= 4
id-Cause
                                                                    ProtocolIE-ID ::= 5
```

id-CellInformation	ProtocolIE-ID	::=	6
id-CellInformation-Item	ProtocolIE-ID	::=	7
id-New-eNB-UE-X2AP-ID	ProtocolIE-ID	::=	9
id-Old-eNB-UE-X2AP-ID	ProtocolIE-ID	::=	10
id-TargetCell-ID	ProtocolIE-ID	::=	11
id-TargeteNBtoSource-eNBTransparentContainer	ProtocolIE-ID	::=	12
id-TraceActivation	ProtocolIE-ID	::=	13
id-UE-ContextInformation	ProtocolIE-ID	::=	14
id-UE-HistoryInformation	ProtocolIE-ID	::=	15
id-UE-X2AP-ID	ProtocolIE-ID	::=	16
id-CriticalityDiagnostics	ProtocolIE-ID	::=	17
id-E-RABs-SubjectToStatusTransfer-List	ProtocolIE-ID	::=	18
id-E-RABs-SubjectToStatusTransfer-Item	ProtocolIE-ID	::=	19
id-ServedCells	ProtocolIE-ID	::=	20
id-GlobalENB-ID	ProtocolIE-ID	::=	21
id-TimeToWait	ProtocolIE-ID	::=	22
id-GUMMEI-ID	ProtocolIE-ID	::=	23
id-GUGroupIDList	ProtocolIE-ID	::=	24
id-ServedCellsToAdd	ProtocolIE-ID	::=	25
id-ServedCellsToModify	ProtocolIE-ID	::=	26
id-ServedCellsToDelete	ProtocolIE-ID	::=	27
id-Registration-Request	ProtocolIE-ID	::=	28
id-CellToReport	ProtocolIE-ID	::=	29
id-ReportingPeriodicity	ProtocolIE-ID	::=	30
id-CellToReport-Item	ProtocolIE-ID	::=	31
id-CellMeasurementResult	ProtocolIE-ID	: :=	32
id-CellMeasurementResult-Item	ProtocolIE-ID	::=	33
id-GUGroupIDToAddList	ProtocolIE-ID	::=	34
id-GUGroupIDToDeleteList	ProtocolIE-ID	::=	35
id-SRVCCOperationPossible	ProtocolIE-ID		
id-Measurement-ID	ProtocolIE-ID		
id-ReportCharacteristics	ProtocolIE-ID	::=	38
id-ENB1-Measurement-ID	ProtocolIE-ID		
id-ENB2-Measurement-ID	ProtocolIE-ID		
id-Number-of-Antennaports	ProtocolIE-ID	::=	41
id-CompositeAvailableCapacityGroup	ProtocolIE-ID	::=	42
id-ENB1-Cell-ID	ProtocolIE-ID		
id-ENB2-Cell-ID	ProtocolIE-ID		
id-ENB2-Proposed-Mobility-Parameters	ProtocolIE-ID	::=	45
id-ENB1-Mobility-Parameters	ProtocolIE-ID		
id-ENB2-Mobility-Parameters-Modification-Range	ProtocolIE-ID	::=	47
id-FailureCellPCI	ProtocolIE-ID		
id-Re-establishmentCellECGI	ProtocolIE-ID	::=	49
id-FailureCellCRNTI	ProtocolIE-ID	::=	50
id-ShortMAC-I	ProtocolIE-ID		
id-SourceCellECGI	ProtocolIE-ID	::=	52
id-FailureCellECGI	ProtocolIE-ID		
id-HandoverReportType	ProtocolIE-ID		
id-PRACH-Configuration	ProtocolIE-ID	::=	55
id-MBSFN-Subframe-Info	ProtocolIE-ID		
id-ServedCellsToActivate	ProtocolIE-ID		
id-ActivatedCellList	ProtocolIE-ID		
id-DeactivationIndication	ProtocolIE-ID		
id-UE-RLF-Report-Container	ProtocolIE-ID		
•			

id-ABSInformation	ProtocolIE-ID ::= 61
id-InvokeIndication	ProtocolIE-ID ::= 62
id-ABS-Status	ProtocolIE-ID ::= 63
id-PartialSuccessIndicator	ProtocolIE-ID ::= 64
