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Contents

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.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

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

[2] 3GPP TS 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)".

[5] ITU-T Recommendation X.691 (2002-07): "Information technology - ASN.1 encoding rules - Specification of Packed Encoding Rules (PER) ".

[6] 3GPP TS 32.422: "Telecommunication Management; Subscriber and Equipment Trace; Trace 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".

[10] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation".

[11] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures ".

[12] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[13] 3GPP TS 23.203: "Policy and charging control architecture".

[14] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System; Stage 3".

[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".

[31] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol Specification".

[32] 3GPP TS 37.340: "Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Multi-connectivity; Stage 2".

[33] 3GPP TS 38.323: "NR; Packet Data Convergence Protocol (PDCP) specification".

[34] 3GPP TS 38.401: "NG-RAN; Architecture description".

[35] IETF RFC 5905: "Network Time Protocol Version 4: Protocol and Algorithms Specification".

[36] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[37] 3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".

[38] 3GPP TS 23.501: "System Architecture for the 5G System"

[39] 3GPP TS 38.413: "NG Radio Access Network (NG-RAN); NG Application Protocol (NGAP)".

[40] 3GPP TS 36.322: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Link Control (RLC) protocol specification".

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].

ACL functionality: A functionality controlling the access to network nodes. In case of Access Control Lists (ACL) functionality is applied in a network node the network node may only accept connections from other peer network nodes once the source addresses of the sending network node is already known in the target node.

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].

E-UTRA-NR Dual Connectivity: as defined in TS 37.340 [32].

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].

en-gNB: as defined in TS 37.340 [32].

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
ACL	Access Control List
BBF	Broadband Forum
BL	Bandwidth reduced Low complexity
CCO	Cell Change Order
CE	Coverage Enhancement
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

EN-DC	E-UTRA-NR Dual Connectivity
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
LWA	LTE-WLAN Aggregation
MCG	Master Cell Group
MDT	Minimization of Drive Tests
MeNB	Master eNB
MME	Mobility Management Entity
MTSI	Multimedia Telephony Service for IMS
NAICS	Network-Assisted Interference Cancellation and Suppression
NR	New Radio
PDCP	Packet Data Convergence Protocol
PLMN	Public Land Mobile Network
ProSe	Proximity Service
QMC	QoE Measurement Collection
QoE	Quality of Experience
SCG	Secondary Cell Group
S-GW	Serving Gateway
SeNB	Secondary eNB
SgNB	Secondary gNB
SIPTO	Selected IP Traffic Offload
SIPTO@LN	Selected IP Traffic Offload at the Local Network
SN	Sequence Number
SSID	Service Set Identifier
TAC	Tracking Area Code
UE	User Equipment
UL	Uplink
V2X	Vehicle-to-Everything
WLAN	Wireless Local Area Network
WT	WLAN Termination

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.
- E-UTRA-NR Dual Connectivity. This function allows the eNB to request another en-gNB 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 or en-gNB 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 signalling connection between two eNBs or between eNB and en-gNB in a controlled manner.
- Inter-eNB UE Context Retrieval. This function allows retrieval of a UE context in case of resumption or re-establishment of an RRC connection.
- Secondary RAT Data Usage Report. This function allows eNB to get the uplink and downlink data volumes for the Secondary RAT on a per E-RAB basis.
- E-UTRA - NR Spectrum Sharing. This function allows uplink and downlink spectrum sharing between a number of E - UTRA and a number of NR cells with overlapping coverage.
- EN-DC Configuration Transfer. This function supports en-gNB X2 TNL address discovery.

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
E-UTRA-NR Dual Connectivity	a) SgNB Addition Preparation b) SgNB Reconfiguration Completion c) MeNB initiated SgNB Modification Preparation d) SgNB initiated SgNB Modification e) SgNB change f) MeNB initiated SgNB Release g) SgNB initiated SgNB Release h) SgNB Counter Check i) RRC transfer j) EN-DC X2 Setup k) EN-DC Configuration Update l) EN-DC Cell Activation m) SgNB Activity Notification n) EN-DC X2 Removal o) gNB Status Indication
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 Retrieval	a) Retrieve UE Context b) Data Forwarding Address Indication
Secondary RAT Data Usage Report	Secondary RAT Data Usage Report
E-UTRA – NR Spectrum Sharing	E-UTRA - NR Cell Resource Coordination
EN-DC Configuration Transfer	EN-DC Configuration Transfer

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 Procedure	Initiating Message	Successful Outcome	Unsuccessful Outcome
		Response message	Response message
Handover Preparation	HANDOVER REQUEST	HANDOVER REQUEST ACKNOWLEDGE	HANDOVER PREPARATION FAILURE
Reset	RESET REQUEST	RESET RESPONSE	
X2 Setup	X2 SETUP REQUEST	X2 SETUP RESPONSE	X2 SETUP FAILURE
eNB Configuration Update	ENB CONFIGURATION UPDATE	ENB CONFIGURATION UPDATE ACKNOWLEDGE	ENB CONFIGURATION UPDATE FAILURE
Resource Status Reporting Initiation	RESOURCE STATUS REQUEST	RESOURCE STATUS RESPONSE	RESOURCE STATUS FAILURE
Mobility Settings Change	MOBILITY CHANGE REQUEST	MOBILITY CHANGE ACKNOWLEDGE	MOBILITY CHANGE FAILURE
Cell Activation	CELL ACTIVATION REQUEST	CELL ACTIVATION RESPONSE	CELL ACTIVATION FAILURE
SeNB Addition Preparation	SENB ADDITION REQUEST	SENB ADDITION REQUEST ACKNOWLEDGE	SENB ADDITION REQUEST REJECT
MeNB initiated SeNB Modification Preparation	SENB MODIFICATION REQUEST	SENB MODIFICATION REQUEST ACKNOWLEDGE	SENB MODIFICATION REQUEST REJECT
SeNB initiated SeNB Modification	SENB MODIFICATION REQUIRED	SENB MODIFICATION CONFIRM	SENB MODIFICATION REFUSE
SeNB initiated SeNB Release	SENB RELEASE REQUIRED	SENB RELEASE CONFIRM	
X2 Removal	X2 REMOVAL REQUEST	X2 REMOVAL RESPONSE	X2 REMOVAL FAILURE
Retrieve UE Context	RETRIEVE UE CONTEXT REQUEST	RETRIEVE UE CONTEXT RESPONSE	RETRIEVE UE CONTEXT FAILURE
SgNB Addition Preparation	SGNB ADDITION REQUEST	SGNB ADDITION REQUEST ACKNOWLEDGE	SGNB ADDITION REQUEST REJECT
MeNB initiated SgNB Modification Preparation	SGNB MODIFICATION REQUEST	SGNB MODIFICATION REQUEST ACKNOWLEDGE	SGNB MODIFICATION REQUEST REJECT
SgNB initiated SgNB Modification	SGNB MODIFICATION REQUIRED	SGNB MODIFICATION CONFIRM	SGNB MODIFICATION REFUSE
SgNB change	SGNB CHANGE REQUIRED	SGNB CHANGE CONFIRM	SGNB CHANGE REFUSE
MeNB initiated SgNB Release	SGNB RELEASE REQUEST	SGNB RELEASE REQUEST ACKNOWLEDGE	SGNB RELEASE REQUEST REJECT
SgNB initiated SgNB Release	SGNB RELEASE REQUIRED	SGNB RELEASE CONFIRM	
EN-DC X2 Setup	EN-DC X2 SETUP REQUEST	EN-DC X2 SETUP RESPONSE	EN-DC X2 SETUP FAILURE
EN-DC Configuration Update	EN-DC CONFIGURATION UPDATE	EN-DC CONFIGURATION UPDATE ACKNOWLEDGE	EN-DC CONFIGURATION UPDATE FAILURE
EN-DC Cell Activation	EN-DC CELL ACTIVATION REQUEST	EN-DC CELL ACTIVATION RESPONSE	EN-DC CELL ACTIVATION FAILURE
E-UTRA - NR Cell Resource Coordination	E-UTRA - NR CELL RESOURCE COORDINATION REQUEST	E-UTRA - NR CELL RESOURCE COORDINATION RESPONSE	

Elementary Procedure	Initiating Message	Successful Outcome	Unsuccessful Outcome
		Response message	Response message
EN-DC X2 Removal	EN-DC X2 REMOVAL REQUEST	EN-DC X2 REMOVAL RESPONSE	EN-DC X2 REMOVAL FAILURE

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
SgNB Reconfiguration Completion	SGNB RECONFIGURATION COMPLETE
SgNB Counter Check	SGNB COUNTER CHECK REQUEST
RRC Transfer	RRC TRANSFER
Secondary RAT Data Usage Report	SECONDARY RAT DATA USAGE REPORT
SgNB Activity Notification	SGNB ACTIVITY NOTIFICATION
Data Forwarding Address Indication	DATA FORWARDING ADDRESS INDICATION
gNB Status Indication	GNB STATUS INDICATION
EN-DC Configuration Transfer	EN-DC CONFIGURATION TRANSFER
Trace Start	TRACE START
Deactivate Trace	DEACTIVATE TRACE

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

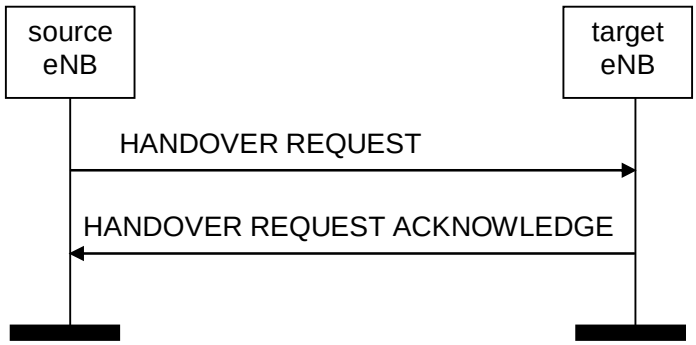

Figure 8.2.1.2-1: Handover Preparation, successful operation

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 $T_{RELOCprep}$.

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 tunnel endpoint, i.e. the information contained in the *Transport Layer address* IE and *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 $T_{RELOCprep}$, start the timer $TX2_{RELOCoverall}$ 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 *Trace Activation* IE includes the *UE Application layer measurement configuration* IE, initiate the requested trace session and QoE Measurement Collection function as described in TS 36.300 [15].

- if the *Trace Activation* IE includes the *Bluetooth Measurement Configuration* IE, within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [31].

- if the *Trace Activation* IE includes the *WLAN Measurement Configuration* IE, within the *MDT Configuration* IE, take it into account for 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 *V2X Services 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 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 *UE Context Reference at the WT* 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 *WT UE Context Kept Indicator* IE set to "True" in the HANDOVER REQUEST ACKNOWLEDGE message; the source eNB shall use this information as specified in TS 36.300 [15].

If the *UE Context Reference at the SgNB* IE is contained in the HANDOVER REQUEST message the target eNB may use it as specified in TS 37.340 [32]. 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 37.340 [32].

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.If the *UE Sidelink Aggregate Maximum Bit Rate* IE is contained in the HANDOVER REQUEST message, the target eNB shall, if supported, use it for the concerned UE's sidelink communication in network scheduled mode for V2X services.

If the *NR UE Security Capabilities* IE is included in the HANDOVER REQUEST message, the target eNB shall, if supported, store this information in the UE context and send it to the respective peer node during subsequent handover preparations and/or EN-DC operations for the UE as defined in TS 33.401 [15].

If the *Aerial UE subscription information* IE is included in the HANDOVER REQUEST message, the target eNB shall, if supported, store this information in the UE context and use it as defined in TS 36.300 [15].

If the *Subscription Based UE Differentiation Information* IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [12].

8.2.1.3 Unsuccessful Operation

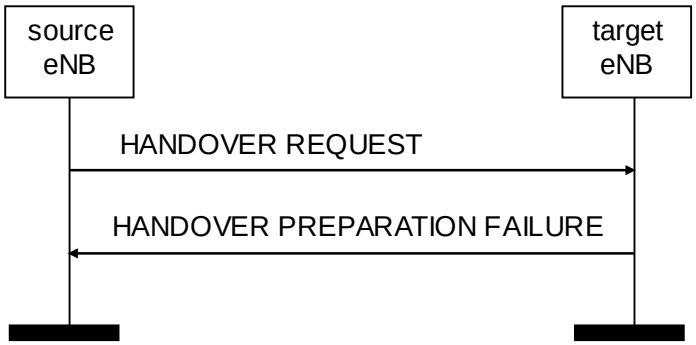

Figure 8.2.1.3-1: Handover Preparation, unsuccessful operation

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 $T_{RELOCprep}$ 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, between the eNBs involved in dual connectivity and/or LWA, or between MeNB and en-gNB involved in EN-DC, 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, LWA, RRC connection re-establishment or EN-DC, 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, LWA, RRC connection re-establishment or EN-DC 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, LWA, RRC connection re-establishment or EN-DC to which data is forwarded, is specified by the behaviour of the "target eNB".
- the behaviour of the en-gNB from which the E-RAB context is transferred, i.e., the en-gNB involved in EN-DC from which data forwarding, is specified by the behaviour of the "source en-gNB",
- the behaviour of the en-gNB to which the E-RAB context is transferred, i.e., the en-gNB involved in EN-DC to which data is forwarded, is specified by the behaviour of the "target en-gNB".

The procedure uses UE-associated signalling.

8.2.2.2 Successful Operation

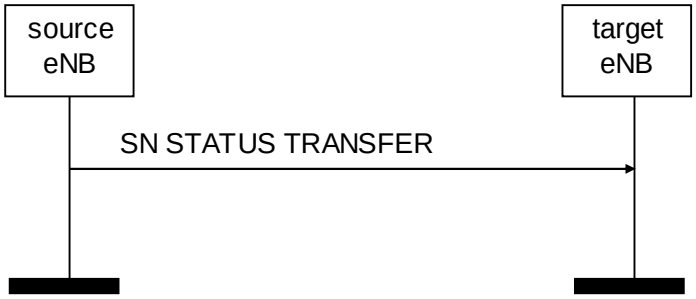

Figure 8.2.2.2-1: SN Status Transfer, successful operation

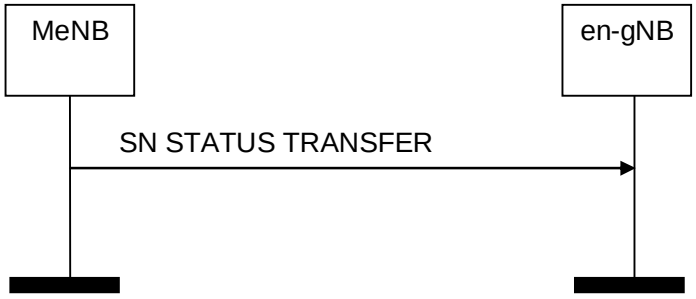

Figure 8.2.2.2-2: MeNB initiated SN Status Transfer for EN-DC, successful operation

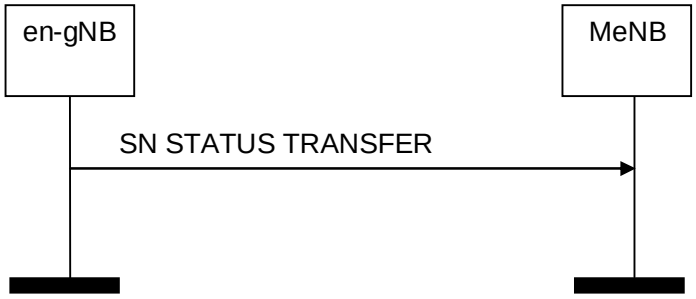

Figure 8.2.2.2-3: en-gNB initiated SN Status Transfer for EN-DC, successful operation

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 of the DL COUNT Value for 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.

EN-DC

If the en-gNB sends the message to the MeNB, then the *SgNB UE X2AP ID* IE shall be included in the SN STATUS TRANSFER message, while the *Old eNB UE X2AP ID* IE is ignored. The *SgNB UE X2AP ID* IE is used as the old UE ID.

If the MeNB sends the message to the en-gNB, then the *SgNB UE X2AP ID* IE shall be included in the SN STATUS TRANSFER message, while the *New eNB UE X2AP ID* IE is ignored. The *SgNB UE X2AP ID* IE is used as the new UE ID.

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. For EN-DC, the UE Context Release procedure is initiated by the MeNB to finally release the UE context at the en-gNB. For EN-DC specific mobility scenarios specified in TS 37.340 [32] where SCG radio resources in the en-gNB are kept, only resources related to the UE-associated signalling connection between the MeNB and the en-gNB 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

Figure 8.2.3.2-3: UE Context Release, successful operation for EN-DC

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].

EN-DC

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

Upon reception of the UE CONTEXT RELEASE message, the en-gNB may release radio and control plane related resources associated to the UE context. For E-RABs for which data forwarding has been performed, the en-gNB should continue forwarding of U-plane data as long as packets are received at the en-gNB from the EPC or the en-gNB buffer has not been emptied (an implementation dependent mechanism decides that data forwarding can be stopped).

In the course of signalling for EN-DC, the *SgNB UE X2AP ID* IE shall be included in the UE CONTEXT RELEASE message, while the *Old eNB UE X2AP ID* IE is ignored. The *SgNB UE X2AP ID* IE is used as the new UE ID.

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].

Interaction with the MeNB initiated SgNB Release procedure:

The en-gNB may receive the SGNB RELEASE REQUEST message including the *UE Context Kept Indicator* IE set to "True", upon which the en-gNB shall, if supported, only release the resources related to the UE-associated signalling connection between the MeNB and the en-gNB, as specified in TS 37.340 [32].

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 $TX2_{RELOCoverall}$, 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

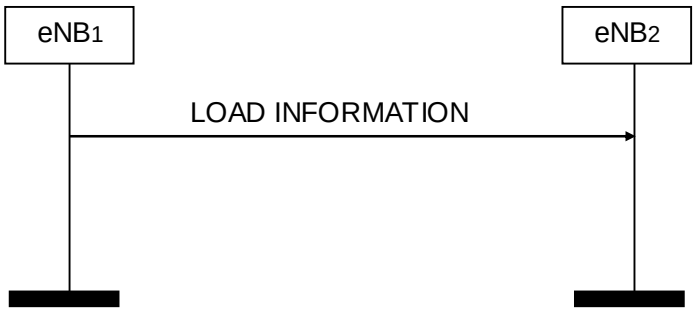

Figure 8.3.1.2-1: Load Indication, successful operation

An eNB_1 initiates the procedure by sending LOAD INFORMATION message to a peer eNB_2.

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

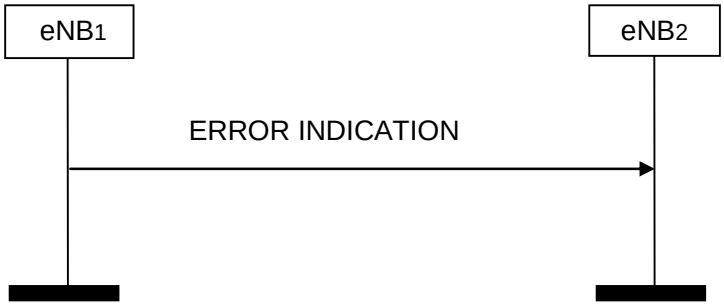

Figure 8.3.2.2-1: Error Indication, successful operation.

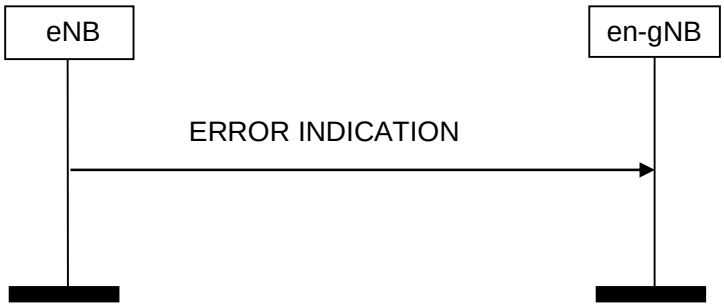

Figure 8.3.2.2-2: eNB initiated Error Indication for EN-DC, successful operation.

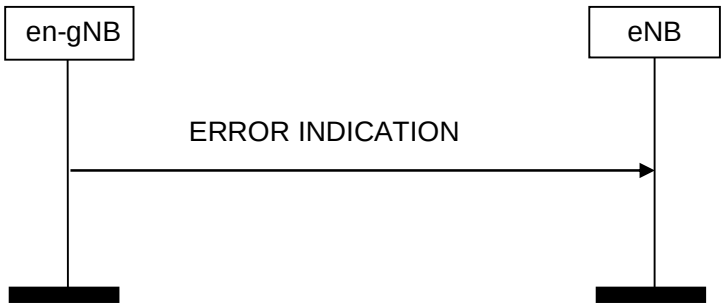

Figure 8.3.2.2-3: en-gNB initiated Error Indication for EN-DC, successful operation.

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. In case the Error Indication procedure is triggered by UE associated signalling, in the course of signalling for EN-DC, the *Old en-gNB UE X2AP ID* IE and the *New eNB UE X2AP ID* IE shall be included in the ERROR INDICATION message. If any of *Old eNB UE X2AP ID* IE, *Old en-gNB UE X2AP ID* IE and *New eNB UE X2AP ID* IE is not correct, the cause shall be set to appropriate value e.g. "unknown Old eNB UE X2AP ID", "unknown Old en-gNB 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.

In case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], if the Error Indication procedure is triggered by non UE-associated signalling, the ERROR INDICATION message shall include the *Interface Instance Indication* IE to identify the corresponding interface instance.

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

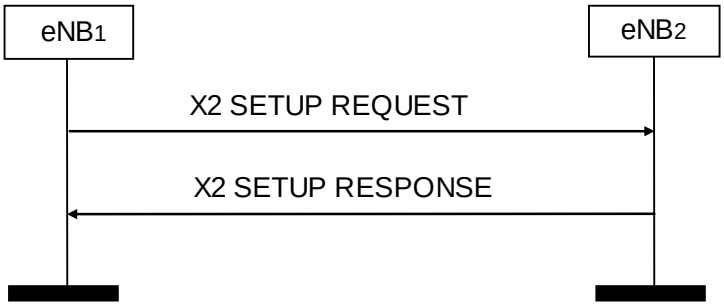

Figure 8.3.3.2-1: X2 Setup, successful operation

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 eNB_1 may include the *Neighbour Information* IE in the X2 SETUP REQUEST message. The candidate eNB_2 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 eNB_1 may include the *TAC* IE with the *Neighbour Information* IE in the X2 SETUP REQUEST message. The candidate eNB_2 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 eNB_1 may include the *NR Neighbour Information* IE in the X2 SETUP REQUEST message. The candidate eNB_2 may also include the *NR Neighbour Information* IE in the X2 SETUP RESPONSE message. The *NR Neighbour Information* IE shall only include NR cells capable of performing EN-DC with the corresponding served E-UTRA cell. The eNB receiving the *NR Neighbour Information* IE may use it according to TS 36.300 [15].