id-MeasurementInitiationResult-List	ProtocolIE-ID ::= 65
id-MeasurementInitiationResult-Item	ProtocolIE-ID ::= 66
id-MeasurementFailureCause-Item	ProtocolIE-ID ::= 67
id-CompleteFailureCauseInformation-List	ProtocolIE-ID ::= 68
id-CompleteFailureCauseInformation-Item	ProtocolIE-ID ::= 69
id-CSG-Id	ProtocolIE-ID ::= 70
id-CSGMembershipStatus	ProtocolIE-ID ::= 71
id-MDTConfiguration	ProtocolIE-ID ::= 72
id-ManagementBasedMDTallowed	ProtocolIE-ID ::= 74
id-RRCConnSetupIndicator	ProtocolIE-ID ::= 75
id-NeighbourTAC	ProtocolIE-ID ::= 76
id-Time-UE-StayedInCell-EnhancedGranularity	ProtocolIE-ID ::= 77
id-RRCConnReestabIndicator	ProtocolIE-ID ::= 78
id-MBMS-Service-Area-List	ProtocolIE-ID ::= 79
id-HO-cause	ProtocolIE-ID ::= 80
id-TargetCellInUTRAN	ProtocolIE-ID ::= 81
id-MobilityInformation	ProtocolIE-ID ::= 82
id-SourceCellCRNTI	ProtocolIE-ID ::= 83
id-MultibandInfoList	ProtocolIE-ID ::= 84
id-M3Configuration	ProtocolIE-ID ::= 85
id-M4Configuration	ProtocolIE-ID ::= 86
id-M5Configuration	ProtocolIE-ID ::= 87
id-MDT-Location-Info	ProtocolIE-ID ::= 88
id-ManagementBasedMDTPLMNList	ProtocolIE-ID ::= 89
id-SignallingBasedMDTPLMNList	ProtocolIE-ID ::= 90
id-ReceiveStatusOfULPDCPSDUsExtended	ProtocolIE-ID ::= 91
id-ULCOUNTValueExtended	ProtocolIE-ID ::= 92
id-DLCOUNTValueExtended	ProtocolIE-ID ::= 93
id-eARFCNExtension	ProtocolIE-ID ::= 94
id-UL-EARFCNExtension	ProtocolIE-ID ::= 95
id-DL-EARFCNExtension	ProtocolIE-ID ::= 96
id-AdditionalSpecialSubframe-Info	ProtocolIE-ID ::= 97
id-Masked-IMEISV	ProtocolIE-ID ::= 98
id-IntendedULDLConfiguration	ProtocolIE-ID ::= 99
id-ExtendedULInterferenceOverloadInfo	ProtocolIE-ID ::= 100
id-RNL-Header	ProtocolIE-ID ::= 101
id-x2APMessage	ProtocolIE-ID ::= 102
id-ProSeAuthorized	ProtocolIE-ID ::= 103
id-ExpectedUEBehaviour	ProtocolIE-ID ::= 104
id-UE-HistoryInformationFromTheUE	ProtocolIE-ID ::= 105
${\sf id extsf{-}DynamicDLTransmissionInformation}$	ProtocolIE-ID ::= 106
id-UE-RLF-Report-Container-for-extended-bands	ProtocolIE-ID ::= 107
id-CoMPInformation	ProtocolIE-ID ::= 108
id-ReportingPeriodicityRSRPMR	ProtocolIE-ID ::= 109
id-RSRPMRList	ProtocolIE-ID ::= 110
id-MeNB-UE-X2AP-ID	ProtocolIE-ID ::= 111
id-SeNB-UE-X2AP-ID	ProtocolIE-ID ::= 112
id-UE-SecurityCapabilities	ProtocolIE-ID ::= 113
id-SeNBSecurityKey	ProtocolIE-ID ::= 114
id-SeNBUEAggregateMaximumBitRate	ProtocolIE-ID ::= 115

id-ServingPLMN	ProtocolIE-ID ::= 116
id-E-RABs-ToBeAdded-List	ProtocolIE-ID ::= 117
id-E-RABs-ToBeAdded-Item	ProtocolIE-ID ::= 118
id-MeNBtoSeNBContainer	ProtocolIE-ID ::= 119
id-E-RABs-Admitted-ToBeAdded-List	ProtocolIE-ID ::= 120
id-E-RABs-Admitted-ToBeAdded-Item	ProtocolIE-ID ::= 121
id-SeNBtoMeNBContainer	ProtocolIE-ID ::= 122
id-ResponseInformationSeNBReconfComp	ProtocolIE-ID ::= 123
id-UE-ContextInformationSeNBModReq	ProtocolIE-ID ::= 124
id-E-RABs-ToBeAdded-ModReqItem	ProtocolIE-ID ::= 125
id-E-RABs-ToBeModified-ModReqItem	ProtocolIE-ID ::= 126
id-E-RABs-ToBeReleased-ModReqItem	ProtocolIE-ID ::= 127
id-E-RABs-Admitted-ToBeAdded-ModAckList	ProtocolIE-ID ::= 128
id-E-RABs-Admitted-ToBeModified-ModAckList	ProtocolIE-ID ::= 129
id-E-RABs-Admitted-ToBeReleased-ModAckList	ProtocolIE-ID ::= 130
id-E-RABs-Admitted-ToBeAdded-ModAckItem	ProtocolIE-ID ::= 131
id-E-RABs-Admitted-ToBeModified-ModAckItem	ProtocolIE-ID ::= 132
id-E-RABs-Admitted-ToBeReleased-ModAckItem	ProtocolIE-ID ::= 133
id-E-RABs-ToBeReleased-ModReqd	ProtocolIE-ID ::= 134
id-E-RABs-ToBeReleased-ModReqdItem	ProtocolIE-ID ::= 135
id-SCGChangeIndication	ProtocolIE-ID ::= 136
id-E-RABs-ToBeReleased-List-RelReg	ProtocolIE-ID ::= 137
id-E-RABs-ToBeReleased-RelReqItem	ProtocolIE-ID ::= 138
id-E-RABs-ToBeReleased-List-RelConf	ProtocolIE-ID ::= 139
id-E-RABs-ToBeReleased-RelConfItem	ProtocolIE-ID ::= 140
id-E-RABs-SubjectToCounterCheck-List	ProtocolIE-ID ::= 141
id-E-RABs-SubjectToCounterCheckItem	ProtocolIE-ID ::= 142
id-CoverageModificationList	ProtocolIE-ID ::= 143
id-ReportingPeriodicityCSIR	ProtocolIE-ID ::= 145
id-CSIReportList	ProtocolIE-ID ::= 146
id-UEID	ProtocolIE-ID ::= 147
id-enhancedRNTP	ProtocolIE-ID ::= 148
id-ProSeUEtoNetworkRelaying	ProtocolIE-ID ::= 149
id-ReceiveStatusOfULPDCPSDUsPDCP-SNlength18	ProtocolIE-ID ::= 150
id-ULCOUNTValuePDCP-SNlength18	ProtocolIE-ID ::= 151
id-DLCOUNTValuePDCP-SNlength18	ProtocolIE-ID ::= 152
id-UE-ContextReferenceAtSeNB	ProtocolIE-ID ::= 153
id-UE-ContextKeptIndicator	ProtocoliE-ID ::= 154
id-New-eNB-UE-X2AP-ID-Extension	ProtocolIE-ID ::= 154
id-Old-eNB-UE-X2AP-ID-Extension	ProtocoliE-ID ::= 156
id-MeNB-UE-X2AP-ID-Extension	ProtocoliE-ID ::= 157
id-SeNB-UE-X2AP-ID-Extension	ProtocolIE-ID ::= 157
id-LHN-ID	
	ProtocolIE-ID ::= 159
id-FreqBandIndicatorPriority	ProtocolIE-ID ::= 160
id-M6Configuration	ProtocolIE-ID ::= 161
id-M7Configuration	ProtocolIE-ID ::= 162
id-Tunnel-Information-for-BBF	ProtocolIE-ID ::= 163
id-SIPTO-BearerDeactivationIndication	ProtocolIE-ID ::= 164
id-GW-TransportLayerAddress	ProtocolIE-ID ::= 165
id-Correlation-ID	ProtocolIE-ID ::= 166
id-SIPTO-Correlation-ID	ProtocolIE-ID ::= 167
id-SIPTO-L-GW-TransportLayerAddress	ProtocolIE-ID ::= 168
id-X2RemovalThreshold	ProtocolIE-ID ::= 169
id-CellReportingIndicator	ProtocolIE-ID ::= 170