The initiating eNB_1 may include the *Number of Antenna Ports* IE in the X2 SETUP REQUEST message. The candidate eNB_2 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 eNB_1 may include the *MBSFN Subframe Info* IE in the X2 SETUP REQUEST message. The candidate eNB_2 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 eNB_1 the X2 SETUP REQUEST message shall contain the *CSG ID* IE. For each CSG cell or hybrid cell served by the candidate eNB_2 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 eNB_1 may include the *MBMS Service Area Identity List* IE in the X2 SETUP REQUEST message. The candidate eNB_2 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 eNB_1 the X2 SETUP REQUEST message may contain the *MultibandInfoList* IE and may also contain the *FreqBandIndicatorPriority* IE. For each cell served by the candidate eNB_2 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 eNB_1 may include the *LHN ID* IE in the X2 SETUP REQUEST message. The candidate eNB_2 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].

The initiating eNB_1 may include the *BandwidthReducedSI* IE in the X2 SETUP REQUEST message. The candidate eNB_2 may also include *BandwidthReducedSI* IE in the X2 SETUP RESPONSE message. The eNB receiving the IE may use it to determine a suitable target in case of subsequent outgoing mobility involving BL UEs or UEs requiring CE.

8.3.3.3 Unsuccessful Operation

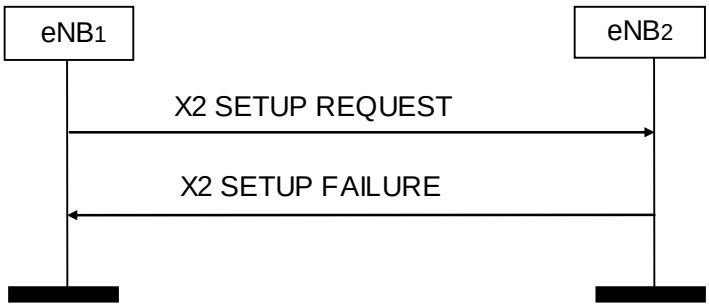

Figure 8.3.3.3-1: X2 Setup, unsuccessful operation

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 eNB_1 shall wait at least for the indicated time before reinitiating the X2 Setup procedure towards the same eNB_2.

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 eNB_1 does not receive either X2 SETUP RESPONSE message or X2 SETUP FAILURE message, the eNB_1 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 eNB_1 receives an X2 SETUP REQUEST message from the peer entity on the same X2 interface:

- In case the eNB_1 answers with an X2 SETUP RESPONSE message and receives a subsequent X2 SETUP FAILURE message, the eNB_1 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 eNB_1 answers with an X2 SETUP FAILURE message and receives a subsequent X2 SETUP RESPONSE message, the eNB_1 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, or the resources in eNB and en-gNB involved in the EN-DC 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, EN-DC X2 Setup procedure.

The procedure uses non UE-associated signalling.

8.3.4.2 Successful Operation

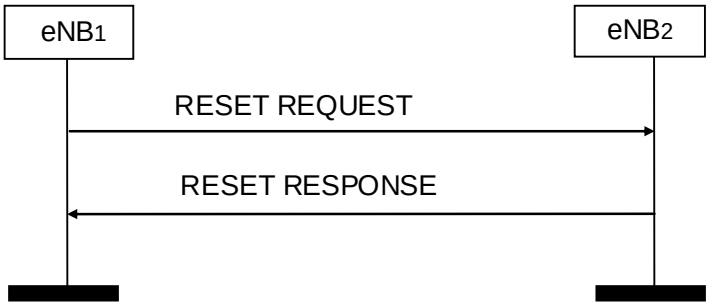

Figure 8.3.4.2-1: Reset, successful operation

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.

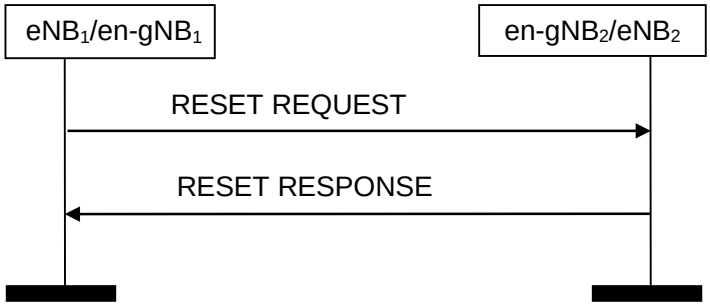

Figure 8.3.4.2-2: Reset, successful operation for EN-DC.

The procedure is initiated with a RESET REQUEST message sent from the eNB_1/en-gNB_1 to en-gNB_2/eNB_2. Upon receipt of this message, eNB_2/en-gNB_2 shall abort any other ongoing procedures over X2 between both nodes. eNB_2/en-gNB_2 shall delete all the context information related to eNB_1/en-gNB_1, except the application level configuration data exchanged during the EN-DC X2 Setup or EN-DC Configuration Update procedures, and release the corresponding resources. After completion of release of the resources, eNB_2/en-gNB_2 shall respond with a RESET RESPONSE message.

If case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], the RESET REQUEST and the RESET RESPONSE messages shall include the *Interface Instance Indication* IE to identify the corresponding interface instance.

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 responding node receives the RESET REQUEST message from the peer entity on the same X2 interface, it shall respond with the RESET RESPONSE message as described in 8.3.4.2.

If the initiating node does not receive RESET RESPONSE message, the initiating node may reinitiate the Reset procedure towards the same eNB/en-gNB, 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

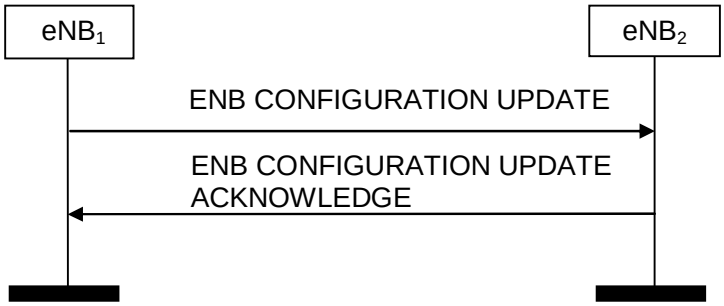

Figure 8.3.5.2-1: eNB Configuration Update, successful operation

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, eNB_2 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, eNB_2 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, eNB_2 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, eNB_2 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 eNB_2 shall consider that the subframe is designated as ABS by the sending eNB.

- If *BandwidthReducedSI* IE is contained in the *Served Cell Information* IE in the ENB CONFIGURATION UPDATE message, eNB_2 may use this information to determine a suitable target in case of subsequent outgoing mobility involving BL UEs or UEs requiring CE.

  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, eNB_2 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, eNB_2 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, eNB_2 shall remove the GU Group Id from its GU Group Id List.

If *Neighbour Information* IE is contained in the ENB CONFIGURATION UPDATE message, eNB_2 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].

If the *NR Neighbour Information* IE is contained in the ENB CONFIGURATION UPDATE message, eNB_2 may use this information to update its neighbour cell relations or use it for other functions. The *NR Neighbour Information* IE shall only include NR cells capable of performing EN-DC with the corresponding served E-UTRA cell. The eNB receiving the *NR Neighbour Information* IE may use it according to TS 36.300 [15].

After successful update of requested information, eNB_2 shall reply with the ENB CONFIGURATION UPDATE ACKNOWLEDGE message to inform the initiating eNB_1 that the requested update of application data was performed successfully. In case the peer eNB_2 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 eNB_1 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, eNB_2 may use the information in the *Cell Coverage State* IE to identify the cell deployment configuration enabled by eNB_1 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 eNB_2 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 eNB_2 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 eNB_2 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 eNB_2 which has not stored a *FreqBandIndicatorPriority* IE received from eNB_1, but has signaled a *FreqBandIndicatorPriority* IE to eNB_1 after the TNL association has become available, receives an ENB CONFIGURATION UPDATE message from eNB_1 containing the *FreqBandIndicatorPriority* IE, the eNB_2 shall initiate the eNB Configuration Update procedure towards eNB_1 including the *FreqBandIndicatorPriority* IE.

8.3.5.3 Unsuccessful Operation

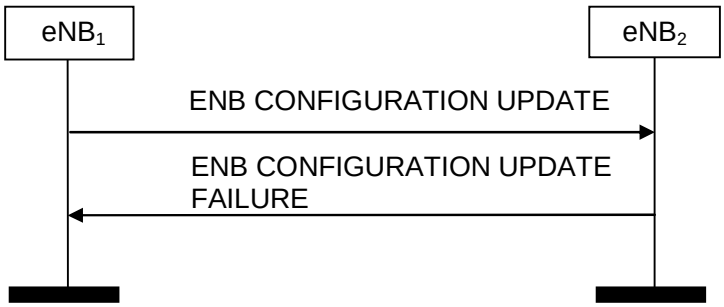

Figure 8.3.5.3-1: eNB Configuration Update, unsuccessful operation

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 eNB_1 shall wait at least for the indicated time before reinitiating the eNB Configuration Update procedure towards the same eNB_2. Both nodes shall continue to operate the X2 with their existing configuration data.

8.3.5.4 Abnormal Conditions

If the eNB_1 after initiating eNB Configuration Update procedure receives neither ENB CONFIGURATION UPDATE ACKNOWLEDGE message nor ENB CONFIGURATION UPDATE FAILURE message, the eNB_1 may reinitiate the eNB Configuration Update procedure towards the same eNB_2, 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

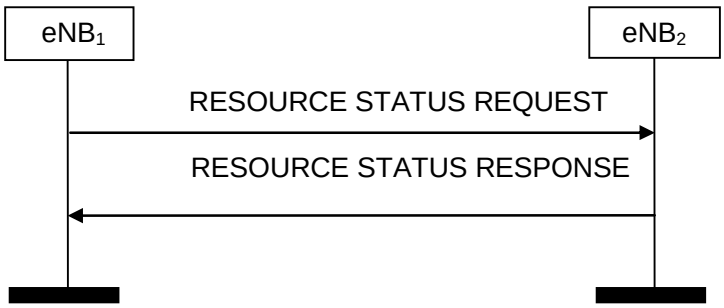

Figure 8.3.6.2-1: Resource Status Reporting Initiation, successful operation

The procedure is initiated with a RESOURCE STATUS REQUEST message sent from eNB_1 to eNB_2. Upon receipt, eNB_2:

- 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 eNB_2 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 eNB_2 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 eNB_2 shall perform measurements on. For each cell, the eNB_2 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 eNB_1 had indicated the ABS pattern to eNB_2;

- 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, eNB_2 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, eNB_2 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, eNB_2 shall use its value as the minimum time interval between two subsequent RESOURCE STATUS UPDATE messages that include the *CSI Report* IE.

If eNB_2 is capable to provide all requested resource status information, it shall initiate the measurement as requested by eNB_1, and respond with the RESOURCE STATUS RESPONSE message.

If eNB_2 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

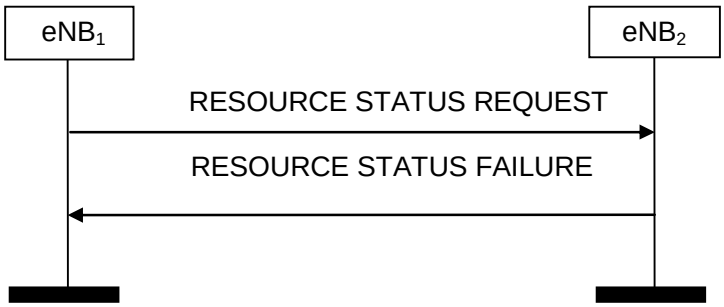

Figure 8.3.6.3-1: Resource Status Reporting Initiation, unsuccessful operation

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 eNB_1 does not receive either RESOURCE STATUS RESPONSE message or RESOURCE STATUS FAILURE message, the eNB_1 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 eNB_1 receives the RESOURCE STATUS RESPONSE message including the *Measurement Initiation Result* IE containing no admitted measurements, the eNB_1 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 eNB_2 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 eNB_2 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 eNB_2 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 eNB_2 shall initiate the RESOURCE STATUS FAILURE message and the cause shall be set to appropriate value e.g. "NoReportPeriodicity".

If the eNB_2 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 eNB_2 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, eNB_2 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, eNB_2 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, eNB_2 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 eNB_2 to report the result of measurements admitted by eNB_2 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 eNB_2 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 eNB_1 receives the RESOURCE STATUS UPDATE message which includes the *UE ID* IE in the *RSRP Measurement Report List* IE, the eNB_1 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, eNB_1 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 eNB_1 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 eNB_1 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 eNB_1 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

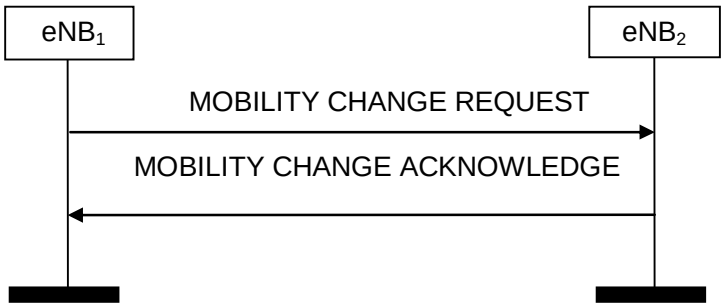

Figure 8.3.8.2-1: Mobility Settings Change, successful operation

The procedure is initiated with a MOBILITY CHANGE REQUEST message sent from eNB_1 to eNB_2.

Upon receipt, eNB_2 shall evaluate if the proposed eNB_2 handover trigger modification may be accepted. If eNB_2 is able to successfully complete the request it shall reply with MOBILITY CHANGE ACKNOWLEDGE.

8.3.8.3 Unsuccessful Operation

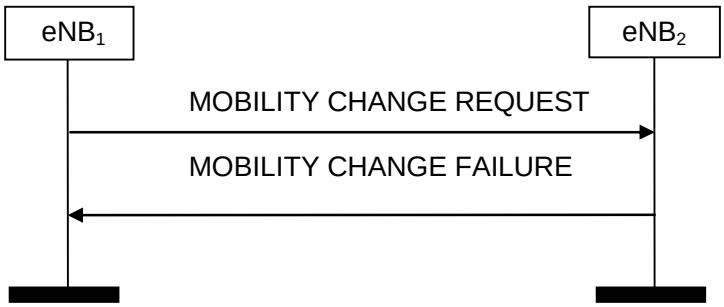

Figure 8.3.8.3-1: Mobility Settings Change, unsuccessful operation

If the requested parameter modification is refused by the eNB_2, or if the eNB_2 is not able to complete the procedure, the eNB_2 shall send a MOBILITY CHANGE FAILURE message with the *Cause* IE set to an appropriate value. The eNB_2 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.

eNB_2 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 eNB_1 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 eNB_2 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.

eNB_2 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 eNB_1 shall ignore the values in the *Failure cell PCI* IE, *Re-establishment cell ECGI* IE, *C-RNTI* IE and *ShortMAC-I* IE.

eNB_2 may include the *RRC Conn Reestab Indicator* IE in the RLF INDICATION message, which may be used by the eNB_1 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 eNB_1 indicates to eNB_2 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 eNB_1, the eNB_1 should include in HANDOVER REPORT message:

- the *Mobility Information* IE, if the *Mobility Information* IE was sent for this handover from eNB_2;
- the *Source cell C-RNTI* IE.

If received, the eNB_2 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 eNB_1 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 eNB_1 indicates to eNB_2 that a completed handover from a cell of eNB_2 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 eNB_1 (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

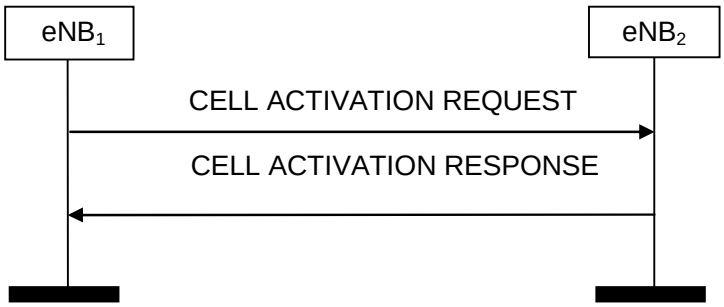

Figure 8.3.11.2-1: Cell Activation, successful operation

An eNB_1 initiates the procedure by sending a CELL ACTIVATION REQUEST message to a peer eNB_2.

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

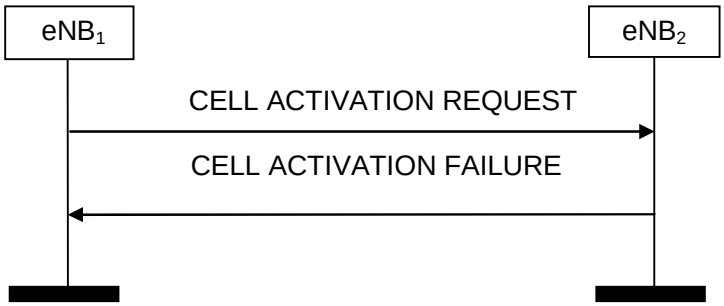

Figure 8.3.11.3-1: Cell Activation, unsuccessful operation

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

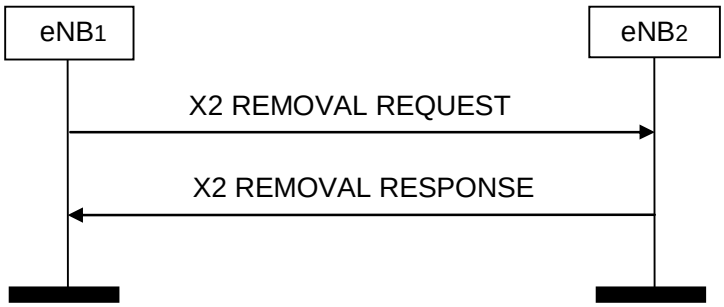

Figure 8.3.12.2-1: X2 Removal, successful operation

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 eNB_2 shall, if supported, accept to remove the signalling connection with eNB_1 if the X2 Benefit Value of the signalling connection determined at the candidate eNB_2 is lower than the value of the *X2 Removal Threshold* IE.

8.3.12.3 Unsuccessful Operation

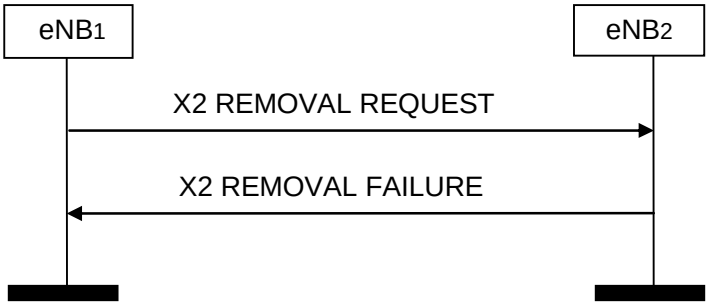

Figure 8.3.12.3-1: X2 Removal, unsuccessful operation

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) or to retrieve the UE context for a UE which attempts to re-establish its RRC connection in an eNB (the new eNB) different from the eNB (the old eNB) where the RRC connection failed, e.g. due to RLF.

The procedure uses UE-associated signalling.

8.3.13.2 Successful Operation

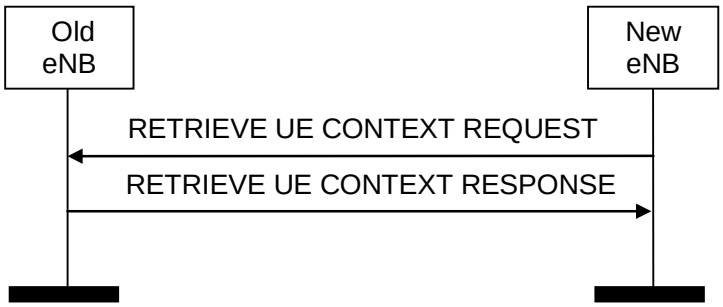

Figure 8.3.13.2-1: Retrieve UE Context, successful operation

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, optionally the C-RNTI, the failure cell PCI 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].

If the *C-RNTI* IE is present in the RETRIEVE UE CONTEXT REQUEST, the old eNB shall ignore the *Resume ID* IE.

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,
- *V2X Services Authorized* IE,
- *Aerial UE subscription information* IE,
- *Subscription Based UE Differentiation Information* 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.

If the *UE Sidelink Aggregate Maximum Bit Rate* IE is contained in the RETRIEVE UE CONTEXT RESPONSE message, the new eNB shall, if supported, use it for the concerned UE's sidelink communication in network scheduled mode for V2X services.

If the *Aerial UE subscription information* IE is included in the RETRIEVE UE CONTEXT RESPONSE message, the target eNB shall, if supported, store this information in the UE context and use it as defined in TS 36.300 [15].

For each E-RAB for which the old eNB proposes to do forwarding of downlink data, the old eNB shall include the *DL Forwarding* IE within the *E-RABs To Be Setup Item* IE of the RETRIEVE UE CONTEXT RESPONSE message.

8.3.13.3 Unsuccessful Operation

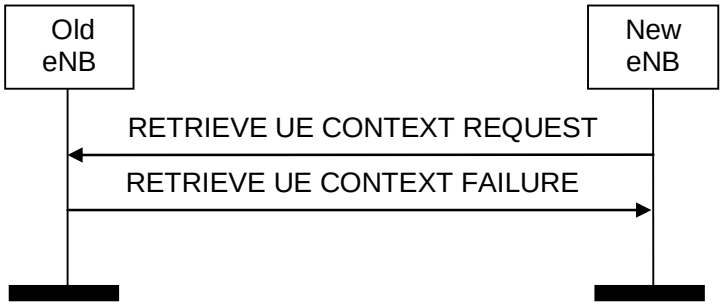

Figure 8.3.13.3-1: Retrieve UE Context, unsuccessful operation

If the old eNB is not able to identify the UE context by means of the Resume ID, or with the ShortMAC-I, C-RNTI, failed cell PCI and new E-UTRAN Cell Identifier 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.

8.3.14 EN-DC X2 Removal

8.3.14.1 General

The purpose of the EN-DC X2 Removal procedure is to remove the signaling connection between eNB and en-gNB in a controlled manner. If successful, this procedure erases any existing application level configuration data in the two nodes.