```
id-BearerTypeProtocolIE-ID::=171id-resumeIDProtocolIE-ID::=172id-UE-ContextInformationRetrieveProtocolIE-ID::=173id-E-RABs-ToBeSetupRetrieve-ItemProtocolIE-ID::=174id-NewEUTRANCellIdentifierProtocolIE-ID::=175id-OffsetOfNbiotChannelNumberToDL-EARFCNProtocolIE-ID::=177id-OffsetOfNbiotChannelNumberToUL-EARFCNProtocolIE-ID::=178
```

END

9.3.8 Container definitions

```
******************
-- Container definitions
__ *********************
X2AP-Containers {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) x2ap (2) version1 (1) x2ap-Containers (5) }
DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
    *******************
-- IE parameter types from other modules.
__ *********************
IMPORTS
   maxPrivateIEs,
   maxProtocolExtensions,
   maxProtocolIEs,
   Criticality,
   Presence,
   PrivateIE-ID,
   ProtocolIE-ID
FROM X2AP-CommonDataTypes;
__ ***********************************
-- Class Definition for Protocol IEs
__ ********************************
X2AP-PROTOCOL-IES ::= CLASS {
               ProtocolIE-ID
   &id
                                 UNIQUE,
   &criticality
               Criticality,
   &Value,
   &presence
               Presence
```

```
WITH SYNTAX {
                   &id
                   &criticality
   CRITICALITY
                   &Value
    PRESENCE
                   &presence
-- Class Definition for Protocol IEs
X2AP-PROTOCOL-IES-PAIR ::= CLASS {
                           ProtocolIE-ID
                                              UNIQUE,
    &firstCriticality
                           Criticality,
    &FirstValue,
    &secondCriticality
                           Criticality,
    &SecondValue,
    &presence
                           Presence
WITH SYNTAX {
                           &id
    FIRST CRITICALITY
                           &firstCriticality
    FIRST TYPE
                           &FirstValue
                           &secondCriticality
    SECOND CRITICALITY
    SECOND TYPE
                           &SecondValue
    PRESENCE
                           &presence
-- Class Definition for Protocol Extensions
__ ********************
X2AP-PROTOCOL-EXTENSION ::= CLASS {
                       ProtocolIE-ID
    &id
                                          UNIQUE,
    &criticality
                       Criticality,
    &Extension,
    &presence
                       Presence
WITH SYNTAX {
   ID
                       &id
    CRITICALITY
                       &criticality
    EXTENSION
                       &Extension
    PRESENCE
                       &presence
-- Class Definition for Private IEs
```

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```
__ *********************
X2AP-PRIVATE-IES ::= CLASS {
   &id
                   PrivateIE-ID,
   &criticality
                   Criticality,
   &Value,
   &presence
                   Presence
WITH SYNTAX {
                   &id
   CRITICALITY
                   &criticality
   TYPE
                    &Value
   PRESENCE
                   &presence
-- Container for Protocol IEs
  ************
ProtocolIE-Container {X2AP-PROTOCOL-IES : IEsSetParam} ::=
   SEQUENCE (SIZE (0..maxProtocolIEs)) OF
   ProtocolIE-Field {{IEsSetParam}}
ProtocolIE-Single-Container {X2AP-PROTOCOL-IES : IEsSetParam} ::=
   ProtocolIE-Field {{IEsSetParam}}
ProtocolIE-Field {X2AP-PROTOCOL-IES : IESSetParam} ::= SEOUENCE {
              X2AP-PROTOCOL-IES.&id
                                                 ({IEsSetParam}),
   criticality
                X2AP-PROTOCOL-IES.&criticality
                                                 ({IEsSetParam}{@id}),
                X2AP-PROTOCOL-IES.&Value
   value
                                                 ({IEsSetParam}{@id})
    -- Container for Protocol IE Pairs
  ******************
ProtocolIE-ContainerPair {X2AP-PROTOCOL-IES-PAIR : IEsSetParam} ::=
   SEQUENCE (SIZE (0..maxProtocolIEs)) OF
   ProtocolIE-FieldPair {{IEsSetParam}}
ProtocolIE-FieldPair {X2AP-PROTOCOL-IES-PAIR : IEsSetParam} ::= SEQUENCE {
                 X2AP-PROTOCOL-IES-PAIR.&id
                                                        ({IEsSetParam}),
   firstCriticality X2AP-PROTOCOL-IES-PAIR.&firstCriticality
                                                        ({IEsSetParam}{@id}),
                                                        ({IEsSetParam}{@id}),
   firstValue X2AP-PROTOCOL-IES-PAIR.&FirstValue
   secondCriticality X2AP-PROTOCOL-IES-PAIR.&secondCriticality
                                                        ({IEsSetParam}{@id}),
   secondValue
                   X2AP-PROTOCOL-IES-PAIR.&SecondValue
                                                        ({IEsSetParam}{@id})
```

```
-- Container Lists for Protocol IE Containers
ProtocolIE-ContainerList {INTEGER : lowerBound, INTEGER : upperBound, X2AP-PROTOCOL-IES : IESSetParam} ::=
   SEQUENCE (SIZE (lowerBound..upperBound)) OF
   ProtocolIE-Container {{IEsSetParam}}
ProtocolIE-ContainerPairList {INTEGER : lowerBound, INTEGER : upperBound, X2AP-PROTOCOL-IES-PAIR : IESSetParam} ::=
   SEQUENCE (SIZE (lowerBound..upperBound)) OF
   ProtocolIE-ContainerPair {{IEsSetParam}}
__ *********************
-- Container for Protocol Extensions
ProtocolExtensionContainer {X2AP-PROTOCOL-EXTENSION : ExtensionSetParam} ::=
   SEQUENCE (SIZE (1..maxProtocolExtensions)) OF
   ProtocolExtensionField {{ExtensionSetParam}}
ProtocolExtensionField {X2AP-PROTOCOL-EXTENSION : ExtensionSetParam} ::= SEQUENCE {
                                                         ({ExtensionSetParam}),
                    X2AP-PROTOCOL-EXTENSION.&id
   criticality
                                                        ({ExtensionSetParam}{@id}),
                    X2AP-PROTOCOL-EXTENSION.&criticality
   extensionValue
                  X2AP-PROTOCOL-EXTENSION. & Extension
                                                         ({ExtensionSetParam}{@id})
    -- Container for Private IEs
  ****************
PrivateIE-Container {X2AP-PRIVATE-IES : IEsSetParam} ::=
   SEQUENCE (SIZE (1..maxPrivateIEs)) OF
   PrivateIE-Field {{IEsSetParam}}
PrivateIE-Field {X2AP-PRIVATE-IES : IESSetParam} ::= SEQUENCE {
               X2AP-PRIVATE-IES.&id
                                              ({IEsSetParam}),
   criticality X2AP-PRIVATE-IES.&criticality ({IEsSetParam}{@id}),
                                              ({IEsSetParam}{@id})
   value
               X2AP-PRIVATE-IES.&Value
END
```