NOTE: In case the signalling transport is shared among several X2-C interface instances, and the TNL association is still used by one or more X2-C interface instances, the initiating node should not initiate the removal of the TNL association.

The procedure uses non UE-associated signaling.

8.3.14.2 Successful Operation

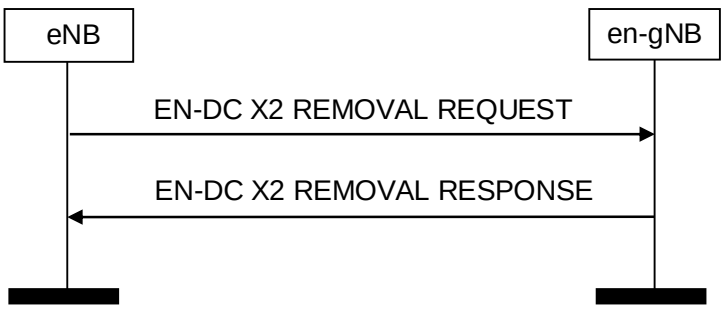

Figure 8.3.14.2-1: eNB Initiated EN-DC X2 Removal, successful operation

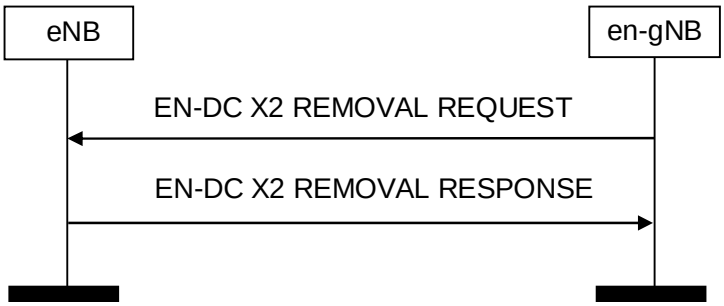

Figure 8.3.14.2-2: en-gNB Initiated EN-DC X2 Removal, successful operation

If case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], the EN-DC X2 REMOVAL REQUEST message and the EN-DC X2 REMOVAL RESPONSE message shall include the *Interface Instance Indication* IE to identify the corresponding interface instance.

eNB initiated EN-DC X2 Removal:

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

If the *X2 Removal Threshold* IE is included in the EN-DC X2 REMOVAL REQUEST message, the candidate en-gNB shall, if supported, accept to remove the signalling connection with eNB if the X2 Benefit Value of the signalling connection determined at the candidate en-gNB is lower than the value of the *X2 Removal Threshold* IE.

en-gNB initiated EN-DC X2 Removal:

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

If the *X2 Removal Threshold* IE is included in the EN-DC X2 REMOVAL REQUEST message, the candidate eNB shall, if supported, accept to remove the signalling connection with en-gNB if the X2 Benefit Value of the signalling connection determined at the candidate eNB is lower than the value of the *X2 Removal Threshold* IE.

8.3.14.3 Unsuccessful Operation

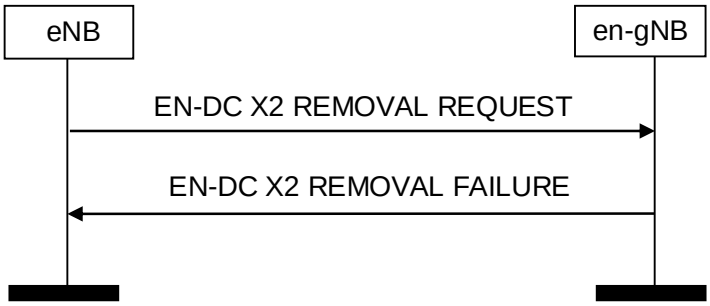

Figure 8.3.14.3-1: eNB Initiated EN-DC X2 Removal, unsuccessful operation

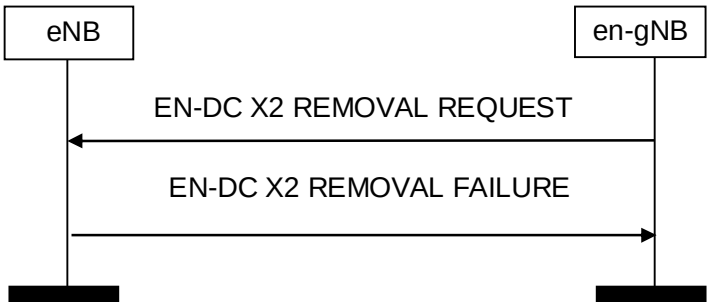

Figure 8.3.14.3-2: en-gNB Initiated EN-DC X2 Removal, unsuccessful operation

If the candidate receiving node cannot accept to remove the signaling connection with initiating node it shall respond with an EN-DC X2 REMOVAL FAILURE message with an appropriate cause value.

If case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], the EN-DC X2 REMOVAL REQUEST message and the EN-DC X2 REMOVAL FAILURE message shall include the *Interface Instance Indication* IE to identify the corresponding interface instance.

8.3.14.4 Abnormal Conditions

Void.

8.3.15 Data Forwarding Address Indication

8.3.15.1 General

The purpose of the Data Forwarding Address Indication procedure is to allow the new eNB to provide data forwarding addresses to the old eNB in case the RRC connection has been re-established, as specified in TS 36.300 [15].

The procedure uses UE-associated signalling.

8.3.15.2 Successful Operation

Figure 8.3.15.2-1: Data Forwarding Address Indication, successful operation

The new eNB initiates the procedure by sending a DATA FORWARDING ADDRESS INDICATION message to the old eNB.

For each E-RAB included in *E-RABs Data Forwarding Address List* IE, the new eNB indicates that it requests data forwarding of downlink packets to the GTP TEID indicated in the *DL GTP Tunnel Endpoint* IE.

8.3.15.3 Unsuccessful Operation

Not applicable.

8.3.15.4 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

eNB_1 initiates the procedure by sending the X2 RELEASE message to eNB_2. Upon the reception of X2 RELEASE message, eNB_2 shall consider that the signalling connection to an eNB indicated by the *eNB ID* IE is unavailable. eNB_2 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

eNB_1 initiates the procedure by sending the X2AP MESSAGE TRANSFER message to eNB_2.

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

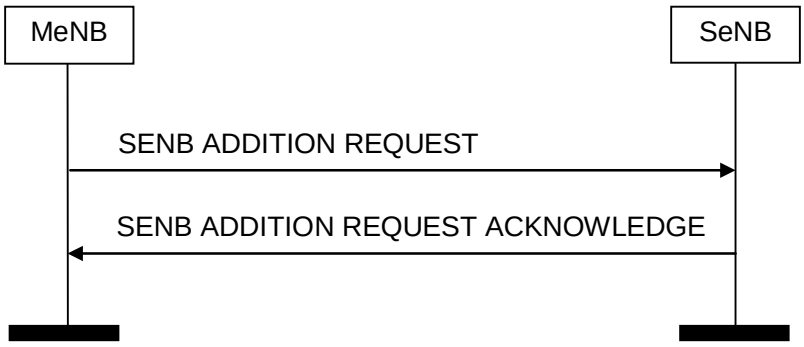

Figure 8.6.1.2-1: SeNB Addition Preparation, successful operation

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 GTP tunnel endpoint, i.e the information contained in the *Transport Layer Address* IE and the *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

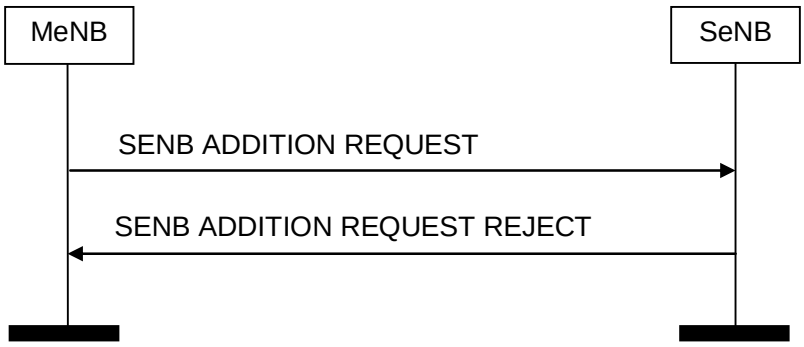

Figure 8.6.1.3-1: SeNB Addition Preparation, unsuccessful operation

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

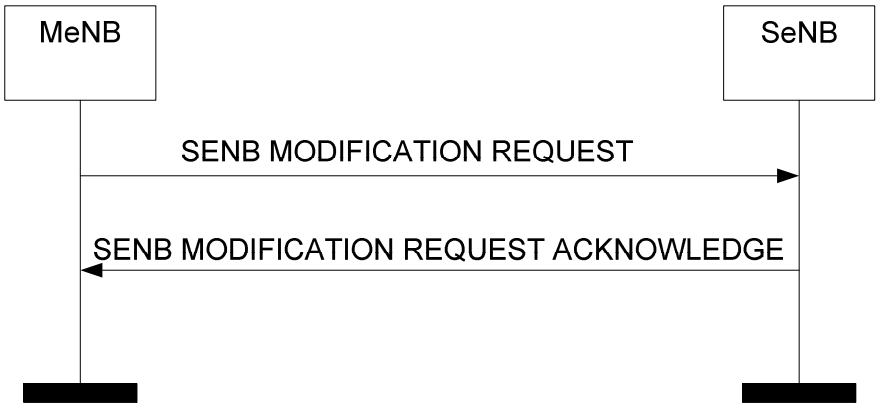

Figure 8.6.3.2-1: MeNB initiated SeNB Modification Preparation, successful operation

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

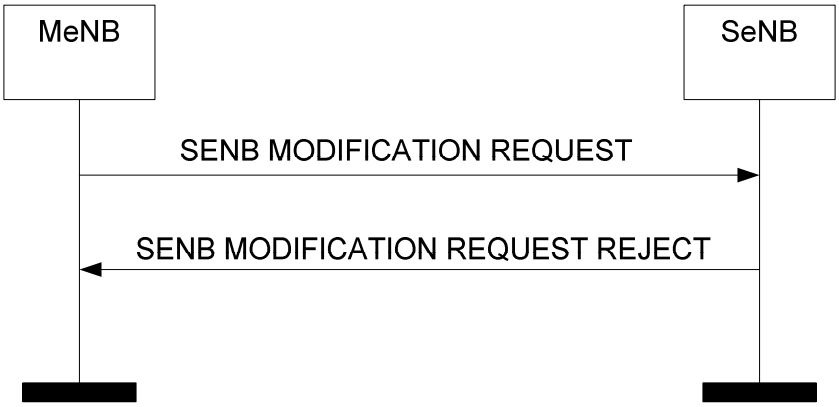

Figure 8.6.3.3-1: MeNB initiated SeNB Modification Preparation, unsuccessful operation

If the SeNB does not admit any modification requested by the MeNB, or a failure occurs during the MeNB initiated SeNB Modfication 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

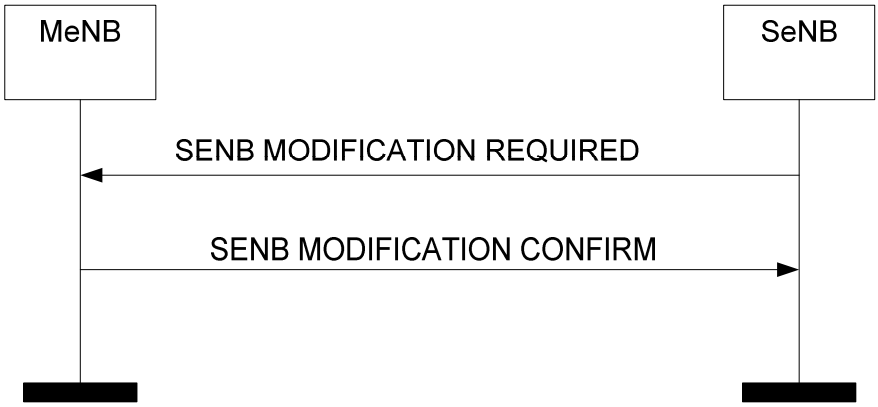

Figure 8.6.4.2-1: SeNB initiated SeNB Modification, successful operation.

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

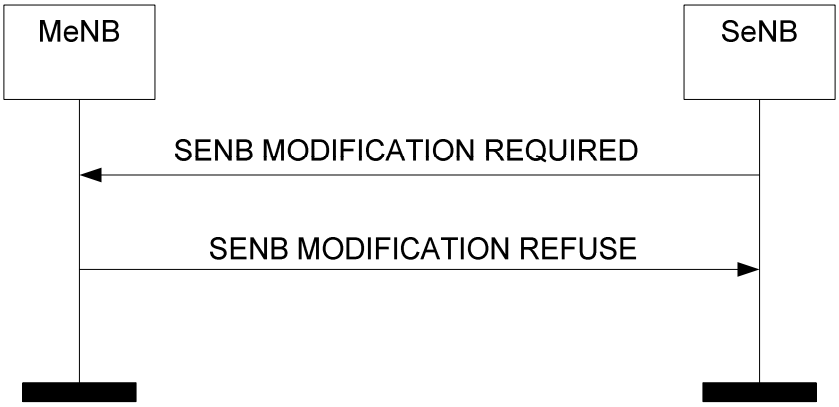

Figure 8.6.4.3-1: SeNB initiated SeNB Modification, unsuccessful operation.

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.

Upon reception of the SENB RELEASE REQUEST message containing *MakeBeforeBreak Indicator* IE set to "True", the SeNB shall, if supported, perform Make-Before-Break SeNB change as specified in TS 36.300 [15].

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

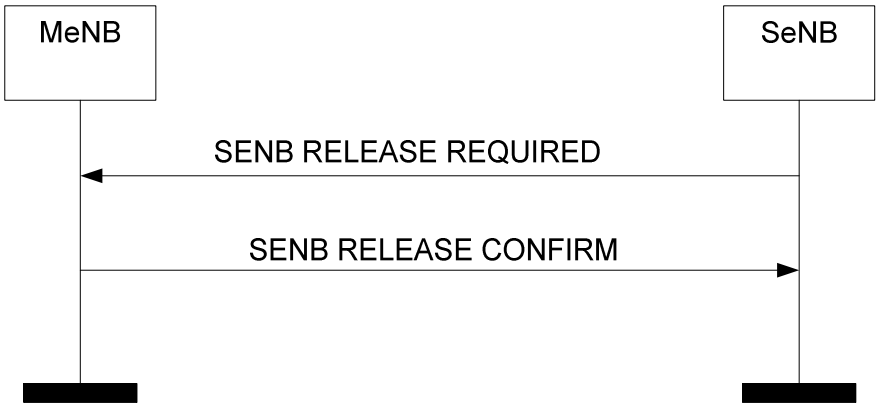

Figure 8.6.6.2-1: SeNB initiated SeNB Release, successful operation.

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.

8.7 Procedures for E-UTRAN-NR Dual Connectivity

8.7.1 EN-DC X2 Setup

8.7.1.1 General

The purpose of the EN-DC X2 Setup procedure is to exchange application level configuration data needed for eNB and en-gNB 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.

NOTE: If X2-C signalling transport is shared among multiple X2-C interface instances, one EN-DC X2 Setup procedure is issued per X2-C interface instance to be setup, i.e. several X2 Setup procedures may be issued via the same TNL association after that TNL association has become operational.

The procedure uses non UE-associated signalling.

8.7.1.2 Successful Operation

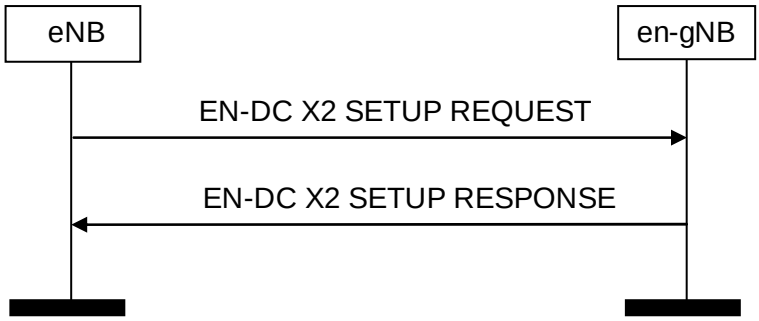

Figure 8.7.1.2-1: eNB Initiated EN-DC X2 Setup, successful operation

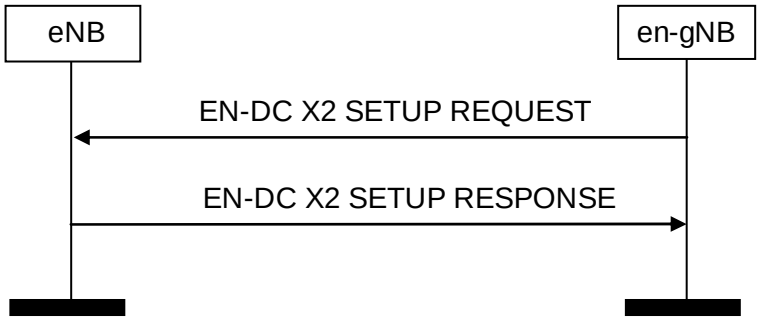

Figure 8.7.1.2-2: en-gNB Initiated EN-DC X2 Setup, successful operation

If case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], the EN-DC X2 SETUP REQUEST message and the EN-DC X2 SETUP RESPONSE message shall include the *Interface Instance Indication* IE to identify the corresponding interface instance.

eNB initiated EN-DC X2 Setup:

An eNB initiates the procedure by sending the EN-DC X2 SETUP REQUEST message to a candidate en-gNB. The candidate en-gNB replies with the EN-DC X2 SETUP RESPONSE message. The initiating eNB shall transfer the complete list of its served cells to the candidate en-gNB. The candidate en-gNB shall reply with the complete list of its served cells. If Supplementary Uplink is configured at the candidate en-gNB, the candidate en-gNB shall include in the EN-DC X2 SETUP RESPONSE message the *SUL Information* IE and the *Supported SUL band List* IE for each served cell where supplementary uplink is configured.

If the EN-DC X2 SETUP REQUEST message contains the *Protected E-UTRA Resource Indication* IE, the receiving en-gNB should take this into account for cell-level resource coordination with the eNB. The en-gNB shall consider the received *Protected E-UTRA Resource Indication* IE content valid until reception of a new update of the IE for the same eNB.

The protected resource pattern indicated in the *Protected E-UTRA Resource Indication* IE is not valid in subframes indicated by the *Reserved Subframes* IE, as well as in the non-control region of the MBSFN subframes i.e. it is valid only in the control region therein. The size of the control region of MBSFN subframes is indicated in the *Protected E-UTRA Resource Indication* IE.

en-gNB initiated EN-DC X2 Setup:

An en-gNB initiates the procedure by sending the EN-DC X2 SETUP REQUEST message to a candidate eNB. The candidate eNB replies with the EN-DC X2 SETUP RESPONSE message. The initiating en-gNB shall transfer the complete list of its served cells to the candidate eNB. The candidate eNB shall reply with the complete list of its served cells.

If Supplementary Uplink is configured at the en-gNB, the en-gNB shall include in the EN-DC X2 SETUP REQUEST message the *SUL Information* IE and the *Supported SUL band List* IE for each served cell where supplementary uplink is configured.

If the EN-DC X2 SETUP RESPONSE message contains the *Protected E-UTRA Resource Indication* IE, the receiving en-gNB should take this into account for cell-level resource coordination with the eNB. The en-gNB shall consider the received *Protected E-UTRA Resource Indication* IE content valid until reception of a new update of the IE for the same eNB.

8.7.1.3 Unsuccessful Operation

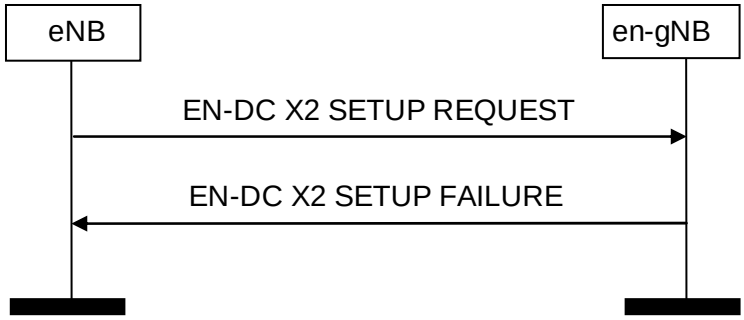

Figure 8.7.1.3-1: eNB Initiated EN-DC X2 Setup, unsuccessful operation

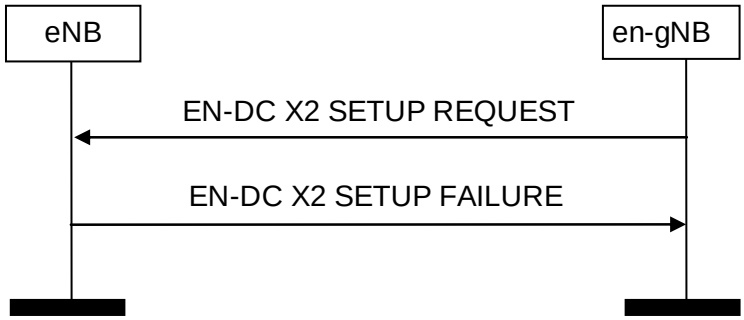

Figure 8.7.1.3-2: en-gNB Initiated EN-DC X2 Setup, unsuccessful operation

If the candidate receving node cannot accept the setup it shall respond with an EN-DC X2 SETUP FAILURE message with appropriate cause value.

If case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], the EN-DC X2 SETUP REQUEST message and the EN-DC X2 SETUP FAILURE message shall include the *Interface Instance Indication* IE to identify the corresponding interface instance.

8.7.1.4 Abnormal Conditions

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

If the initiating node does not receive either EN-DC X2 SETUP RESPONSE message or EN-DC X2 SETUP FAILURE message, the initiating node may reinitiate the EN-DC X2 Setup procedure towards the same candidate node, provided that the content of the EN-DC X2 SETUP REQUEST message is identical to the content of the previously unacknowledged EN-DC X2 SETUP REQUEST message.

If the EN-DC X2 SETUP FAILURE message includes the *Time To Wait* IE the initiating node shall wait at least for the indicated time before reinitiating the EN-DC X2 Setup procedure towards the same peer node.

If the initiating node receives an EN-DC X2 SETUP REQUEST message from the peer entity on the same X2 interface:

- In case the initiating node answers with an EN-DC X2 SETUP RESPONSE message and receives a subsequent EN-DC X2 SETUP FAILURE message, the initiating node shall consider the X2 interface as non operational and the procedure as unsuccessfully terminated according to sub clause 8.7.1.3.