9.4 Message transfer syntax

X2AP shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax, as specified in ITU-T Rec. X.691 [5].

9.5 Timers

$T_{RELOCprep}$

- Specifies the maximum time for the Handover Preparation procedure in the source eNB.

$TX2_{RELOCoverall} \\$

- Specifies the maximum time for the protection of the overall handover procedure in the source eNB.

T_{DCprep}

- Specifies the maximum time for the SeNB Addition Preparation or MeNB initiated SeNB Modification Preparation procedure in the MeNB.

$T_{DCoverall}$

- Specifies the maximum time in the SeNB for either the SeNB initiated SeNB Modification procedure or the protection of the E-UTRAN actions necessary to configure UE resources at SeNB Addition or MeNB initiated SeNB Modification.

Handling of unknown, unforeseen and erroneous protocol data

Section 10 of TS 36.413 [4] is applicable for the purposes of the present document.

Annex A (informative): Change History

TSG#	TSG Doc.	CR	Rev	Subject/Comment	New
09/2009				Rel-9 version is created based on v.8.7.0	9.0.0
45	RP-090787	0296	1	Handling of Emergency Calls in Limited Service Mode	9.0.0
45	RP-090787	0297	1	Emergency Calls Mobility Handling	9.0.0
46	RP-091192	0307		Introduction of signalling support for Composite Available Capacity with	9.1.0
				relative units	
46	RP-091192	0308	2	Configuration adaptation for MLB on X2	9.1.0
46	RP-091183	0310	1	Clarification on operational use of updated configuration data	9.1.0
46	RP-091192	0317	2	Automatic PRACH information exchange over X2 for SON	9.1.0
46	RP-091192	0333	1	Introduction of Radio Link Failure Indication procedure	9.1.0
46	RP-091192	0334	1	Introduction of Handover Report procedure	9.1.0
46	RP-091192	0335		Introduction of signalling support for Composite Available Capacity with	9.1.0
				relative units	
47	RP-100213	0337		Correction to the Resource Status Reporting Initiation procedure	9.2.0
47	RP-100229	0341	2	Addition of MBSFN information on X2 interface	9.2.0
47	RP-100228	0344	4	Cell pair identification for Mobility Settings Change procedure	9.2.0
47	RP-100213	0352		Addition of cause value for not admitted E-RAB	9.2.0
47	RP-100229	0355	1	Rapporteur"s update of X2AP protocol	9.2.0
47	RP-100230	0356	3	RNL-based energy saving solution	9.2.0
47	RP-100228	0358	1	Inclusion of UE RLF Report in RLF INDICATION message	9.2.0
48	RP-100599	0363	1	Correction of RLF INDICATION message	9.3.0
48	RP-100599	0364	1	Missing error cause for Not supported QCI on Handover	9.3.0
48	RP-100599	0370	1	Introduction of PLMN-related abnormal conditions during X2 handover in	9.3.0
				network sharing scenarios.	
48	RP-100599	0372	1	Outcome of RAN3#68 review of X2AP	9.3.0
48	RP-100599	0373	1	Correction of forbidden inter-RAT	9.3.0
49	RP-100908	0376	1	Explicit PLMN coding in Trace IEs	9.4.0
49	RP-100906	0380	2	The corrections for Last Visited Cell Information	9.4.0
49	RP-100906	0383	1	Handover Restriction List	9.4.0
49	RP-100908	0384	1	Complete list of served cells to be provided in X2 SETUP and eNB	9.4.0
				Configuration Update messages	
50	RP-101271	0385		Clarification on Handover Restriction List	9.5.0
50	RP-101270	0403	3	Correction of semantics description	9.5.0
12/2010				Rel-10 version created based in v. 9.5.0	10.0.0
50	RP-101304	0393	2	Introduction of partial failure in Resource Status Reporting Initiation	10.0.0
				procedure including detailed reporting of failure cause	
50	RP-101279	0407	4	X2 handover support	10.0.0
	SP-100629			Clarification on the use of References (TS 21.801 CR#0030)	10.1.0
51	RP-110231	0408		Conditions for Enhanced X2 mobility	10.1.0
51	RP-110237	0409		Introduction of X2 signalling support for eICIC	10.1.0
51	RP-110222	0411	1	Correction of the usage of optional ShortMAC-I IE in RLF INDICATION	10.1.0
				message	
51	RP-110230	0413		Support for MDT	10.1.0
51	RP-110226	0419	2	Clarification on TEID value range for X2AP	10.1.0
51	RP-110231	0420		Clarify X2 Handover Scenarios	10.1.0
51	RP-110237	0427	1	Enabling reporting of ABS resource status for eICIC purposes	10.1.0
52	RP-110695	0435	1	MDT correction for TAI	10.2.0
52	RP-110698	0436		Clarification on Radio Resource Status	10.2.0
52	RP-110700	0443		X2 support of RLF Report extension for SON MRO defined in R10	10.2.0
52	RP-110695	1	3	Support for MDT user consent	10.2.0
52	RP-110686		2	Rapporteur"s proposal following review of TS 36.423	10.2.0
52	RP-110689	0452	1	Correction of the partial success mechanism in Resource Status	10.2.0
			<u> </u>	Reporting	<u> </u>
52	RP-110695		2	MDT amendments	10.2.0
52	RP-110685	0454		Reference review outcome in TS 36.423	10.2.0
52	RP-110695	0456		Correction of trace function and trace session	10.2.0
53	RP-111196	0464	2	Clarification of procedures defined for MLB purposes	10.3.0
53	RP-111196	0469	1	ASN.1 definition conforms to ITU-T Recommendations	10.3.0

53	DD_111104	0476	2	Undates of reported quantities for aICIC	10 2 0
53 53	RP-111194 RP-111195	0476 0478		Updates of reported quantities for eICIC Definition of value of bit in Measurements to Activate	10.3.0
53	RP-111195 RP-111197	0478		Clarification on PLMN Identity	10.3.0
54	RP-111197 RP-111648	0479	2	Correction on ABS Information	10.3.0
55	RP-111046		1	Correct of reset	10.4.0
03/2012	131 - 120234	U 1 J1	 	Rel-11 version created based in v. 10.5.0	11.0.0
55	RP-120236	0487	1		11.0.0
	120200	0 107		and eNB update procedures	11.0.0
56	RP-120751	0496	-	Introduction of the Security Algorithm (ZUC)	11.1.0
56	RP-120751	0498	2	Clarification on TAC in X2 Setup	11.1.0
56	RP-120751	0501		Adding RRC re-establishment cause to RLF indication	11.1.0
56	RP-120752		1	Correction on Emergency ARP Value	11.1.0
56	RP-120752	0516	1	Improved granularity for the time UE stayed in cell	11.1.0
57	RP-121137	0520	2	Support of MBMS Service Continuity	11.2.0
57	RP-121140	0527	3	Multiband support per cell	11.2.0
57	RP-121135	0540	1	Enhancement of HO REPORT to enable inter-RAT ping-pong detection	11.2.0
				and addition of HO cause value to the UE history information	
57	RP-121139	0546		Support for new special subframe configurations	11.2.0
58	RP-121731	0548		Addition of Mobility Information	11.3.0
58	RP-121730	0549		Introduction of new MDT measurements	11.3.0
58	RP-121732	0550		HeNB Mobility enhancement when target is hybrid HeNB	11.3.0
58	RP-121730	0552	2	Multi-PLMN MDT	11.3.0
58	RP-121731	0564	_	Clarification on successful handover for HO report procedure	11.3.0
58	RP-121737	0569		X2AP Rapporteur Update	11.3.0
59	RP-130208		3	Correction on the Special Subframe Pattern	11.4.0
59	RP-130208	0580	2	Support for Downlink-Only Bands	11.4.0
59	RP-130207	0581		Correction on use of Mobility Information	11.4.0
59	RP-130207	0582	1	Correction on MRO procedures	11.4.0
59	RP-130237	0583		Extending maxEARFCN	11.4.0
59 59	RP-130237		1	Extending Maximum Frequency Band Index	11.4.0
59	RP-130211	0585	1	Rapporteur correction of X2AP	11.4.0
59	RP-130207	0586	4	Clarification on Signalling Based MDT PLMN List	11.4.0
60	RP-130210 RP-130643	0587	1	X2AP modification for PDCP SN extension	11.4.0
60		0588	1	Correction on the Definition of Direct Neighbours	11.5.0
60	RP-130641 RP-130640	0589 0590		Correction for the MDT Location Information IE Correction on RLF INDICATION procedure	11.5.0 11.5.0
60	RP-130640		1	Security key generation in case of MFBI	11.5.0
60	RP-130643	0593		Correction on the Multiple Frequency Band Indicators	11.5.0
61	RP-131181	0598		Correction on Handover Report procedure	11.6.0
61		0602		Correction on ABS Information	11.6.0
61		0606		Correction of terminology concerning the mobility restriction function	11.6.0
62	RP-131103	0609		Correction of Handover Restriction List	11.7.0
62			1	Correction for Load Balancing Related cause value CR for 36423	11.7.0
62	RP-131902	0623		Correction for Load Balancing Related IE	12.0.0
62	RP-131909		3	Handling SIPTO@LN during UE Context Release procedure	12.0.0
63	RP-140294	0634		Correction to tabular of Served Cell Information IE	12.1.0
64	RP-140901	0629	4	TDD eIMTA support on X2AP	12.2.0
64	RP-140906	0630		Provide IMEISV to eNB to identify UE characteristics	12.2.0
64	RP-140905	0661	1	Correction of SN STATUS TRANSFER	12.2.0
64	RP-140905	0676		Clarification of DL ABS status	12.2.0
64	RP-140897	0641	4	Introduce X2GW procedures in Stage-3	12.2.0
65	RP-141520	0663		Introduction of the UE history reported from the UE	12.3.0
65	RP-141518	0690		Introduction of an indication of the expected UE behaviour	12.3.0
66	RP-142089		8	Introduction of Dual Connectivity	12.4.0
66	RP-142090	0692		Introduction of inter-eNB CoMP signalling	12.4.0
66	RP-142092	0748		X2 support for Network Assisted Interference Cancellation	12,4.0
66	RP-142094	0754		X2AP Rapporteur Update	12.4.0
66	RP-142094	0759		Correction on RLF Report Container	12.4.0
66	RP-142094	0776		Setting of Re-establishment Cell ID in RLF Indication message	12.4.0
66	RP-142094	0777		X2 Removal Signaling	12.4.0
12/2014				History table corrected	12.4.1
12/2014				ASN.1 correction to make it compilable	12.4.2
67	RP-150353	0693		ProSe authorized indication	12.5.0
67	RP-150351	0782	1	Corrections on the usage of SeNB UE AMBR in dual connectivity	12.5.0