- In case the initiating node answers with an EN-DC X2 SETUP FAILURE message and receives a subsequent EN-DC X2 SETUP RESPONSE message, the initiating node shall ignore the EN-DC X2 SETUP RESPONSE message and consider the X2 interface as non operational.

8.7.2 EN-DC Configuration Update

8.7.2.1 General

The purpose of the EN-DC Configuration Update procedure is to update application level configuration data needed for eNB and en-gNB to interoperate correctly over the X2 interface.

The procedure uses non UE-associated signalling.

8.7.2.2 Successful Operation

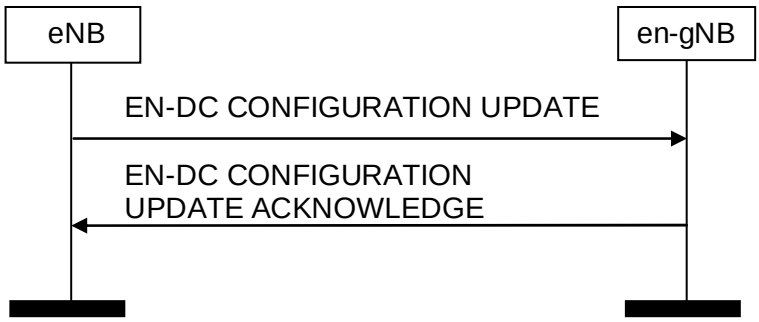

Figure 8.7.2.2-1: eNB Initiated EN-DC Configuration Update, successful operation

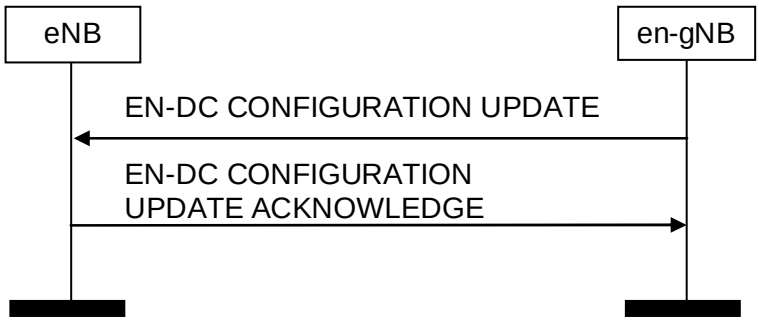

Figure 8.7.2.2-2: en-gNB Initiated EN-DC Configuration Update, successful operation

If case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], the EN-DC CONFIGURATION UPDATE message and the EN-DC CONFIGURATION UPDATE ACKNOWLEDGE message shall include the *Interface Instance Indication* IE to identify the corresponding interface instance.

eNB initiated EN-DC Configuration Update:

An eNB initiates the procedure by sending an EN-DC CONFIGURATION UPDATE message to a peer en-gNB.

After successful update of requested information, en-gNB shall reply with the EN-DC CONFIGURATION UPDATE ACKNOWLEDGE message to inform the initiating eNB that the requested update of application data was performed successfully.

If the *Cell Assistance Information* IE is present, the en-gNB may use it to generate the *List of Served NR Cells* IE and include the list in the EN-DC CONFIGURATION UPDATE ACKNOWLEDGE message.

If the EN-DC CONFIGURATION UPDATE REQUEST message contains the Protected E-UTRA Resource Indication IE, the receiving en-gNB should take this into account for cell-level resource coordination with the eNB. The en-gNB shall consider the received Protected E-UTRA Resource Indication IE content valid until reception of a new update of the IE for the same eNB. The protected resource pattern indicated in the Protected E-UTRA Resource Indication IE is not valid in subframes indicated by the Reserved Subframes IE, as well as in the non-control region of the MBSFN subframes i.e. it is valid only in the control region therein. The size of the control region of MBSFN subframes is indicated in the Protected E-UTRA Resource Indication IE.

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

If Supplementary Uplink is configured at the en-gNB, the en-gNB shall include in the EN-DC X2 CONFIGURATION UPDATE ACKNOWLEDGE message the *SUL Information* IE and the *Supported SUL band List* IE for each cell added in the Served NR Cells To Add IE and in the Served NR Cells To Modify IE.

en-gNB initiated EN-DC Configuration Update:

An en-gNB initiates the procedure by sending an EN-DC CONFIGURATION UPDATE message to an eNB.

If Supplementary Uplink is configured at the en-gNB, the en-gNB shall include in the EN-DC X2 CONFIGURATION UPDATE message the *SUL Information* IE and the *Supported SUL band List* IE for each served cell added in the Served NR Cells To Add IE and in the Served NR Cells To Modify IE.

If the Deactivation Indication IE is contained in the *Served NR Cells To Modify* IE, it indicates that the concerned NR cell was switched off to lower energy consumption, and is available for activation on request from the eNB, as described in TS 36.300 [15].

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

Upon reception of an EN-DC CONFIGURATION UPDATE message, eNB shall update the information for en-gNB as follows:

Update of Served NR Cell Information:

- If *Served NR Cells To Add* IE is contained in the EN-DC CONFIGURATION UPDATE message, eNB shall add cell information according to the information in the *Served NR Cell Information* IE.
- If *Served NR Cells To Modify* IE is contained in the EN-DC CONFIGURATION UPDATE message, eNB shall modify information of cell indicated by *Old NR-CGI* IE according to the information in the *Served NR Cell Information* IE.
- If *Served NR Cells To Delete* IE is contained in the EN-DC CONFIGURATION UPDATE message, eNB shall delete information of cell indicated by *Old NR-CGI* IE.

If the EN-DC CONFIGURATION UPDATE RESPONSE message contains the Protected E-UTRA Resource Indication IE, the receiving en-gNB should take this into account for cell-level resource coordination with the eNB. The en-gNB shall consider the received *Protected E-UTRA Resource Indication* IE content valid until reception of a new update of the IE for the same eNB.

The en-gNB may initiate a further EN-DC Configuration Update procedure only after a previous EN-DC Configuration Update procedure has been completed.

8.7.2.3 Unsuccessful Operation

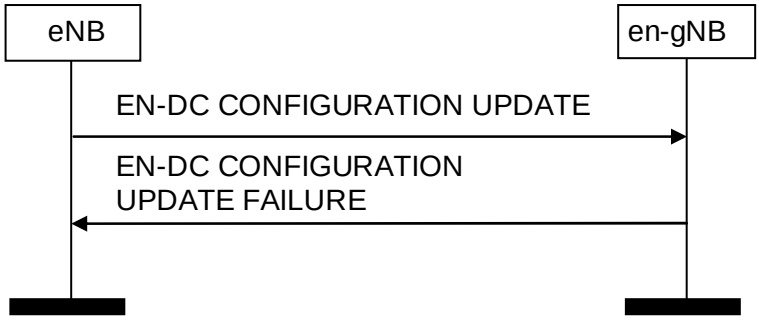

Figure 8.7.2.3-1: eNB Initiated EN-DC Configuration Update, unsuccessful operation

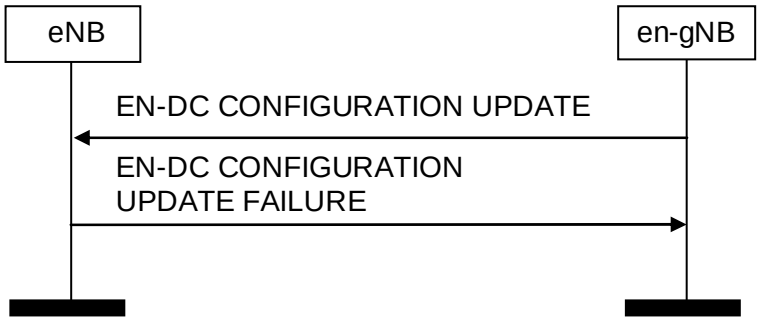

Figure 8.7.2.3-2: en-gNB Initiated EN-DC Configuration Update, unsuccessful operation

If the candidate receving node can not accept the update it shall respond with an EN-DC CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the EN-DC CONFIGURATION UPDATE FAILURE message includes the *Time To Wait* IE the initiating node shall wait at least for the indicated time before reinitiating the EN-DC Configuration Update procedure towards the same peer node. Both nodes shall continue to operate the X2 with their existing configuration data.

If case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], the EN-DC CONFIGURATION UPDATE message and the EN-DC CONFIGURATION UPDATE FAILURE message shall include the *Interface Instance Indication* IE to identify the corresponding interface instance.

8.7.2.4 Abnormal Conditions

If the initiating node after initiating EN-DC Configuration Update procedure receives neither EN-DC CONFIGURATION UPDATE ACKNOWLEDGE message nor EN-DC CONFIGURATION UPDATE FAILURE message, the initiating node may reinitiate the EN-DC Configuration Update procedure towards the same candidate receving node, provided that the content of the EN-DC CONFIGURATION UPDATE message is identical to the content of the previously unacknowledged EN-DC CONFIGURATION UPDATE message.

8.7.3 EN-DC Cell Activation

8.7.3.1 General

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

The procedure uses non UE-associated signalling.

8.7.3.2 Successful Operation

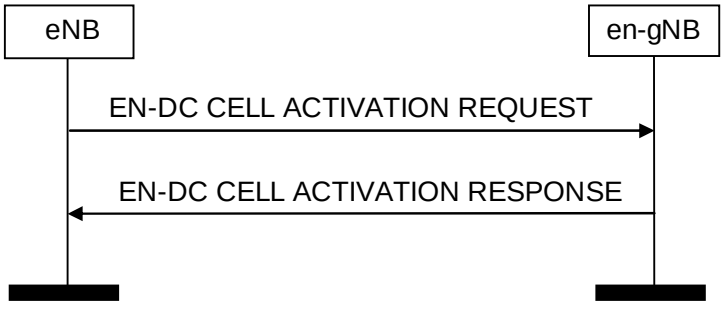

Figure 8.7.3.2-1: EN-DC Cell Activation, successful operation

An eNB initiates the procedure by sending a EN-DC CELL ACTIVATION REQUEST message to a peer en-gNB.

Upon receipt of this message, the en-gNB should activate the cell(s) indicated in the EN-DC CELL ACTIVATION REQUEST message and shall indicate in the EN-DC CELL ACTIVATION RESPONSE message for which cells the request was fulfilled.

If case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], the EN-DC CELL ACTIVATION REQUEST message and the EN-DC CELL ACTIVATION RESPONSE message shall contain the *Interface Instance Indication* IE to identify the corresponding interface instance.

Interactions with EN-DC Configuration Update procedure:

The en-gNB shall not send an EN-DC CONFIGURATION UPDATE message to the eNB just for the reason of the cell(s) indicated in the EN-DC CELL ACTIVATION REQUEST message changing cell activation state, as the receipt of the EN-DC CELL ACTIVATION RESPONSE message by the eNB is used to update the information about the activation state of en-gNB cells in the eNB.

8.7.3.3 Unsuccessful Operation

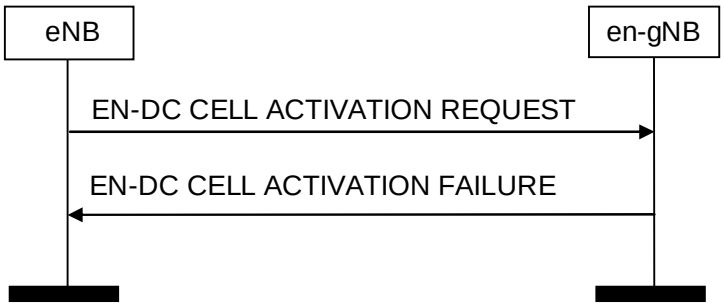

Figure 8.7.3.3-1: EN-DC Cell Activation, unsuccessful operation

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

If case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], the EN-DC CELL ACTIVATION REQUEST message and the EN-DC CELL ACTIVATION FAILURE message shall contain the *Interface Instance Indication* IE to identify the corresponding interface instance.

8.7.3.4 Abnormal Conditions

Not applicable.

8.7.4 SgNB Addition Preparation

8.7.4.1 General

The purpose of the SgNB Addition Preparation procedure is to request the en-gNB to allocate resources for EN-DC connectivity operation for a specific UE.

The procedure uses UE-associated signalling.

8.7.4.2 Successful Operation

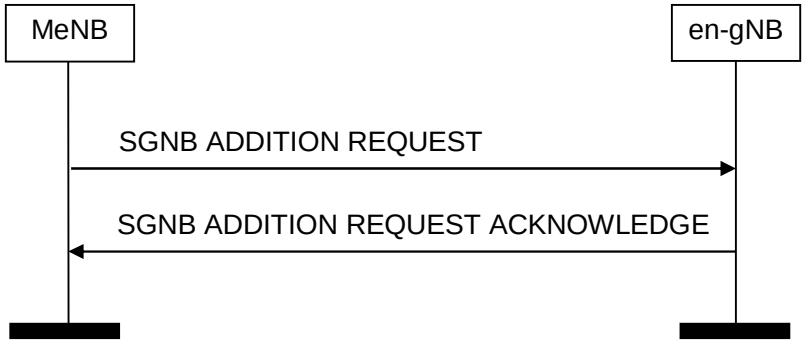

Figure 8.7.4.2-1: SgNB Addition Preparation, successful operation

The MeNB initiates the procedure by sending the SGNB ADDITION REQUEST message to the en-gNB. When the MeNB sends the SGNB 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 *Full E-RAB Level QoS Parameters* IE or in the *Requested MCG E-RAB Level QoS Parameters IE* or in the *Requested SCG E-RAB Level QoS Parameters* IE shall follow the principles described for the E-RAB Setup procedure in TS 36.413 [4].

If the SGNB ADDITION REQUEST message contains the *Serving PLMN* IE, the en-gNB may use it for RRM purposes.

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

If the SGNB ADDITION REQUEST message contains the *Handover Restriction List* IE, the en-gNB node, if supported, shall store this information and use it to select an appropriate NR cell.

If the SGNB ADDITION REQUEST message contains the *MeNB Resource Coordination Information* IE, the en-gNB should forward it to lower layers and it may use it for the purpose of resource coordination with the MeNB. The en-gNB shall consider the received *UL Coordination Information* IE value valid until reception of a new update of the IE for the same UE. The en-gNB shall consider the received *DL Coordination Information* IE value valid until reception of a new update of the IE for the same UE. If the *MeNB Coordination Assistance Information* IE is contained in the *MeNB Resource Coordination Information* IE, the en-gNB shall, if supported, use the information to determine further coordination of resource utilisation between the en-gNB and the MeNB.

The en-gNB shall choose the ciphering algorithm based on the information in the *NR UE Security Capabilities* IE and locally configured priority list of AS encryption algorithms and apply the key indicated in the *SgNB Security Key* IE as specified in the TS 33.401 [18].

If the SGNB ADDITION REQUEST message contains the *Subscriber Profile ID for RAT/Frequency Priority* IE, the en-gNB may use it for RRM purposes.

The en-gNB shall search for the target NR cell among the NR neighbour cells of the E-UTRAN cell indicated in *MeNB Cell ID* IE, as specified in the TS 37.340 [32].

If the *Masked IMEISV* IE is contained in the SGNB ADDITION REQUEST message the en-gNB shall, if supported, use it to determine the characteristics of the UE for subsequent handling.

The en-gNB shall report to the MeNB, in the SGNB 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 SgNB Addition Preparation procedure in the course of the Inter-MeNB handover without SgNB change procedure as described in TS 37.340 [32]. The deleted E-RABs are not included in the *E-RABs To Be Added List* IE in the SGNB ADDITION REQUEST message, from MeNB point of view. If the en-gNB reports a certain E-RAB to be successfully established, respective SCG resources, from an en-gNB 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 en-gNB point of view, may be actually failed to be established or modified or kept.

For each E-RAB successfully established in the en-gNB, the en-gNB shall report to the MeNB, in the SGNB ADDITION REQUEST ACKNOWLEDGE message, the same value in the *EN-DC Resource Configuration* IE as received in the SGNB ADDITION REQUEST message.

For each E-RAB for which allocation of the PDCP entity is requested at the en-gNB:

- 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 SGNB ADDITION REQUEST message. For each E-RAB that it has decided to admit, the en-gNB may include the *DL Forwarding GTP Tunnel Endpoint* IE within the *E-RABs Admitted To Be Added Item* IE of the SGNB 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 GTP tunnel endpoint, i.e the information contained in the *Transport Layer Address* IE and the *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 en-gNB 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.

- the en-gNB shall use the *S1 UL GTP Tunnel Endpoint* IE of the SGNB ADDITION REQUEST message as the UL S1-U address.

- the MeNB shall use the *SgNB UL GTP Tunnel Endpoint at PDCP* IE of the SGNB ADDITION REQUEST ACKNOWLEDGE message as the UL X2-U address.

- if the SGNB ADDITION REQUEST message contains for an E-RAB to be added which is requested to be configured with MCG resources the *MeNB DL GTP Tunnel Endpoint at MCG* IE the en-gNB shall use it as the DL X2-U address for delivery of DL PDCP PDUs.

- the en-gNB shall include in the SGNB ADDITION REQUEST ACKNOWLEDGE message the *S1 DL GTP Tunnel Endpoint at the SgNB* IE.

- the en-gNB shall include in the SGNB ADDITION REQUEST ACKNOWLEDGE message the *RLC Mode* IE.

- the en-gNB may include for each bearer in the *E-RABs Admitted To Be Added List* IE in the SGNB ADDITION REQUEST ACKNOWLEDGE the *PDCP SN Length* IE to indicate the PDCP SN length for that bearer.

- If the *RLC Mode* IE is included for an E-RAB within the *E-RABs To be Added List* IE in the SGNB ADDITION REQUEST message, it indicates the mode that the MeNB used for the E-RAB when it was hosted at the MeNB.

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

If the SGNB ADDITION ACKNOWLEDGE message contains the *SgNB Resource Coordination Information* IE, the MeNB may use it for the purpose of resource coordination with the en-gNB. The MeNB shall consider the received *UL Coordination Information* IE value valid until reception of a new update of the IE for the same UE. The MeNB shall consider the received *DL Coordination Information* IE value valid until reception of a new update of the IE for the same UE. If the *SgNB Coordination Assistance Information* IE is contained in the *SgNB Resource Coordination Information* IE, the MeNB shall, if supported, use the information to determine further coordination of resource utilisation between the en-gNB and the MeNB.

If the *SgNB UE X2AP ID* IE is contained in the SGNB ADDITION REQUEST message, the en-gNB shall, if supported, store this information and use it as defined in TS 37.340 [32].

If the SGNB ADDITION REQUEST message contains the *SGNB Addition Trigger Indication*, the en-gNB shall include the *RRC config indication* IE in the SGNB ADDITION REQUEST ACKNOWLEDGE message to inform the MeNB if the en-gNB applied full or delta configuration, as specified in TS 37.340 [32].

If the en-gNB receives for an E-RAB for which the PDCP entiy is allocated at the MeNB the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE and the *Duplication Activation* IE in the SGNB ADDITION REQUEST message, it may provide the *Secondary SgNB DL GTP Tunnel Endpoint at SCG* IE and the *LCID* IE to the MeNB in the SGNB ADDITION REQUEST ACKNOWLEDGE message if PDCP duplication is configured at the en-gNB.

If the SGNB ADDITION REQUEST message contains the *UL PDCP SN Length* IE and the *DL PDCP SN Length* IE, the en-gNB shall, if supported, store this information and use it for lower layer configuration of the concerned MN terminated bearer.

If the *Location Information at SgNB Reporting* IE is included in the SGNB ADDITION REQUEST, the SgNB shall, if supported, start providing information about the current location of the UE. If the *Location Information at SgNB* IE is included in the SGNB ADDITION REQUEST ACKNOWLEDGE, the MeNB may transfer the included information towards the MME.

If *Trace Activation* IE has previously been received for this UE, it shall be included in the SGNB ADDITION REQUEST message. If the *Trace Activation* IE is included in the SGNB ADDITION REQUEST message, the en-gNB shall, if supported, initiate the requested trace function as described in TS 32.422 [6].

Interactions with the MeNB initiated SgNB Modification procedure:

If the en-gNB provides for an E-RAB for which the PDCP entiy is allocated at the MeNB the *Secondary SgNB DL GTP Tunnel Endpoint at SCG* IE to the MeNB in the SGNB ADDITION REQUEST ACKNOWLEDGE message and the MeNB has not provided the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE in the SGNB ADDITION REQUEST message, the MeNB shall trigger the MeNB initiated SgNB Modification procedure to provide the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE to the SgNB.

Interactions with the SgNB Reconfiguration Completion procedure:

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

Interaction with the Activity Notification procedure

Upon receiving an SGNB ADDITION REQUEST message containing the *Desired Activity Notification Level* IE, the en-gNB shall, if supported, use this information to decide whether to trigger subsequent SgNB Activitity Notification procedures according to the requested notification level.

8.7.4.3 Unsuccessful Operation

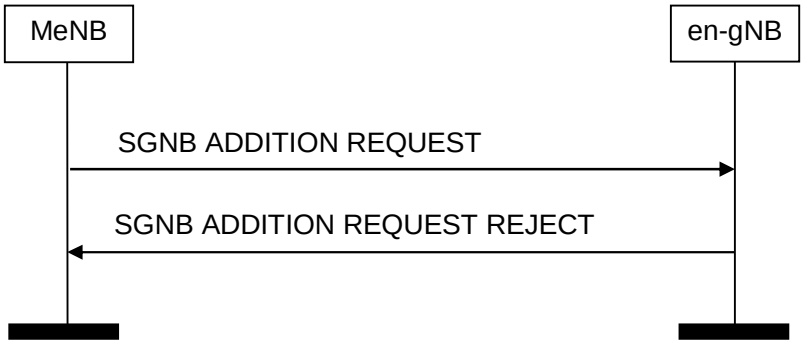

Figure 8.7.4.3-1: SgNB Addition Preparation, unsuccessful operation

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

8.7.4.4 Abnormal Conditions

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

If the en-gNB receives a SGNB 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 en-gNB shall consider the establishment of the corresponding E-RAB as failed.

If the supported algorithms for encryption defined in the *NR Encryption Algorithms* IE in the *NR UE Security Capabilities* IE, plus the mandated support of NEA0 in all UEs (TS 33.401 [18]), do not match any algorithms defined in the configured list of allowed encryption algorithms in the en-gNB (TS 33.401 [18]), the en-gNB shall reject the procedure using the SGNB ADDITION REQUEST REJECT message.

If the supported algorithms for integrity defined in the *NR Integrity Protection Algorithms* IE in the *NR UE Security Capabilities* IE do not match any algorithms defined in the configured list of allowed integrity protection algorithms in the en-gNB (TS 33.401 [18]), the en-gNB shall reject the procedure using the SGNB ADDITION REQUEST REJECT message.

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

If the MeNB has provided the en-gNB for an E-RAB for which the PDCP entiy is allocated at the MeNB the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE and the *Duplication Activation* IE in the SGNB ADDITION REQUEST

message, and the en-gNB does not provide the *Secondary SgNB DL GTP Tunnel Endpoint at SCG* IE and the *LCID* IE to the MeNB in the SGNB ADDITION REQUEST ACKNOWLEDGE message, the MeNB shall assume that PDCP duplication was not configured at the en-gNB and releases duplication resources.

If the en-gNB provides for an E-RAB for which the PDCP entiy is allocated at the MeNB the *Secondary SgNB DL GTP Tunnel Endpoint at SCG* IE and the *LCID* IE to the MeNB in the SGNB ADDITION REQUEST ACKNOWLEDGE message and the MeNB has not provided the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE and the *Duplication Activation* IE in the SGNB ADDITION REQUEST message, and the MeNB does not trigger the MeNB initiated SgNB Modification procedure to provide the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE and the *Duplication Activation* IE to the SgNB the en-gNB before the SgNB Reconfigurationi Completion procedure was triggered, the en-gNB shall trigger the release of the concerned E-RAB.

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

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

Interactions with the MeNB initiated SgNB Release procedure:

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

8.7.5 SgNB Reconfiguration Completion

8.7.5.1 General

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

The procedure uses UE-associated signalling.

8.7.5.2 Successful Operation

Figure 8.7.5.2-1: SgNB Reconfiguration Complete procedure, successful operation.

The MeNB initiates the procedure by sending the SGNB RECONFIGURATION COMPLETE message to the en-gNB.

The SGNB RECONFIGURATION COMPLETE message may contain information that

- either the UE has successfully applied the configuration requested by the en-gNB. The MeNB may also provide NR *RRCReconfigurationComplete* message in the *MeNB to SgNB Container* IE.
- or the configuration requested by the en-gNB has been rejected. The MeNB shall provide information with sufficient precision in the included *Cause* IE to enable the en-gNB to know the reason for an unsuccessful reconfiguration.

Upon reception of the SGNB RECONFIGURATION COMPLETE message the en-gNB shall stop the timer $T_{DCoverall}$.

8.7.5.3 Abnormal Conditions

Void.

8.7.6 MeNB initiated SgNB Modification Preparation

8.7.6.1 General

This procedure is used to enable an MeNB to request an en-gNB to modify the UE context at the en-gNB, or to query the current SCG configuration for supporting delta signalling in MeNB initiated SgNB change, or to provide the S-RLF-related information to the en-gNB.

The procedure uses UE-associated signalling.

8.7.6.2 Successful Operation

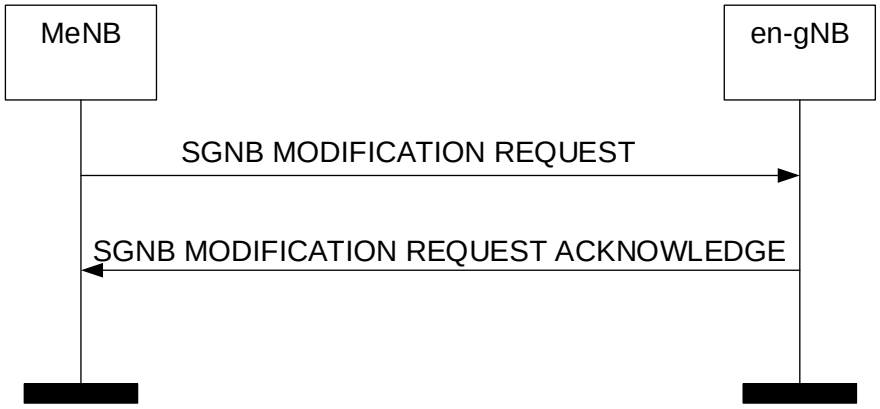

Figure 8.7.6.2-1: MeNB initiated SgNB Modification Preparation, successful operation

The MeNB initiates the procedure by sending the SGNB MODIFICATION REQUEST message to the en-gNB. When the MeNB sends the SGNB MODIFICATION REQUEST message, it shall start the timer T_{DCprep}.

The SGNB MODIFICATION REQUEST message may contain:

- within the *UE Context Information* IE (if the modification of the UE context at the en-gNB is requested);
  - 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 *SgNB UE Aggregate Maximum Bit Rate* IE;
- the *MeNB to SgNB Container* IE;
- the *SCG Configuration Query* IE;
- the *MeNB Resource Coordination Information* IE;
- the *Requested split SRBs IE*;
- the *Requested split SRBs release* IE.

If the SGNB MODIFICATION REQUEST message contains the *Serving PLMN* IE, the en-gNB may use it for RRM purposes.

If the SGNB MODIFICATION REQUEST message contains the *Handover Restriction List* IE, the en-gNB shall

- replace the previously provided Handover Restriction List by the received Handover Restriction List in the UE context;

- use this information to select an appropriate NR cell.

If the *SgNB UE Aggregate Maximum Bit Rate* IE is included in the SGNB MODIFICATION REQUEST message, the en-gNB shall:

- replace the previously provided SgNB UE Aggregate Maximum Bit Rate by the received SgNB UE Aggregate Maximum Bit Rate in the UE context;

- use the received SgNB UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE as defined in TS 37.340 [32].

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

If the SGNB MODIFICATION REQUEST message contains the *MeNB Resource Coordination Information* IE, the en-gNB should forward it to lower layers and it may use it for the purpose of resource coordination with the MeNB. The en-gNB shall consider the received *UL Coordination Information* IE value valid until reception of a new update of the IE for the same UE. The en-gNB shall consider the received *DL Coordination Information* IE value valid until reception of a new update of the IE for the same UE. If the *MeNB Coordination Assistance Information* IE is contained in the *MeNB Resource Coordination Information* IE, the en-gNB shall, if supported, use the information to determine further coordination of resource utilisation between the en-gNB and the MeNB.

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

The en-gNB shall include the E-RABs for which resources have been either added or modified or released at the en-gNB 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 en-gNB 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 successfully established or modified or released in the en-gNB, the en-gNB shall report to the MeNB, in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message, the same value in the *EN-DC Resource Configuration* IE as received in the SGNB MODIFICATION REQUEST message.

The en-gNB shall, if included, choose the ciphering algorithm based on the information in the *NR UE Security Capabilities* IE and locally configured priority list of AS encryption algorithms and apply the key indicated in the *SgNB Security Key* IE as specified in the TS 33.401 [18].

For each E-RAB for which allocation of the PDCP entity is requested at the en-gNB:

- 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 SGNB MODIFICATION REQUEST message. For each E-RAB that it has decided to admit, the en-gNB may include the *DL Forwarding GTP Tunnel Endpoint* IE within the *E-RABs Admitted To Be Added Item* IE of the SGNB 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 SGNB MODIFICATION REQUEST message.

- if applicable, the en-gNB may include for each bearer in the *E-RABs Admitted To Be Added List* IE in the SGNB 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 applicable, the en-gNB may include for each bearer in the *E-RABs Admitted To Be Modified* List IE which is configured with the SN terminated split bearer option in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message the *UL Configuration* IE to indicate that the MCG UL configuration of the UE has changed.

- if applicable, the en-gNB may include for each bearer in the *E-RABs Admitted To Be Added List* IE in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message the *UL PDCP SN Length* IE and the *DL PDCP SN Length* IE to indicate the PDCP SN length for that bearer.

For each E-RAB configured with SCG resources and the PDCP entity is hosted by the MeNB and

- requested to be modified,
  - if the SGNB MODIFICATION REQUEST message includes the *MeNB UL GTP Tunnel Endpoint at PDCP* IE in the *E-RABs To Be Modified Item* IE, the en-gNB shall act as specified in TS 37.340 [32].
  - if the SGNB MODIFICATION REQUEST message contains the *MeNB UL GTP Tunnel Endpoint at PDCP* IE the en-gNB shall use it as the new UL X2-U address.
  - the en-gNB may include in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message the *SgNB DL GTP Tunnel Endpoint at SCG* IE.

If, dependent on the configured bearer type, the *Full E-RAB Level QoS Parameters* IE or the *Maximum MCG admittable E-RAB Level QoS Parameters* IE or the *Requested SCG E-RAB level QoS Parameters* IE are included in the SGNB MODIFICATION REQUEST message for an E-RAB to be modified the en-gNB shall allocate respective resources and provide corresponding radio configuration information within the *SgNB to MeNB Container* IE as described in TS 37.340 [32].

If the SGNB MODIFICATION REQUEST message contains, for an E-RAB to be modified which is configured with the PDCP entity in the en-gNB, the *S1 UL GTP Tunnel Endpoint* IE, the en-gNB shall use it as the new UL S1-U address.

If the SGNB MODIFICATION REQUEST message contains an E-RAB to be modified which is configured with the MN terminated split bearer option, the MeNB may include the *UL Configuration* IE to indicate that the SCG UL configuration of the UE has changed.

If the SGNB MODIFICATION REQUEST message contains for an E-RAB to be modified which is configured with the PDCP enitiy in the en-gNB and MCG resources the *MeNB DL GTP Tunnel Endpoint at MCG* IE the en-gNB shall use it as the DL X2-U address.

If the SGNB MODIFICATION REQUEST message contains the *Subscriber Profile ID for RAT/Frequency Priority* IE, the en-gNB may use it for RRM purposes.

For an E-RAB to be modified which is configured with the PDCP entity in the en-gNB the en-gNB may include in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message the *S1 DL GTP Tunnel Endpoint at the SgNB* IE.

If the SGNB MODIFICATION REQUEST ACKNOWLEDGE message contains the *SgNB Resource Coordination Information* IE, the MeNB may use it for the purpose of resource coordination with the en-gNB. The MeNB shall consider the received *UL Coordination Information* IE value valid until reception of a new update of the IE for the same UE. The MeNB shall consider the received *DL Coordination Information* IE value valid until reception of a new update of the IE for the same UE. If the *SgNB Coordination Assistance Information* IE is contained in the *SgNB Resource Coordination Information* IE, the MeNB shall, if supported, use the information to determine further coordination of resource utilisation between the en-gNB and the MeNB.

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

If the *SCG Configuration Query* IE is included in the SGNB MODIFICATION REQUEST message, the en-gNB shall provide corresponding radio configuration information within the *SgNB to MeNB Container* IE as described in TS 37.340 [32].

If the SGNB MODIFICATION REQUEST message contains the *Requested split SRBs* IE, the en-gNB may use it to add split SRBs. If the SGNB MODIFICATION REQUEST message contains the *Requested split SRBs release* IE, the en-gNB may use it to release split SRBs.

If the en-gNB receives for an E-RAB to be setup for which the PDCP entiy is allocated at the MeNB the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE and the *Duplication Activation* IE in the SGNB MODIFICATION REQUEST message, it may provide the *Secondary SgNB DL GTP Tunnel Endpoint at SCG* IE and the *LCID* IE to the

MeNB in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message if PDCP duplication is configured at the en-gNB.

If the SGNB MODIFICATION REQUEST message contains the *RLC Status* IE, the en-gNB shall assume that RLC has been reestablished at the MeNB and may trigger PDCP data recovery.

If the en-gNB applied a full configuration or delta configuration, e.g. as part of a mobility procedure involving a change of DU, the en-gNB shall inform the MeNB by including the *RRC config indication* IE in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message.

If SGNB MODIFICATION REQUEST message contains the *UL PDCP SN Length* IE and the *DL PDCP SN Length* IE, the en-gNB shall, if supported, store this information and use it for lower layer configuration of the concerned MN terminated bearer.

If the *RLC Mode* IE is included for an E-RAB within the *E-RABs To be Added List* IE in the SGNB MODIFICATION REQUEST message, it indicates the mode that the MeNB used for the E-RAB when it was hosted at the MeNB.

If the SGNB MODIFICATION REQUEST message contains the *MeNB Cell ID* IE, the en-gNB may search for the target NR cell among the NR neighbour cells of the E-UTRAN cell indicated in *MeNB Cell ID* IE, as specified in the TS 37.340 [32].

If the SGNB MODIFICATION REQUEST ACKNOWLEDGE message contains the *RLC Status* IE, the MeNB shall assume that RLC has been reestablished at the en-gNB and may trigger PDCP data recovery.

If the *Location Information at SgNB Reporting* IE is included in the SGNB MODIFICATION REQUEST, the SgNB shall, if supported, start providing information about the current location of the UE. If the *Location Information at SgNB* IE is included in the SGNB MODIFICATION REQUEST ACKNOWLEDGE, the MeNB may transfer the included information towards the MME.

Interactions with the MeNB initiated SgNB Modification procedure:

If the en-gNB provides for an E-RAB to be setup for which the PDCP entiy is allocated at the MeNB the *Secondary SgNB DL GTP Tunnel Endpoint at SCG* IE and the *LCID* IE to the MeNB in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message and the MeNB has not provided the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE and the *Duplication Activation* IE in the SGNB MODIFICATION REQUEST message, the MeNB shall trigger the MeNB initiated SgNB Modification procedure to provide the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE and the *Duplication Activation* IE to the SgNB.

Interactions with the SgNB Reconfiguration Completion procedure:

If the en-gNB admits a modification of the UE context requiring the MeNB to report about the success of the RRC connection reconfiguration procedure, the en-gNB shall start the timer $T_{DCoverall}$ when sending the SGNB MODIFICATION REQUEST ACKNOWLEDGE message to the MeNB. The reception of the SGNB RECONFIGURATION COMPLETE message shall stop the timer $T_{DCoverall}$.

Interaction with the Activity Notification procedure

Upon receiving an SGNB MODIFICATION REQUEST message containing the *Desired Activity Notification Level* IE, the en-gNB shall, if supported, use this information to decide whether to trigger subsequent SgNB Activity Notification procedures, or stop or modify ongoing triggering of these procedures due to a previous request.

8.7.6.3 Unsuccessful Operation

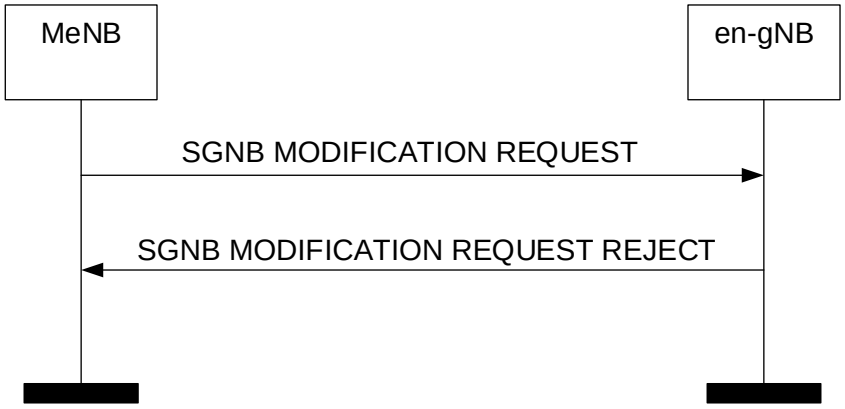

Figure 8.7.6.3-1: MeNB initiated SgNB Modification Preparation, unsuccessful operation

If the en-gNB does not admit any modification requested by the MeNB, or a failure occurs during the MeNB initiated SgNB Modfication Preparation, the en-gNB shall send the SGNB MODIFICATION REQUEST REJECT message to the MeNB. The message shall contain the *Cause* IE with an appropriate value.

If the en-gNB receives a SGNB MODIFICATION REQUEST message containing the *MeNB to SgNB Container* IE that does not include required information as specified in TS 38.331 [31], the en-gNB shall send the SGNB MODIFICATION REQUEST REJECT message to the MeNB.

8.7.6.4 Abnormal Conditions

If the en-gNB receives a SGNB 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 en-gNB shall not admit the action requested for the corresponding E-RABs.

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

If the en-gNB receives a SGNB MODIFICATION REQUEST message containing, dependent on the configured bearer type, the *Full E-RAB Level QoS Parameters* IE or the *Requested SCG 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 en-gNB shall not admit the corresponding E-RAB.

If the supported algorithms for encryption defined in the *NR Encryption Algorithms* IE in the *NR UE Security Capabilities* IE in the *UE Context Information* IE, plus the mandated support of NEA0 in all UEs (TS 33.401 [18]), do not match any algorithms defined in the configured list of allowed encryption algorithms in the en-gNB (TS 33.401 [18]), the en-gNB shall reject the procedure using the SGNB MODIFICATION REQUEST REJECT message.

If the supported algorithms for integrity defined in the *NR Integrity Protection Algorithms* IE in the *NR UE Security Capabilities* IE in the *UE Context Information* IE do not match any algorithms defined in the configured list of allowed integrity protection algorithms in the en-gNB (TS 33.401 [18]), the en-gNB shall reject the procedure using the SGNB MODIFICATION REQUEST REJECT message.

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

If the MeNB has provided the en-gNB for an E-RAB to be setupr which the PDCP entiy is allocated at the MeNB the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE in the SGNB MODIFICATION REQUEST message, and the en-gNB does not provide the *Secondary SgNB DL GTP Tunnel Endpoint at SCG* IE to the MeNB in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message, the MeNB shall assume that PDCP duplication was not configured at the en-gNB and releases duplication resources.

If the en-gNB provides for an E-RAB to be setup for which the PDCP entiy is allocated at the MeNB the *Secondary SgNB DL GTP Tunnel Endpoint at SCG* IE to the MeNB in the SGNB MODIFICATION REQUEST

ACKNOWLEDGE message and the MeNB has not provided the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE in the SGNB MODIFICATION REQUEST message, and the MeNB does not trigger the MeNB initiated SgNB Modification procedure to provide the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE to the SgNB the en-gNB before the SgNB Reconfigurationi Completion procedure was triggered, the en-gNB shall trigger the release of the concerned E-RAB.

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

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

Interaction with the SgNB initiated SgNB Modification Preparation procedure:

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

If the MeNB has a Prepared SgNB Modification and receives the SGNB MODIFICATION REQUIRED message, the MeNB shall respond with the SGNB MODIFICATION REFUSE message to the en-gNB with an appropriate cause value in the *Cause* IE.

Interactions with the MeNB initiated SgNB Release procedure:

If the timer T_{DCprep} expires before the MeNB has received the SGNB MODIFICATION REQUEST ACKNOWLEDGE message, the MeNB shall regard the SgNB Modification Preparation procedure as being failed and may trigger the MeNB initiated SgNB Release procedure.

8.7.7 SgNB initiated SgNB Modification

8.7.7.1 General

This procedure is used by the en-gNB to modify the UE context in the en-gNB.

The procedure uses UE-associated signalling.

8.7.7.2 Successful Operation

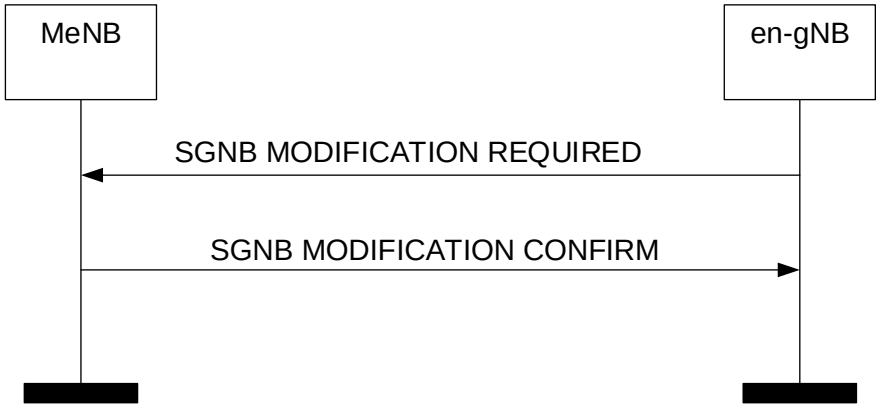

Figure 8.7.7.2-1: SgNB initiated SgNB Modification, successful operation.

The en-gNB initiates the procedure by sending the SGNB MODIFICATION REQUIRED message to the MeNB. When the en-gNB sends the SGNB MODIFICATION REQUIRED message, it shall start the timer $T_{DCoverall}$.

The SGNB MODIFICATION REQUIRED message may contain

- the *PDCP Change Indication* IE;
- the *SgNB to MeNB Container* 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 *SgNB Resource Coordination Information* IE.

For the SN terminated split bearers, the en-gNB may include in the SGNB MODIFICATION REQUIRED message the *UL Configuration* IE to indicate that the MCG UL configuration of the UE has changed.

The en-gNB may include for each bearer in the *E-RABs to Be Modified List* IE in the SGNB MODIFICATION REQUIRED message the *New DRB ID Request* IE to request the MeNB to assign a new DRB ID for that bearer.

If the MeNB is able to perform the change requested by the en-gNB, the MeNB shall send the SGNB MODIFICATION CONFIRM message to the en-gNB. The SGNB MODIFICATION CONFIRM message may contain the *MeNB to SgNB Container* IE.

If the SGNB MODIFICATION REQUIRED message contains the *SgNB Resource Coordination Information* IE, the MeNB may use it for the purpose of resource coordination with the en-gNB. The MeNB shall consider the received *UL Coordination Information* IE value valid until reception of a new update of the IE for the same UE. The MeNB shall consider the received *DL Coordination Information* IE value valid until reception of a new update of the IE for the same UE. If the *SgNB Coordination Assistance Information* IE is contained in the *SgNB Resource Coordination Information* IE, the MeNB shall, if supported, use the information to determine further coordination of resource utilisation between the en-gNB and the MeNB.

If the en-gNB applied a full configuration or delta configuration, e.g. as part of a mobility procedure involving a change of DU, the en-gNB shall inform the MeNB by including the *RRC config indication* IE in the SGNB MODIFICATION REQUIRED message.

For each E-RAB successfully modified or released as requested by the en-gNB, the MeNB shall inform the en-gNB, in the SGNB MODIFICATION CONFIRM message, the same value in the *EN-DC Resource Configuration* IE as received in the SGNB MODIFICATION REQUIRED message.

Upon reception of the SGNB MODIFICATION CONFIRM message the en-gNB shall stop the timer $T_{DCoverall}$.