67	RP-150351	0790	1	Corrections of Dual Connectivity in general	12.5.0
67	RP-150351		1	Corrections of Dual Connectivity in general	12.5.0
67		0797	1	Correction on DC stage3	
67	RP-150348	0801	1	Correction of the Usage of the MultibandInfoList IE	12.5.0 12.5.0
67	RP-150351	0802	<u> </u>	Introduction of Cause values for Dual Connectivity	
	RP-150356	0803	1	ASN.1 Corrections for X2AP	12.5.0
67	RP-150351		2	Corrections for Dual Connectivity	12.5.0
67	RP-150356	0805		Miscellaneous Editorials for X2AP	12.5.0
67	RP-150351	0806	1	Correction on SeNB behaviour for distinguishing uplink PDCP PDUs	12.5.0
68	RP-150943	0807	1	Correction on the definition of SeNB Reconfiguration Complete	12.6.0
68	RP-150943	0827	1	Introduction of a new DC cause for not supported configurations	12.6.0
68	RP-150943	0831		Clarification on UE-AMBR for split bearer	12.6.0
06/2015				Rel-13 version created based in v. 12.6.0	13.0.0
68	RP-150945		8	Addition of Intra-LTE notifications of AAS-based reconfigurations	13.0.0
69	RP-151455	0788	11	Introduction of enhanced inter-eNB CoMP signalling	13.1.0
69	RP-151451	0854	1	Correction on GBR parameters for dual connectivity	13.1.0
69	RP-151450	0877	1	Handling of Unknown or Erroneous AP IDs in Dual Connectivity	13.1.0
70	RP-152100	0850	5	UE-to-Network Relay authorization	13.2.0
70	RP-152099	0892	2	Extension of PDCP SN	13.2.0
70	RP-152102	0901	4	Adding CSG support to DC	13.2.0
70	RP-152086	0907		Correction on inter eNB CoMP	13.2.0
70	RP-152102	0910	5	Support of SIPTO stand-alone architecture in dual connectivity	13.2.0
70	RP-152102	0911	2	Support of SIPTO and LIPA in dual connectivity	13.2.0
70	RP-152102		6	Support of handover without SeNB change	13.2.0
70	RP-152102	0916	2	Handling of User Inactivity in the SeNB	13.2.0
70	RP-152086	0918		Correction of Subband Index	13.2.0
70	RP-152085	+	4	Correction of intra cell handovers in multiband deployments	13.2.0
70	RP-152102	0927	2	Extension of UE X2AP ID	13.2.0
70	RP-152102	0929	2	SIPTO@LN and LIPA bearer deactivation for DC	13.2.0
70	RP-152103	0932	3	Introduction of feMDT	13.2.0
70	RP-152108	0936	2	Addition of the Cell Deployment Status Indicator and replacing cell	13.2.0
				information	
70	RP-152102	0939	1	Tunnel Information of BBAI in Dual Connectivity	13.2.0
71	RP-160449	0937	3	Addition of X2 Removal Threshold to the X2 Removal Request message	13.3.0
71	RP-160449	0949	2	Modification of an ongoing resource reporting procedure	13.3.0
71	RP-160448	0950	1	Correction on SeNB Addition Preparation concerning inter-MeNB	13.3.0
				handover without SeNB change	
71	RP-160448	0953	1	Correction on usage of extended eNB UE X2AP ID	13.3.0
71	RP-160448	0954		Correction for SeNB Addition behaviour Abnormal	13.3.0
71	RP-160451	0959		Clarification on the abnormal condition for DC SIPTO@LN	13.3.0
71	RP-160449	0962	1	Rapporteur"s Update	13.3.0
71	RP-160448	0963		Correction on Old/New eNB UE X2AP ID	13.3.0
72	RP-161042	0965		Introduction of the inter-eNB UE Context Resume function	13.4.0
72	RP-161043	0968		Correction on the DC function description	13.4.0
72	RP-161043	0969		Correction on eNB UE X2AP ID Extension	13.4.0
72	RP-161043	0972		Indication of Bearer Type for cIOT	13.4.0
72	RP-161047	0978	_	Correction of RSRP Measurement Report List	13.4.0
73	RP-161551	0989	1	Correction of NB-IoT inter node RRC container	13.5.0
73	RP-161550	0998		Correction on Security Related Information in UE Context Retrieval	13.5.0
	171-101000	0990		Request	13.3.0
74	RP-162340	0995	3	Correction to Served Cell Information for NB-IoT	13.6.0

History

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