If the SGNB MODIFICATION CONFIRM message contains the *MeNB Resource Coordination Information* IE, the en-gNB should forward it to lower layers and it may use it for the purpose of resource coordination with the MeNB. The en-gNB shall consider the received *UL Coordination Information* IE value valid until reception of a new update of the IE for the same UE. The en-gNB shall consider the received *DL Coordination Information* IE value valid until reception of a new update of the IE for the same UE. If the *MeNB Coordination Assistance Information* IE is contained in the *MeNB Resource Coordination Information* IE, the en-gNB shall, if supported, use the information to determine further coordination of resource utilisation between the en-gNB and the MeNB.

If the MeNB receives for an E-RAB for which the PDCP entiy is allocated at the MeNB the *Secondary SgNB DL GTP Tunnel Endpoint at SCG* IE in the SGNB MODIFICATION REQUIRED message, it shall provide the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE to the en-gNB in the SGNB MODIFICATION CONFIRM message. If the *LCID* IE is included in the SGNB MODIFICATION REQUIRED message, the MeNB should take it into account.

If the SGNB MODIFICATION REQUIRED message contains the *RLC Status* IE, the MeNB shall assume that RLC has been reestablished at the en-gNB and may trigger PDCP data recovery.

If the *RLC Mode* IE is included for an E-RAB within the *E-RABs To Be Released List* IE (for E-RABs hosted at the en-gNB) in the SGNB MODIFICATION REQUIRED message, it indicates the mode that the en-gNB used for the E-RAB when it was hosted at the en-gNB.

The MeNB shall include only E-RABs with the following IE in *E-RABs Admitted To Be Modified List* IE:

- the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE.

If the *Location Information at SgNB* IE is included in the SGNB MODIFICATION REQUIRED, the MeNB may transfer the included information towards the MME.

Interaction with the MeNB initiated SgNB Modification Preparation procedure:

If applicable, as specified in TS 37.340 [32], the en-gNB may receive, after having initiated the SgNB initiated SgNB Modification procedure, the SGNB 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 37.340 [32], the en-gNB may receive, after having initiated the SgNB initiated SgNB Modification procedure, the SGNB MODIFICATION REQUEST message including the *SgNB Security Key* IE within the *UE Context Information* IE.

If applicable, as specified in TS 37.340 [32], the en-gNB may receive, after having initiated the SgNB initiated SgNB Modification procedure, the SGNB MODIFICATION REQUEST message including the *measGapConfig* IE as defined in TS 38.331 [31] within the *MeNB to SgNB Container* IE.

The en-gNB may receive, after having initiated the SgNB initiated SgNB modification procedure including the *New DRB ID Request* IE for an SN terminated bearer within the *E-RABs To Be Modified List* IE, the SGNB MODIFICATION REQUEST message to release and add the same bearer with a new DRB ID or with the same DRB ID but together with the *SgNB Security Key* IE within the *UE Context Information* IE.

8.7.7.3 Unsuccessful Operation

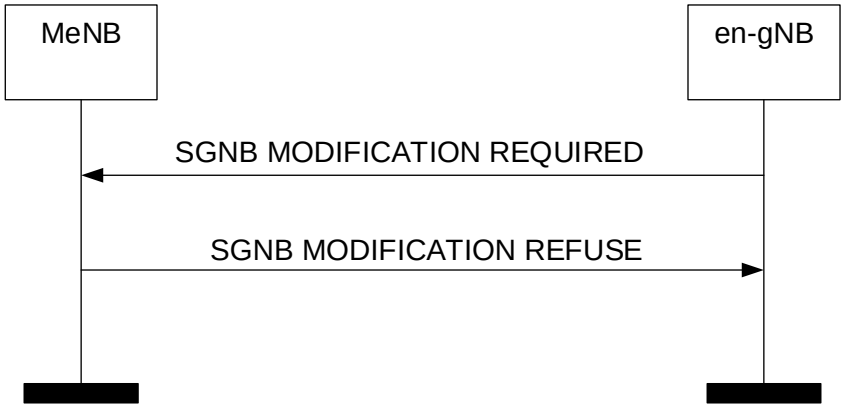

Figure 8.7.7.3-1: SgNB initiated SgNB Modification, unsuccessful operation.

In case the requested modification cannot be performed successfully the MeNB shall respond with the SGNB MODIFICATION REFUSE message to the en-gNB with an appropriate cause value in the *Cause* IE.

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

8.7.7.4 Abnormal Conditions

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

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 SgNB Release procedure.

If the en-gNB does not receives for an E-RAB for which the PDCP entiy is allocated at the MeNB the *Secondary MeNB UL GTP Tunnel Endpoint at PDCP* IE to the en-gNB in the SGNB MODIFICATION CONFIRM message although the *Secondary SgNB DL GTP Tunnel Endpoint at SCG* IE was provided to the MeNB in the SGNB MODIFICATION REQUIRED message, it shall assume the setup of the secondary X2-U bearer as being failed.

Interaction with the MeNB initiated SgNB Modification Preparation procedure:

If the en-gNB, after having initiated the SgNB initiated SgNB Modification procedure, receives the SGNB MODIFICATION REQUEST message including other IEs than an applicable *SgNB Security Key* IE and/or applicable forwarding addresses or applicable measurement gap pattern or information applicable to release and add the same bearer with different DRB ID, the en-gNB shall

- regard the SgNB initiated SgNB Modification Procedure as being failed;
- stop the $T_{DCoverall}$, which was started to supervise the SgNB initiated SgNB Modification procedure;
- be prepared to receive the SGNB MODIFICATION REFUSE message from the MeNB and;

- continue with the MeNB initiated SgNB Modification Preparation procedure as specified in section 8.7.6.

Interaction with the MeNB initiated handover procedure:

If the MeNB, after having initiated the handover procedure, receives the SGNB MODIFICATION REQUIRED message, the MeNB shall refuse the SgNB modification procedure with an appropriate cause value in the *Cause* IE.

8.7.8 SgNB Change

8.7.8.1 General

This procedure is used by the en-gNB to change to another en-gNB.

The procedure uses UE-associated signalling.

8.7.8.2 Successful Operation

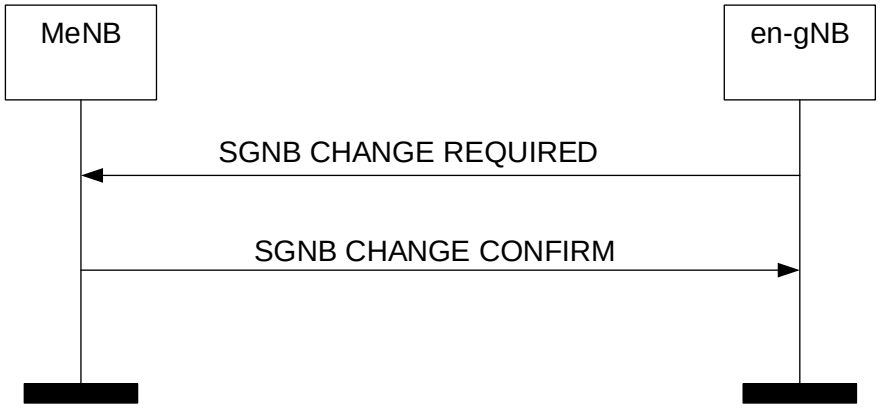

Figure 8.7.8.2-1: SgNB Change, successful operation.

The en-gNB initiates the procedure by sending the SGNB CHANGE REQUIRED message to the MeNB including the *Target SgNB ID Information IE*. When the en-gNB sends the SGNB CHANGE REQUIRED message, it shall start the timer $T_{DCoverall}$.

The SGNB CHANGE REQUIRED message may contain

- the *SgNB to MeNB Container* IE.

If the MeNB is able to perform the change requested by the en-gNB, the MeNB shall send the SGNB CHANGE CONFIRM message to the en-gNB. For each E-RAB configured with the PDCP entity in the en-gNB, 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.

The en-gNB may start data forwarding and stop providing user data to the UE and shall stop the timer $T_{DCoverall}$ upon reception of the SGNB CHANGE CONFIRM message.

8.7.8.3 Unsuccessful Operation

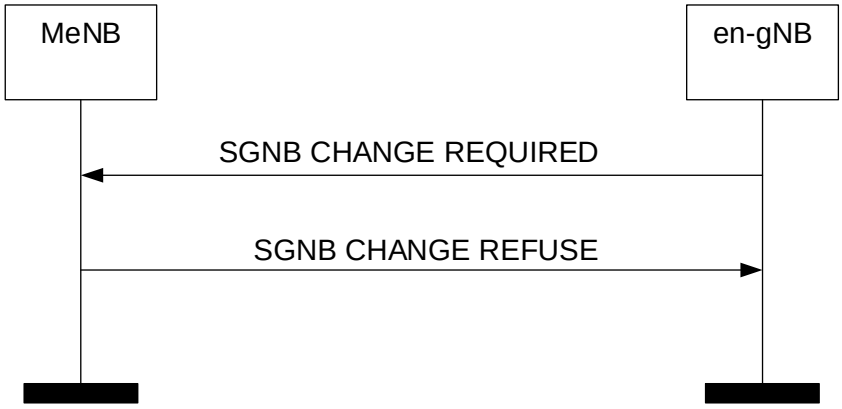

Figure 8.7.8.3-1: SgNB Change, unsuccessful operation.

In case the request change cannot be performed successfully the MeNB shall respond with the SGNB CHANGE REFUSE message to the en-gNB with an appropriate cause value in the *Cause* IE.

8.7.8.4 Abnormal Conditions

If the timer $T_{DCoverall}$ expires before the en-gNB has received the SGNB CHANGE CONFIRM or the SGNB CHANGE REFUSE message, the en-gNB shall regard the requested change as failed and may take further actions like triggering the SgNB initiated SgNB Release procedure to release all en-gNB resources allocated for the UE.

Interaction with the MeNB initiated handover procedure:

If the MeNB, after having initiated the handover procedure, receives the SGNB CHANGE REQUIRED message, the MeNB shall refuse the SgNB change procedure with an appropriate cause value in the Cause IE.

8.7.9 MeNB initiated SgNB Release

8.7.9.1 General

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

The procedure uses UE-associated signalling.

8.7.9.2 Successful Operation

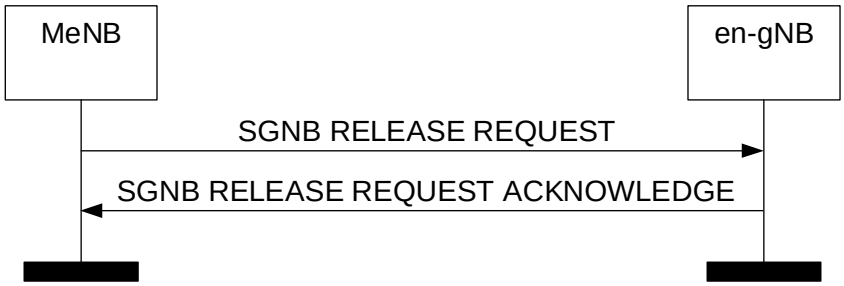

Figure 8.7.9.2-1: MeNB initiated SgNB Release, successful operation

The MeNB initiates the procedure by sending the SGNB RELEASE REQUEST message. Upon reception of the SGNB RELEASE REQUEST message the en-gNB shall stop providing user data to the UE. The *SgNB UE X2AP ID* IE shall be included if it has been obtained from the en-gNB.

If the bearer context in the en-gNB was configured with the PDCP entity in the en-gNB, for E-RAB 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 SGNB RELEASE REQUEST message to indicate that the en-gNB should perform data forwarding of uplink/downlink packets for that E-RAB.

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

If the en-gNB confirms the request to release en-gNB resources it shall send the SGNB RELEASE REQUEST ACKNOWLEDGE message to the MeNB.

If the *RLC Mode* IE is included for an E-RAB within the *E-RABs Admitted To Be Released List* IE (for E-RABs hosted at the en-gNB) in the SGNB RELEASE REQUEST ACKNOWLEDGE message, it indicates the mode that the en-gNB used for the E-RAB when it was hosted at the en-gNB.

8.7.9.3 Unsuccessful Operation

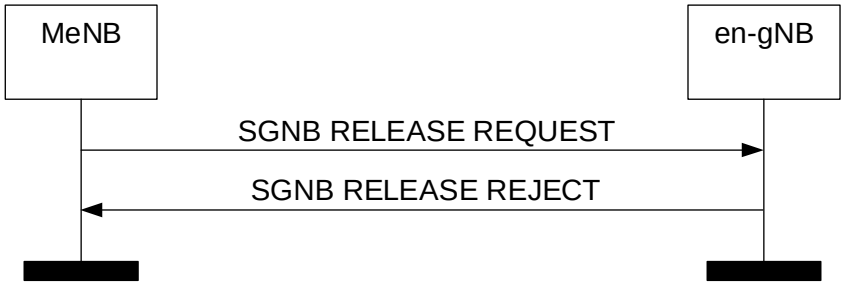

Figure 8.7.9.3-1: MeNB initiated SgNB Release, unsuccessful operation

If the en-gNB cannot confirm the request to release en-gNB resources it shall send the SGNB RELEASE REQUEST REJECT message to the MeNB with an appropriate cause indicated in the *Cause* IE.

8.7.9.4 Abnormal Conditions

If the SGNB RELEASE REQUEST message refer to a context that does not exist, the en-gNB shall ignore the message.

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

Interactions with the UE Context Release procedure:

If the MeNB does not receive the reply from the en-gNB before it has to relase the EN-DC connection, or it receives SGNB RELEASE REQUEST REJECT, it may trigger the UE Context Release procedure. If the en-gNB received the UE CONTEXT RELEASE right after receiving the SGNB RELEASE REQUEST (and before or after responding to it), the en-gNB shall consider the related MeNB initiated SgNB Release procedure as being the resolution of abnormal conditions and release the related UE context immediately.

8.7.10 SgNB initiated SgNB Release

8.7.10.1 General

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

The procedure uses UE-associated signalling.

8.7.10.2 Successful Operation

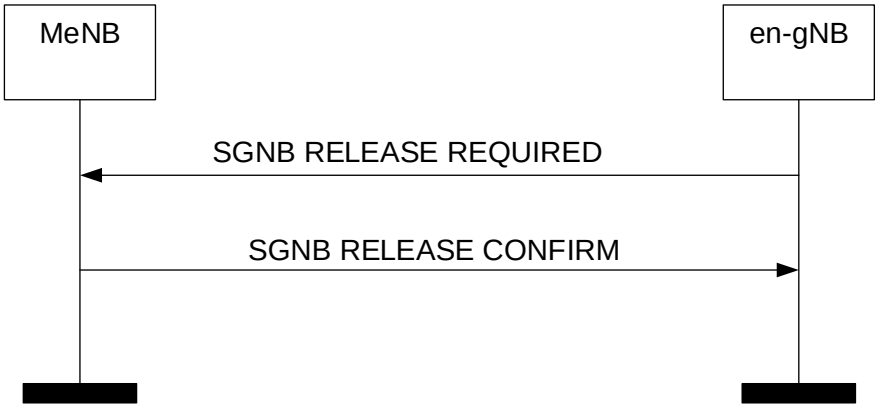

Figure 8.7.10.2-1: SgNB initiated SgNB Release, successful operation.

The en-gNB initiates the procedure by sending the SGNB RELEASE REQUIRED message to the MeNB.

Upon reception of the SGNB RELEASE REQUIRED message, the MeNB replies with the SGNB RELEASE CONFIRM message. For each E-RAB configured with the PDCP entity in the en-gNB, 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 PDCP entity in the MeNB and SCG resources, 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.

If the *RLC Mode* IE is included for an E-RAB within the *E-RABs To Be Released List* IE (for E-RABs hosted at the en-gNB) in the SGNB RELEASE REQUIRED message, it indicates the mode that the en-gNB used for the E-RAB when it was hosted at the en-gNB.

The en-gNB may start data forwarding and stop providing user data to the UE upon reception of the SGNB RELEASE CONFIRM message.

8.7.10.3 Unsuccessful Operation

Not applicable.

8.7.10.4 Abnormal Conditions

Void.

8.7.11 SgNB Counter Check

8.7.11.1 General

This procedure is initiated by the en-gNB to request the MeNB to execute a counter check procedure to verify the value of the PDCP COUNTs associated with SN terminated bearers.

The procedure uses UE-associated signalling.

8.7.11.2 Successful Operation

Figure 8.7.11.2-1: SgNB Counter Check procedure, successful operation.

The en-gNB initiates the procedure by sending the SGNB COUNTER CHECK REQUEST message to the MeNB.

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

8.7.11.3 Unsuccessful Operation

Not applicable.

8.7.11.4 Abnormal Conditions

Not applicable.

8.7.12 RRC Transfer

8.7.12.1 General

The purpose of the RRC Transfer procedure is to deliver a PDCP-C PDU encapsulating an LTE RRC message to the en-gNB so that it may then be forwarded to the UE, or from the en-gNB, if it was received from the UE. Delivery status may also be provided from the en-gNB to the MeNB using the RRC Transfer.

The procedure is also to enable transfer of the NR RRC message container with the NR measurements from the MeNB to the en-gNB, when received from the UE.

The procedure is also to enable transfer of the NR RRC message container with the NR failure information from the MeNB to the en-gNB, when received from the UE.

The procedure uses UE-associated signalling.

8.7.12.2 Successful Operation

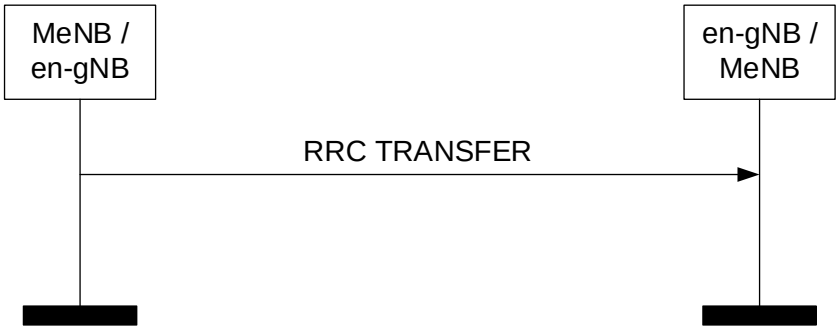

Figure 8.7.12.2-1: RRC Transfer procedure, successful operation.

Either the MeNB initiates the procedure by sending the RRC TRANSFER message to the en-gNB or the en-gNB initiates the procedure by sending the RRC TRANSFER message to the MeNB.

If the en-gNB receives an RRC TRANSFER message which includes neither the *RRC Container* IE in the *Split SRB* IE nor the *RRC container* IE in *NR UE Report* IE, it shall ignore the message. If the en-gNB receives an RRC TRANSFER message with the Delivery Status IE, it shall ignore the message. If the en-gNB receives the *RRC Container* IE in the *Split SRB* IE, it shall deliver the contained PDCP-C PDU encapsulating an RRC message to the UE.

If the MeNB receives the *Delivery Status* IE in the *split SRB* IE the MeNB shall consider RRC messages up to the indicated NR PDCP SN as having been successfully delivered (as defined in TS 36.322 [40]) to the UE by the en-gNB.

8.7.12.3 Abnormal Conditions

In case of the split SRBs, the receiving node may ignore the message, if the MeNB has not indicated possibility of RRC transfer at the bearer setup.

8.7.13 Secondary RAT Data Usage Report

8.7.13.1 General

This procedure is initiated by the en-gNB to report secondary RAT data volume.

The procedure uses UE-associated signalling.

8.7.13.2 Successful Operation

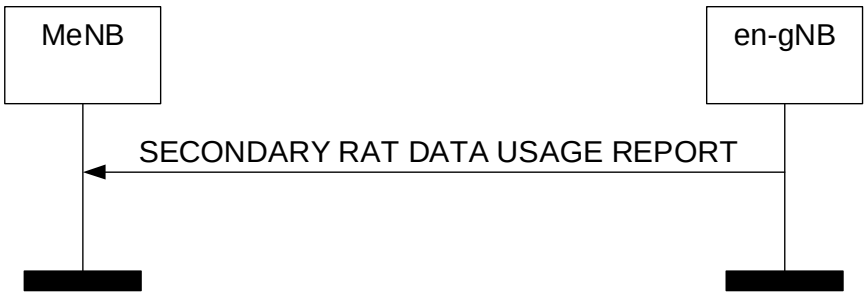

Figure 8.7.13.2-1: Secondary RAT Data Usage Report procedure, successful operation.

The en-gNB initiates the procedure by sending the SECONDARY RAT DATA USAGE REPORT message to the MeNB.

8.7.13.3 Unsuccessful Operation

Not applicable.

8.7.13.4 Abnormal Conditions

Not applicable.

8.7.14 Partial reset of EN-DC

8.7.14.1 General

This procedure is triggered by the en-gNB or the MeNB to initiate the reset of the resources for selected UEs.

The procedure uses non UE-associated signalling.

8.7.14.2 Successful Operation

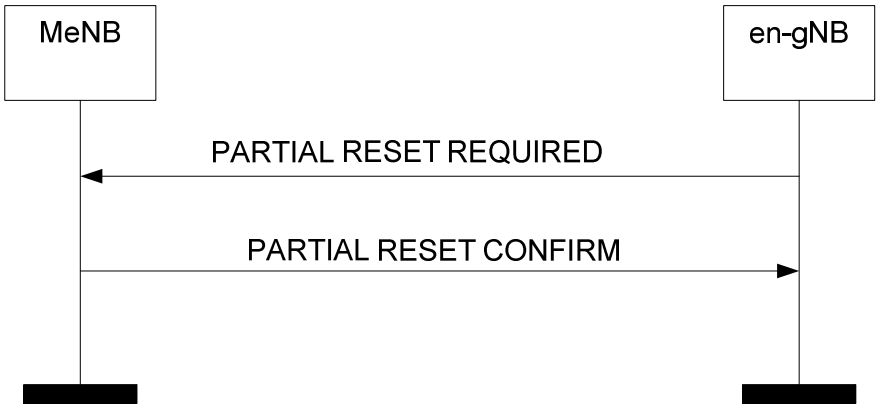

Figure 8.7.14.2-1: en-gNB initiated Partial Reset of EN-DC, successful operation.

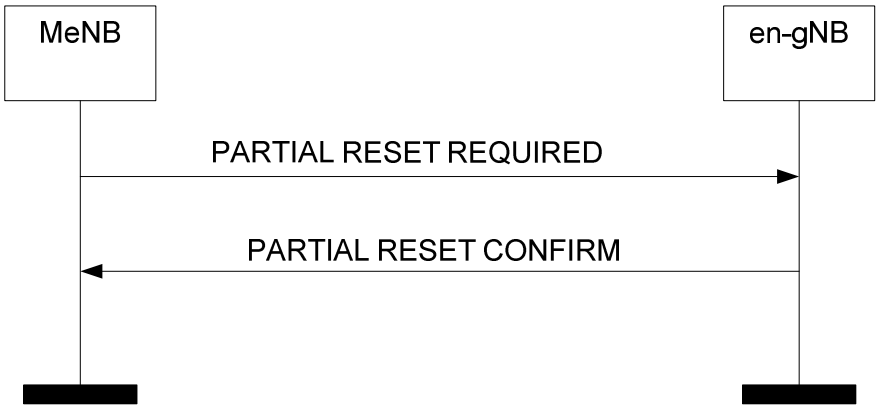

Figure 8.7.14.2-2: eNB initiated Partial Reset of EN-DC, successful operation.

The en-gNB or MeNB initiates the procedure by sending the PARTIAL RESET REQUIRED message to the MeNB or the en-gNB.

In case of the eNB-initiated Partial Reset, at reception of the PARTIAL RESET REQUIRED message, the en-gNB node shall release all allocated resources on X2 and Uu related to the UE association(s) indicated in the PARTIAL RESET REQUIRED message and remove the indicated UE contexts including X2AP ID.

In case of the en-gNB-initiated Partial Reset, at reception of the PARTIAL RESET REQUIRED message, the MeNB may decide to release all allocated resources on X2 and Uu related to the UE association(s) indicated in the PARTIAL RESET REQUIRED message and remove the indicated UE contexts including X2AP ID, or to reconfigure the UEs for MN-terminated MCG bearers.

After the receiving node has released or reconfigured all assigned X2 resources and the UE X2AP IDs for all indicated UE associations which can be used for new UE-associated logical X2-connections over the X2 interface, the receiving node shall respond with the PARTIAL RESET CONFIRM message. The node receiving the request does not need to wait for the release or reconfiguration of radio resources to be completed before returning the PARTIAL RESET CONFIRM message.

The node initiating the procedure shall include the *SgNB UE X2AP ID* IE in the PARTIAL RESET REQUIRED message if it has already been allocated for the UE. The node receiving the request shall use the *SgNB UE X2AP ID* IE (if included) and/or the *MeNB UE S1AP ID* IE (and the *MeNB UE S1AP ID Extension* IE, if included) to identify the UE association(s) to be released. If the *SgNB UE X2AP ID* IE was included in the PARTIAL RESET REQUIRED message, the receiving node shall include it also in the PARTIAL RESET CONFIRM message.

The node receiving the request shall include in the PARTIAL RESET CONFIRM message, for each UE association to be released, the same list of UE-associated logical X2-connections over X2. The list shall be in the same order as received in the PARTIAL RESET REQUIRED message and shall include also unknown UE-associated logical X2-connections.

If case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], the PARTIAL RESET REQUIRED message and the PARTIAL RESET CONFIRM message shall contain the *Interface Instance Indication* IE to identify the corresponding interface instance.

Interactions with other procedures:

If the PARTIAL RESET REQUIRED message is received, any other ongoing procedure (except for a Reset or another Partial Reset of EN-DC procedures) on the same X2 interface related to a UE association, indicated in the PARTIAL RESET REQUIRED message, shall be aborted.

8.7.14.3 Unsuccessful Operation

Not applicable.

8.7.14.4 Abnormal Conditions

Void.

8.7.15 E-UTRA – NR Cell Resource Coordination

8.7.15.1 General

The purpose of the E-UTRA – NR Cell Resource Coordination procedure is to enable coordination of radio resource allocation between an eNB and an en-gNB that are sharing spectrum and whose coverage areas are fully or partially overlapping. During the procedure, the eNB and en-gNB shall exchange their intended resource allocations for data traffic, and, if possible, converge to a shared resource. The procedure is only to be used for the purpose of E-UTRA – NR spectrum sharing.

The procedure uses non-UE-associated signalling.

8.7.15.2 Successful Operation

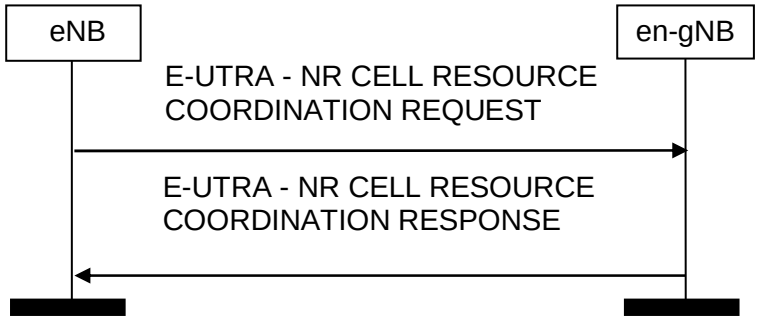

Figure 8.7.15.2-1: eNB-initiated E-UTRA – NR Cell Resource Coordination request, successful operation

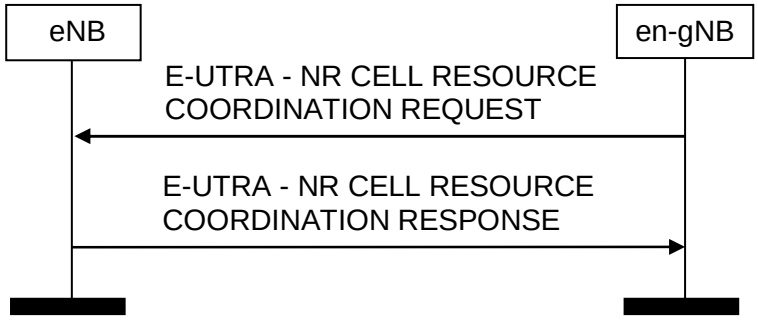

Figure 8.7.15.2-2: en-gNB-initiated E-UTRA – NR Cell Resource Coordination request, successful operation

If case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], the E-UTRA – NR CELL RESOURCES COORDINATION REQUEST message and the E-UTRA – NR CELL RESOURCES COORDINATION RESPONSE message shall contain the *Interface Instance Indication* IE to identify the corresponding interface instance.

eNB initiated E-UTRA – NR Cell Resource Coordination:

An eNB initiates the procedure by sending the E-UTRA – NR CELL RESOURCE COORDINATION REQUEST message to an en-gNB over the X2 interface. The en-gNB extracts the *Data Traffic Resource Indication* IE and it replies by sending the E-UTRA – NR CELL RESOURCE COORDINATION RESPONSE message. The en-gNB shall calculate the full eNB resource allocation by combining the *Data Traffic Resource Indication* IE and the *Protected E-UTRA Resource Indication* IE that were most recently received from the eNB.

In case of conflict between the most recently received *Data Traffic Resource Indication* IE and the most recently received *Protected E-UTRA Resource Indication* IE, the en-gNB shall give priority to the *Protected E-UTRA Resource Indication* IE.

If the *Initiating Node Type* is eNB, then the E-UTRA – NR CELL RESOURCE COORDINATION REQUEST message shall contain at least one *EUTRA Cell ID* in the List of E-UTRA Cells in NR Coordination Request. If the *Initiating Node Type* is en-gNB, then the E-UTRA – NR CELL RESOURCE COORDINATION REQUEST message shall contain at least one NR-Cell ID in the List of NR Cells in NR Coordination Request.

en-gNB initiated E-UTRA – NR Cell Resource Coordination:

An en-gNB initiates the procedure by sending the E-UTRA – NR CELL RESOURCE COORDINATION REQUEST message to an eNB. The eNB replies with the E-UTRA – NR CELL RESOURCE COORDINATION RESPONSE message. The en-gNB shall calculate the full eNB resource allocation by combining the *Data Traffic Resource Indication* IE and the *Protected E-UTRA Resource Indication* IE that were most recently received from the eNB.

In case of conflict between the most recently received *Data Traffic Resource Indication* IE and the most recently received *Protected E-UTRA Resource Indication* IE, the en-gNB shall give priority to the *Protected E-UTRA Resource Indication* IE.

8.7.16 SgNB Activity Notification

8.7.16.1 General

The purpose of the SgNB Activity Notification procedure is to allow an en-gNB to send a notification to an eNB concerning user data traffic activity of already established E-RABs. The procedure uses UE-associated signalling.

8.7.16.2 Successful Operation

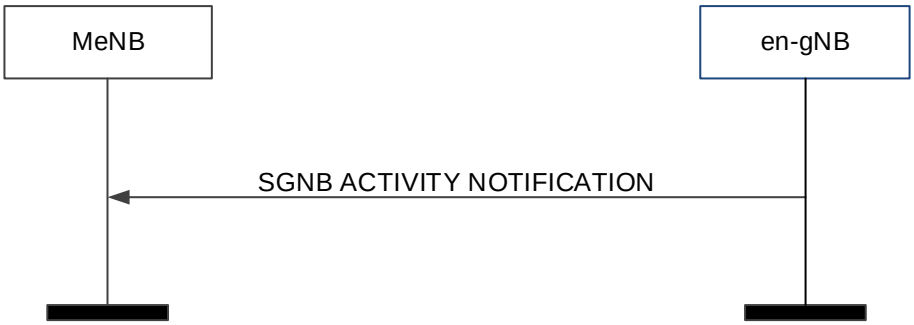

Figure 8.7.16.2-1: Activity Notification procedure, successful operation

The en-gNB initiates the procedure by sending an SGNB ACTIVITY NOTIFICATION message to the MeNB.

The SGNB ACTIVITY NOTIFICATION message may contain notification for UE context level user plane activity in the *UE Context level user plane activity report* IE.

The SGNB ACTIVITY NOTIFICATION message may contain notification for activity of E-RABs.

8.7.16.3 Abnormal Conditions

Void.

8.7.17 gNB Status Indication

8.7.17.1 General

The purpose of the gNB Status Indication procedure is to inform the eNB that the en-gNB is overloaded so that overload reduction actions can be applied. The procedure uses non-UE associated signalling.

8.7.17.2 Successful Operation

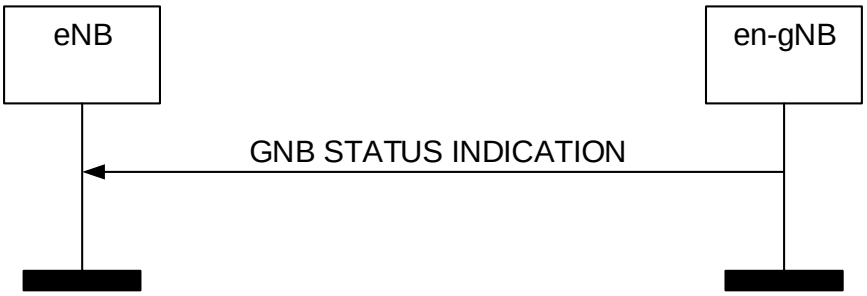

Figure 8.7.17.2-1: gNB Status Indiciation procedure, successful operation

If the *gNB Overload Information* IE in the GNB STATUS INDICATION message is set to "overloaded", the eNB shall apply overload reduction actions until it receives a subsequent GNB STATUS INDICATION message with *gNB Overload Information* IE set to "not-overloaded".

The detailed overload reduction policy is up to eNB implementation.

If case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], the GNB STATUS INDICATION message shall contain the *Interface Instance Indication* IE to identify the corresponding interface instance.

8.7.17.3 Abnormal Conditions

Void.

8.7.18 EN-DC Configuration Transfer

8.7.18.1 General

The purpose of the EN-DC Configuration Transfer procedure is to transfer the EN-DC SON Configuration container, either from the eNB to the en-gNB or from the en-gNB to the eNB, in the context of en-gNB X2 TNL address discovery as described in TS 36.300 [15].

The procedure uses non UE-associated signalling.

8.7.18.2 Successful Operation

Figure 8.7.18.2-1: eNB initiated EN-DC Configuration Transfer, successful operation

Figure 8.7.18.2-2: en-gNB initiated EN-DC Configuration Transfer, successful operation

The eNB initiates the procedure by sending the EN-DC CONFIGURATION TRANSFER message to an en-gNB.

If the en-gNB receives, in the *EN-DC SON Configuration Transfer* IE, the *SON Information* IE containing the *SON Information Request* IE, it may transfer back the requested information towards the eNB indicated in the *Source eNB-ID* IE of the *EN-DC SON Configuration Transfer* IE by initiating the EN-DC Configuration Transfer procedure.

If the en-gNB receives, in the *EN-DC SON Configuration Transfer* IE, the *X2 TNL Configuration Info* IE containing the *eNB X2 Extended Transport Layer Addresses* IE, it may use it as part of its ACL functionality configuration actions, if such ACL functionality is deployed.

In case the *IP-Sec Transport Layer Address* IE is present and the *GTP Transport Layer Addresses* IE within the *eNB X2 Extended Transport Layer Addresses* IE is not empty, GTP traffic is conveyed within an IP-Sec tunnel terminated at the IP-Sec tunnel end point given in by the *IP-Sec Transport Layer Address* IE.

In case the *IP-Sec Transport Layer Address* IE is not present, GTP traffic is terminated at the end points given by the list of addresses in *eNB GTP Transport Layer Addresses* IE within the *eNB X2 Extended Transport Layer Addresses* IE.

In case the *eNB GTP Transport Layer Addresses* IE is empty and the *IP-Sec Transport Layer Address* IE is present, SCTP traffic is conveyed within an IP-Sec tunnel terminated at the IP-Sec tunnel end point given in the *IP-Sec Transport Layer Address* IE, within the *eNB X2 Extended Transport Layer Addresses* IE.

If the en-gNB is configured to use one IPsec tunnel for EN-DC X2 traffic (IPsec star topology) then the traffic to the peer eNB shall be routed through this IPsec tunnel and the *IP-Sec Transport Layer Address* IE shall be ignored.

The en-gNB initiates the procedure by sending the EN-DC CONFIGURATION TRANSFER message to an eNB.

If case of network sharing with multiple cell ID broadcast with shared X2-C signalling transport, as specified in TS 36.300 [15], the EN-DC CONFIGURATION TRANSFER message shall contain the *Interface Instance Indication* IE to identify the corresponding interface instance.

8.7.18.3 Abnormal Conditions

Void.

8.7.19 Trace Start

8.7.19.1 General

The purpose of the Trace Start procedure is to allow the MeNB to request the en-gNB to initiate a trace session for a UE. The procedure uses UE-associated signalling.

8.7.19.2 Successful Operation

Figure 8.7.19.2-1: Trace Start, successful operation

The Trace Start procedure is initiated by the MeNB sending the TRACE START message to the en-gNB for that specific UE. Upon reception of the TRACE START message, the en-gNB shall initiate the requested trace session as described in TS 32.422 [6].

8.7.19.3 Abnormal Conditions

Void.

8.7.20 Deactivate Trace

8.7.20.1 General

The purpose of the Deactivate Trace procedure is to allow the MeNB to request the en-gNB to stop the trace session for the indicated trace reference. The procedure uses UE-associated signalling.

8.7.20.2 Successful Operation

Figure 8.7.20.2-1: Deactivate Trace, successful opration

The Deactivate Trace procedure is initiated by the MeNB by sending the DEACTIVATE TRACE to the en-gNB for that specific UE. Upon reception of the DEACTIVATE TRACE message, the en-gNB shall stop the trace session for the indicated trace reference in the *E-UTRAN Trace ID* IE.

8.7.20.3 Abnormal Conditions

Void.

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 → 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	M		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	M		INTEGER (0..2^{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	M		9.2.12		–	
>Subscriber Profile ID for RAT/Frequency priority	O		9.2.25		–	
>E-RABs To Be Setup List		*1*			–	
>>E-RABs To Be Setup Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>>E-RAB ID	M		9.2.23		–	
>>>E-RAB Level QoS Parameters	M		9.2.9	Includes necessary QoS parameters	–	
>>>DL Forwarding	O		9.2.5		–	
>>>UL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SGW endpoint of the S1 transport bearer. For delivery of UL PDUs.	–	
>>>Bearer Type	O		9.2.92		YES	reject
>RRC Context	M		OCTET STRING	Includes the RRC *HandoverPreparationInformation* message as defined in subclause 10.2.2 of TS 36.331 [9], or the RRC *HandoverPreparationInformation-NB* message as defined in 10.6.2 of TS 36.331 [9].	–	
>Handover Restriction List	O		9.2.3		–	
>Location Reporting Information	O		9.2.21	Includes the necessary parameters for location reporting	–	
>Management Based MDT Allowed	O		9.2.59		YES	ignore
>Management Based MDT PLMN List	O		MDT PLMN List 9.2.64		YES	ignore
>UE Sidelink Aggregate Maximum Bit Rate	O		9.2.97	This IE applies only if the UE is authorized for V2X services.	YES	Ignore
UE History Information	M		9.2.38	Same definition as in TS 36.413 [4]	YES	ignore
Trace Activation	O		9.2.2		YES	ignore
SRVCC Operation Possible	O		9.2.33		YES	ignore
CSG Membership Status	O		9.2.52		YES	reject

Mobility Information	O		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	O		9.2.69		YES	ignore
UE History Information from the UE	O		OCTET STRING	VisitedCellInfoList contained in the UEInformationResponse message (TS 36.331 [9])	YES	ignore
Expected UE Behaviour	O		9.2.70		YES	ignore
ProSe Authorized	O		9.2.78		YES	ignore
UE Context Reference at the SeNB	O				YES	ignore
>Global SeNB ID	M		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	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB		
Old eNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the source eNB	YES	reject
V2X Services Authorized	O		9.2.93		YES	ignore
UE Context Reference at the WT	O				YES	ignore
>WT ID	M		9.2.95			
>WT UE XwAP ID	M		9.2.96			
UE Context Reference at the SgNB	O				YES	ignore
>Global en-gNB ID	M		9.2.112			
>SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the SgNB.	–	
NR UE Security Capabilities	O		9.2.107		YES	ignore
Aerial UE subscription information	O		9.2.129		YES	ignore
Subscription Based UE Differentiation Information	O		9.2.136		YES	ignore

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 → 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	M		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 Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>UL GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	–	
>>DL GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer. used for forwarding of DL PDUs	–	
E-RABs Not Admitted List	O		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	O		9.2.7		YES	ignore
UE Context Kept Indicator	O		9.2.85		YES	ignore
Old eNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the source eNB	YES	ignore
New eNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the target eNB	YES	reject
WT UE Context Kept Indicator	O		UE Context Kept Indicator 9.2.85	Indicates that the WT has acknowledged to keep the UE context	YES	ignore

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 → 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	M		eNB UE X2AP ID 9.2.24	Allocated at the source eNB	YES	ignore
Cause	M		9.2.6		YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
Old eNB UE X2AP ID Extension	O		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 or for EN-DC.

Direction: source eNB → target eNB (handover), eNB from which the E-RAB context is transferred → eNB to which the E-RAB context is transferred (RRC connection re-establishment or dual connectivity), MeNB/en-gNB from which the E-RAB context is transferred → en-gNB/MeNB to which the E-RAB context is transferred (EN-DC).

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/EN-DC 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/EN-DC 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 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>Receive Status Of UL PDCP SDUs	O		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	M		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	M		COUNT Value 9.2.15	PDCP-SN and Hyper frame number that the target eNB/en-gNB 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	O		BIT STRING (1..16384)	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	O		COUNT Value Extended 9.2.66	PDCP-SN and Hyper Frame Number of the first missing UL SDU in case of 15 bit long PDCP-SN	YES	ignore
>>DL COUNT Value Extended	O		COUNT Value Extended 9.2.66	PDCP-SN and Hyper Frame Number that the target eNB/en-gNB 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	O		BIT STRING (1..131072)	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	O		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	O		COUNT Value for PDCP SN Length 18 9.2.82	PDCP-SN and Hyper Frame Number that the target eNB/en-gNB should assign for the next DL SDU not having an SN yet in case of 18 bit long PDCP-SN	YES	ignore
Old eNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated for handover at the source eNB and for dual connectivity/EN-DC at the eNB from which the E-RAB context is transferred.	YES	reject
New eNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated for handover at the target eNB and for dual connectivity/EN-DC at the eNB to which the E-RAB context is transferred.	YES	reject
SgNB UE X2AP ID	O		en-gNB UE X2AP ID 9.2.100	Allocated for EN-DC at the SgNB.	YES	ignore

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 → source eNB (handover), MeNB → SeNB (dual connectivity), MeNB → en-gNB (EN-DC).

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/EN-DC at the MeNB.	YES	reject
Old eNB UE X2AP ID Extension	O		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	O		Extended eNB UE X2AP ID 9.2.86	Allocated for handover at the source eNB and for dual connectivity/EN-DC at the MeNB.	YES	reject
SIPTO Bearer Deactivation Indication	O		ENUMERATED (True, …,)	Indicates that SIPTO@LN PDN connection deactivation is needed.	YES	ignore
SgNB UE X2AP ID	O		en-gNB UE X2AP ID 9.2.100	Allocated for EN-DC at the SgNB.	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 → 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	M		eNB UE X2AP ID 9.2.24	Allocated at the source eNB	YES	reject
New eNB UE X2AP ID	O		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	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the source eNB	YES	reject
New eNB UE X2AP ID Extension	O		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.

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	ignore
Cell Information	M				YES	ignore
>Cell Information Item		*1 .. <maxCellineNB>*			EACH	ignore
>>Cell ID	M		ECGI 9.2.14	Id of the source cell	–	
>>UL Interference Overload Indication	O		9.2.17		–	
>>UL High Interference Information		*0 .. <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)	O		9.2.19		–	
>>ABS Information	O		9.2.54		YES	ignore
>>Invoke Indication	O		9.2.55		YES	ignore
>>Intended UL-DL Configuration	O		ENUMERATED(sa0, sa1, sa2, sa3, sa4, sa5, sa6,…)	One of the UL-DL configurations 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	O		9.2.67	This IE applies to TDD only.	YES	ignore
>>CoMP Information	O		9.2.74		YES	ignore
>>Dynamic DL transmission information	O		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/en-gNB.

Direction: $eNB_1 \rightarrow eNB_2$ or eNB → en-gNB or en-gNB → 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	O		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	O		eNB UE X2AP ID 9.2.24	Allocated for handover at the target eNB and for dual connectivity/EN-DC at the MeNB or the eNB to which the E-RAB context is transferred.	YES	ignore
Cause	O		9.2.6		YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
Old eNB UE X2AP ID Extension	O		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	O		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
Old en-gNB UE X2AP ID	O		en-gNB UE X2AP ID 9.2.100	Allocated for EN-DC at the en-gNB.	YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

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.

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
Served Cells		*1 .. <maxCellineNB>*		Complete list of cells served by the eNB	YES	reject
>Served Cell Information	M		9.2.8		–	
>Neighbour Information		*0 .. <maxnoofNeighbours>*			–	
>>ECGI	M		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the neighbour cell	–	
>>PCI	M		INTEGER (0..503, …)	Physical Cell Identifier of the neighbour cell	–	
>>EARFCN	M		9.2.26	DL EARFCN for FDD or EARFCN for TDD	–	
>>TAC	O		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
>NR Neighbour Information	O		9.2.98	NR neighbour, capable of performing EN-DC with the served E-UTRA cell	YES	ignore
GU Group Id List		*0 .. <maxfPools>*		List of all the pools to which the eNB belongs	GLOBAL	reject
>GU Group Id	M		9.2.20		-	
LHN ID	O		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.

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
Served Cells		*1 .. <maxCellineNB>*		Complete list of cells served by the eNB	GLOBAL	reject
>Served Cell Information	M		9.2.8		–	
>Neighbour Information		*0 .. <maxnoofNeighbours>*			–	
>>ECGI	M		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the neighbour cell	–	
>>PCI	M		INTEGER (0..503, …)	Physical Cell Identifier of the neighbour cell	–	
>>EARFCN	M		9.2.26	DL EARFCN for FDD or EARFCN for TDD	–	
>>TAC	O		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
>NR Neighbour Information	O		9.2.98	NR neighbour, capable of performing EN-DC with the served E-UTRA cell	YES	ignore
GU Group Id List		*0 .. <maxPools>*		List of all the pools to which the eNB belongs	GLOBAL	reject
>GU Group Id	M		9.2.20		-	
Criticality Diagnostics	O		9.2.7		YES	ignore
LHN ID	O		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.

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	O		9.2.32		YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore

9.1.2.6 RESET REQUEST

This message is sent from one eNB to another eNB/en-gNB or from en-gNB to an eNB and is used to request the X2 interface between the two eNB or between an eNB and an en-gNB to be reset.

Direction: $eNB_1 \rightarrow eNB_2$, eNB → en-gNB, en-gNB → eNB.

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
Interface Instance Indication	O		9.2.143		YES	reject

9.1.2.7 RESET RESPONSE

This message is sent by a eNB/en-gNB as a response to a RESET REQUEST message.

Direction: $eNB_2 \rightarrow eNB_1$, eNB → en-gNB, en-gNB → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Criticality Diagnostics	O		9.2.7		YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

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.

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
Served Cells To Add		*0 .. <maxCellineNB>*		Complete list of added cells served by the eNB	GLOBAL	reject
>Served Cell Information	M		9.2.8		–	
>Neighbour Information		*0 .. <maxnoofNeighbours>*			–	
>>ECGI	M		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the neighbour cell	–	
>>PCI	M		INTEGER (0..503, …)	Physical Cell Identifier of the neighbour cell	–	
>>EARFCN	M		9.2.26	DL EARFCN for FDD or EARFCN for TDD	–	
>>TAC	O		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
>NR Neighbour Information	O		9.2.98	NR neighbour, capable of performing EN-DC with the served E-UTRA cell	YES	ignore
Served Cells To Modify		*0 .. <maxCellineNB>*		Complete list of modified cells served by the eNB	GLOBAL	reject
>Old ECGI	M		ECGI 9.2.14	Old E-UTRAN Cell Global Identifier	-	
>Served Cell Information	M		9.2.8		–	
>Neighbour Information		*0 .. <maxnoofNeighbours>*			–	
>>ECGI	M		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the neighbour cell	–	
>>PCI	M		INTEGER (0..503, …)	Physical Cell Identifier of the neighbour cell	–	
>>EARFCN	M		9.2.26	DL EARFCN for FDD or EARFCN for TDD	–	
>>TAC	O		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
>NR Neighbour Information	O		9.2.98	NR neighbour, capable of performing EN-DC with the served E-UTRA cell	YES	ignore
>Deactivation Indication	O		ENUMERATED(deactivated, …)	Indicates that the concerned cell is switched off for energy saving reasons	YES	ignore
Served Cells To Delete		*0 .. <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>*			GLOBAL	reject
>GU Group Id	M		9.2.20		-	
GU Group Id To Delete List		*0 .. <maxPools>*			GLOBAL	reject
>GU Group Id	M		9.2.20		-	
Coverage Modification List		*0 .. <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 (0..15, …)	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	O		ENUMERATED(pre-change-notification, ...)	Indicates the Cell Coverage State is planned to be used at the next reconfiguration		
>Cell Replacing Info	C-ifCellDeploymentStatusIndicatorPresent					
>>Replacing Cells		*0 .. <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	O		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	O		9.2.32		YES	ignore
Criticality Diagnostics	O		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.

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
eNB1 Measurement ID	M		INTEGER (1..4095,...)	Allocated by eNB_1	YES	reject
eNB2 Measurement ID	C-ifRegistrationRequestStoporPartialStoporAdd		INTEGER (1..4095,...)	Allocated by eNB_2	YES	ignore
Registration Request	M		ENUMERATED(start, stop, …, partial stop, add)	Type of request for which the resource status is required.	YES	reject
Report Characteristics	O		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 .. <maxCellineNB>*			EACH	ignore
>>Cell ID	M		ECGI 9.2.14		–	
Reporting Periodicity	O		ENUMERATED(1000ms, 2000ms, 5000ms,10000ms, …)	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	O		ENUMERATED(partial success allowed, ...)	Included if partial success is allowed	YES	ignore
Reporting Periodicity of RSRP Measurement Report	O		ENUMERATED(120ms, 240ms, 480ms, 640ms, ...)	Periodicity that can be used for the reporting of RSRP Measurement Report Periodic.	YES	ignore

Reporting Periodicity of CSI Report	O		ENUMERATED(5ms, 10ms, 20ms, 40ms, 80ms, ...)	Periodicity that can be used for the reporting of CSI Report Periodic.	YES	ignore

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

Condition	Explanation
ifRegistrationRequestStoporPartialStoporAdd	This IE shall be present if the *Registration Request* IE is set to the 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.

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 Measurement ID	M		INTEGER (1..4095,...)	Allocated by eNB_1	YES	reject
eNB2 Measurement ID	M		INTEGER (1..4095,...)	Allocated by eNB_2	YES	reject
Criticality Diagnostics	O		9.2.7		YES	ignore
Measurement Initiation Result		*0..1*		List of all cells in which measurement objects were requested, included when indicating partial success	YES	ignore
>**Measurement Initiation Result Item**		*1 .. <maxCellineNB>*			EACH	ignore
>>Cell ID	M		ECGI 9.2.14		–	
>>**Measurement Failure Cause List**		*0..1*		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 .. <maxFailedMeasObjects>*			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	M		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.

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 Measurement ID	M		INTEGER (1..4095,...)	Allocated by eNB_1	YES	reject
eNB2 Measurement ID	M		INTEGER (1..4095,...)	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	O		9.2.7		YES	ignore
Complete Failure Cause Information		*0..1*		Complete list of failure causes for all requested cells	YES	ignore
>**Complete Failure Cause Information Item**		*1 .. <maxCellineNB>*			EACH	ignore
>>Cell ID	M		ECGI 9.2.14		–	
>>**Measurement Failure Cause List**		*1*			–	
>>>**Measurement Failure Cause Item**		*1 .. <maxFailedMeasObjects>*			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	M		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	M		INTEGER (1..4095,...)	Allocated by eNB_1	YES	reject
eNB2 Measurement ID	M		INTEGER (1..4095,...)	Allocated by eNB_2	YES	reject
Cell Measurement Result		*1*			YES	ignore
>Cell Measurement Result Item		*1 .. <maxCellineNB>*			EACH	ignore
>>Cell ID	M		ECGI 9.2.14			
>>Hardware Load Indicator	O		9.2.34			
>>S1 TNL Load Indicator	O		9.2.35			
>>Radio Resource Status	O		9.2.37			
>>Composite Available Capacity Group	O		9.2.44		YES	ignore
>>ABS Status	O		9.2.58		YES	ignore
>>RSRP Measurement Report List	O		9.2.76		YES	ignore
>>CSI Report	O		9.2.79		YES	ignore
>>Cell Reporting Indicator	O		ENUMERATED(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 eNB_1 to neighbouring eNB_2 to initiate adaptation of mobility parameters.

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
eNB1 Cell ID	M		ECGI 9.2.14		YES	reject
eNB2 Cell ID	M		ECGI 9.2.14		YES	reject
eNB1 Mobility Parameters	O		Mobility Parameters Information 9.2.48	Configuration change in eNB_1 cell	YES	ignore
eNB2 Proposed Mobility Parameters	M		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 9.2.14		YES	reject
eNB2 Cell ID	M		ECGI 9.2.14		YES	reject
Criticality Diagnostics	O		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	M		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	O		9.2.49		YES	ignore
Criticality Diagnostics	O		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.

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
Failure cell PCI	M		INTEGER (0..503, …)	Physical Cell Identifier	YES	ignore
Re-establishment cell ECGI	M		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	O		BIT STRING (SIZE (16))	ShortMAC-I contained in the RRC Re-establishment Request message (TS 36.331 [9])	YES	ignore
UE RLF Report Container	O		OCTET STRING	*RLF -Report-r*9 IE contained in the UEInformationResponse message (TS 36.331 [9])	YES	ignore
RRC Conn Setup Indicator	O		ENUMERATED(RRC 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	O		ENUMERATED(reconfigurationFailure, handoverFailure, otherFailure, ...)	The ReestablishmentCause in RRCConnectionReestablishmentRequest message(TS 36.331 [9])	YES	ignore
UE RLF Report Container for extended bands	O		OCTET STRING	*RLF-Report-v9e0* IE contained in the UEInformationResponse message (TS 36.331 [9])	YES	ignore

9.1.2.19 HANDOVER REPORT

This message is sent by the eNB_1 to report a handover failure event or other critical mobility problem.

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	ignore
Handover Report Type	M		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	M		ECGI 9.2.14	ECGI of target cell for handover procedure (in eNB_1)	YES	ignore
Re-establishment cell ECGI	C-ifHandoverReportType HoToWrongCell		ECGI 9.2.14	ECGI of cell where UE attempted re-establishment	YES	ignore
Target cell in UTRAN	C-ifHandoverReportType InterRATpingpong		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	O		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	O		BIT STRING (SIZE (32))	Information provided in the HANDOVER REQUEST message from eNB_2.	YES	ignore
UE RLF Report Container	O		OCTET STRING	The UE RLF Report Container IE received in the RLF INDICATION message.	YES	ignore
UE RLF Report Container for extended bands	O		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.

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
Served Cells To Activate		*1 .. <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 .. <maxCellineNB>*			GLOBAL	ignore
>ECGI	M		9.2.14		-	
Criticality Diagnostics	O		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	O		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.

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
RNL Header	M		9.2.68		YES	reject
X2AP Message	O		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	O		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	O		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	O		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 → 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	O		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))	**RRC Resume:** Corresponds to the *ShortResumeMAC-I* in the *RRCConnection ResumeRequest* message as defined in TS 36.331 [9] **RRC Reestablishment:** Corresponds to the *ShortMAC-I* in the *RRCConnectionReestablishmentRequest*message as defined in TS 36.331 [9].	YES	reject
New E-UTRAN Cell Identifier	M		BIT STRING (SIZE (28))	**RRC Resume:** Corresponds to the *cellIdentity* within the *VarShortResumeMAC-Input* as specified in TS 36.331 [9]. **RRC Reestablishment:** Corresponds to the *cellIdentity* within the *VarShortMAC-Input* as specified in TS 36.331 [9].	YES	reject
C-RNTI	O		BIT STRING (SIZE (16))	C-RNTI contained in the RRC Re-establishment Request message (TS 36.331 [9]). If this IE is present, the Resume ID IE is ignored	YES	reject
Failure cell PCI	O		INTEGER (0..503, …)	Physical Cell Identifier	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 → new 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	ignore
New eNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the new eNB	YES	ignore
Old eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the old eNB	YES	ignore
Old eNB UE X2AP ID Extension	O		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 (0..2^{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	M		9.2.12		–	
>Subscriber Profile ID for RAT/Frequency priority	O		9.2.25		–	
>E-RABs To Be Setup List		1			–	
>>E-RABs To Be Setup Item		1 .. <maxnoofBearers>			EACH	ignore
>>>E-RAB ID	M		9.2.23		–	
>>>E-RAB Level QoS Parameters	M		9.2.9	Includes necessary QoS parameters	–	
>>>Bearer Type	O		9.2.92		–	
>>>UL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SGW endpoint of the S1 transport bearer. For delivery of UL PDUs.	YES	reject
>>>DL Forwarding	O		9.2.5		YES	ignore
>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 *HandoverPreparationInformation-NB* message as defined in subclause 10.6.2 of TS 36.331 [9].	–	
>Handover Restriction List	O		9.2.3		–	
>Location Reporting Information	O		9.2.21	Includes the necessary parameters for location reporting	–	

>Management Based MDT Allowed	O		9.2.59		–	
>Management Based MDT PLMN List	O		MDT PLMN List 9.2.64		–	
>UE Sidelink Aggregate Maximum Bit Rate	O		9.2.97	This IE applies only if the UE is authorized for V2X services.	YES	ignore
Trace Activation	O		9.2.2		YES	ignore
SRVCC Operation Possible	O		9.2.33		YES	ignore
Masked IMEISV	O		9.2.69		YES	ignore
Expected UE Behaviour	O		9.2.70		YES	ignore
ProSe Authorized	O		9.2.78		YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
V2X Services Authorized	O		9.2.93		YES	ignore
Aerial UE subscription information	O		9.2.129		YES	ignore
Subscription Based UE Differentiation Information	O		9.2.136		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 → 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	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the new eNB	YES	ignore
Cause	M		9.2.6		YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore

9.1.2.31 EN-DC X2 SETUP REQUEST

This message is sent by an initiating node to a neighbouring node, both nodes able to interact for EN-DC, to transfer the initialization information for a TNL association.

Direction: eNB → en-gNB, en-gNB → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
CHOICE *Initiating NodeType*	M					
>eNB						
>>Global eNB ID	M		9.2.22		YES	reject
>>List of Served E-UTRA Cells		*1 .. <maxCellineNB>*		Complete list of cells served by the eNB	YES	reject
>>>Served E-UTRA Cell Information	M		Served Cell Information 9.2.8		–	
>>>NR Neighbour Information	O		9.2.98	NR neighbours	YES	ignore
>en-gNB						
>>Global en-gNB ID	M		9.2.112		YES	reject
>>List of Served NR Cells		*1 .. <maxCellinengNB>*		Complete list of cells served by the engNB.	YES	reject
>>>Served NR Cell Information	M		9.2.110		–	
>>>NR Neighbour Information	O		9.2.98	NR neighbours.	YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

Range bound	Explanation
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.
maxCellinengNB	Maximum no. cells that can be served by an en-gNB. Value is 16384.

9.1.2.32 EN-DC X2 SETUP RESPONSE

This message is sent by a neighbouring node to an initiating node, both nodes able to interact for EN-DC, to transfer the initialization information for a TNL association.

Direction: eNB → en-gNB, en-gNB → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
CHOICE *Responding NodeType*	M					
>eNB						
>>Global eNB ID	M		9.2.22		YES	reject
>>List of Served E-UTRA Cells		*1 .. <maxCellineNB>*		Complete list of cells served by the eNB	YES	reject
>>>Served E-UTRA Cell Information	M		Served Cell Information 9.2.8		–	
>>>NR Neighbour Information	O		9.2.98	NR neighbours	YES	ignore
>en-gNB						
>>Global en-gNB ID	M		9.2.112		YES	reject
>>List of Served NR Cells		*1 .. <maxCellinengNB>*		Complete list of cells served by the en-gNB	YES	reject
>>>Served NR Cell Information	M		9.2.110		–	
>>>NR Neighbour Information	O		9.2.98	NR neighbours	YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

Range bound	Explanation
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.
maxCellinengNB	Maximum no. cells that can be served by an en-gNB. Value is 16384.

9.1.2.33 EN-DC X2 SETUP FAILURE

This message is sent by the neighbouring node to indicate EN-DC X2 Setup failure.

Direction: eNB → en-gNB, en-gNB → eNB.

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	O		9.2.7		YES	ignore
Time To Wait	O		9.2.32		YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

9.1.2.34 EN-DC CONFIGURATION UPDATE

This message is sent by an initiating node to a peer neighbouring node, both nodes able to interact for EN-DC, to transfer updated information for a TNL association.

Direction: eNB → en-gNB, en-gNB → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
CHOICE Initiating NodeType	M					
>eNB						
>>Cell Assistance Information	O		**9.2.115**		YES	ignore
>>Served E-UTRA Cells To Add		*0 .. <maxCellineNB>*			GLOBAL	reject
>>>Served E-UTRA Cell Information	M		Served Cell Information 9.2.8		–	
>>>NR Neighbour Information	O		9.2.98	NR neighbours	YES	ignore
>>Served E-UTRA Cells To Modify		*0 .. <maxCellineNB>*		Complete list of modified cells served by the eNB	GLOBAL	reject
>>>Old ECGI	M		ECGI 9.2.14	Old E-UTRAN Cell Global Identifier	–	
>>>Served E-UTRA Cell Information	M		Served Cell Information 9.2.8		–	
>>>NR Neighbour Information	O		9.2.98	NR neighbours	YES	ignore
>>Served E-UTRA Cells To Delete		*0 .. <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	-	
>en-gNB						
>>Served NR Cells To Add		*0 .. <maxCellinen-gNB>*			GLOBAL	reject
>>>Served NR Cell Information	M		9.2.110		–	
>>>NR Neighbour Information	O		9.2.98	NR neighbours	YES	ignore
>>Served NR Cells To Modify		*0 .. <maxCellinen-gNB>*			GLOBAL	reject
>>>Old NR-CGI	M		NR CGI 9.2.111		-	
>>>Served NR Cell Information	M		9.2.110		–	
>>>NR Deactivation Indication	O		ENUMERATED(deactivated, …)	Indicates that the concerned NR cell is switched off for energy saving reasons. If this IE is not included, indicates that the concerned cell is activated.	YES	ignore
>>>NR Neighbour Information	O		9.2.98	NR neighbours	YES	ignore
>>Served NR Cells To Delete		*0 .. <maxCellinen-gNB>*			GLOBAL	reject

>>>Old NR-CGI	M		NR CGI 9.2.111		-	
Interface Instance Indication	O		9.2.143		YES	reject

Range bound	Explanation
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.
maxCellinengNB	Maximum no. cells that can be served by an en-gNB. Value is 16384.

9.1.2.35 EN-DC CONFIGURATION UPDATE ACKNOWLEDGE

This message is sent by a neighbouring node to a peer node, both nodes able to interact for EN-DC, to acknowledge update of information for a TNL association.

Direction: en-gNB → eNB, eNB → en-gNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
CHOICE Responding NodeType	M					
>*eNB*						
>en-gNB						
>>List of Served NR Cells		0 .. <maxCellinengNB>		Complete or limited list of cells served by the en-gNB, if requested by the eNB.		
>>>Served NR Cell Information	M		9.2.110			
>>>NR Neighbour Information	O		9.2.98	NR neighbours.	YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

Range bound	Explanation
maxCellinengNB	Maximum no. cells that can be served by an en-gNB. Value is 16384.

9.1.2.36 EN-DC CONFIGURATION UPDATE FAILURE

This message is sent by a neighbouring node to a peer node to indicate EN-DC eNB Configuration Update Failure.

Direction: en-gNB → eNB, eNB → en-gNB.

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	O		9.2.7		YES	ignore
Time To Wait	O		9.2.32		YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

9.1.2.37 EN-DC CELL ACTIVATION REQUEST

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

Direction: eNB → en-gNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Served NR Cells To Activate		*1*			GLOBAL	reject
>Served NR Cells To Activate Item		*1 .. < maxCellinengNB >*				
>>**NR CGI**	M		9.2.111		-	
Activation ID	M		INTEGER (0..255)	Allocated by the eNB	YES	reject
Interface Instance Indication	O		9.2.143		YES	reject

Range bound	Explanation
maxCellinengNB	Maximum no. cells that can be served by an en-gNB. Value is 16384.

9.1.2.38 EN-DC CELL ACTIVATION RESPONSE

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

Direction: en-gNB → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Activated NR Cell List		*1*			GLOBAL	ignore
>Activated NR Cell Item		*1 .. < maxCellinengNB >*				
>>NR CGI	M		9.2.111		-	
Activation ID	M		INTEGER (0..255)	Allocated by the eNB	YES	reject
Criticality Diagnostics	O		9.2.7		YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

Range bound	Explanation
maxCellinengNB	Maximum no. cells that can be served by an en-gNB. Value is 16384.

9.1.2.39 EN-DC CELL ACTIVATION FAILURE

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

Direction: en-gNB → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Activation ID	M		INTEGER (0..255)	Allocated by the eNB	YES	reject
Cause	M		9.2.6		YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

9.1.2.40 EN-DC X2 REMOVAL REQUEST

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

Direction: eNB → en-gNB, en-gNB → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
CHOICE *Initiating Node Type*	M					
>eNB						
>>Global eNB ID	M		9.2.22		YES	reject
>en-gNB						
>>Global en-gNB ID	M		9.2.112			
X2 Removal Threshold	O		X2 Benefit Value 9.2.90		YES	reject
Interface Instance Indication	O		9.2.143		YES	reject

9.1.2.41 EN-DC X2 REMOVAL RESPONSE

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

Direction: eNB → en-gNB, en-gNB → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
CHOICE *Initiating Node Type*	M					
>eNB						
>>Global eNB ID	M		9.2.22		YES	reject
>en-gNB						
>>Global en-gNB ID	M		9.2.112		YES	reject
Criticality Diagnostics	O		9.2.7		YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

9.1.2.42 EN-DC X2 REMOVAL FAILURE

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

Direction: eNB → en-gNB, en-gNB → eNB.

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	O		9.2.7		YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

9.1.2.43 DATA FORWARDING ADDRESS INDICATION

This message is sent by the new eNB to indicate to the old eNB forwarding addresses for each E-RAB for which it admits data forwarding.

Direction: new eNB → 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	ignore
New eNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the new eNB	YES	ignore
Old eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the old eNB	YES	ignore
Old eNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the old eNB	YES	ignore
E-RABs Data Forwarding Address List		*1*			YES	ignore
> E-RABs Data Forwarding Address Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>DL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	–	

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

9.1.2.44 EN-DC CONFIGURATION TRANSFER

This message is sent by an eNB in order to transfer the EN-DC SON Configuration container to an en-gNB, or it is sent by an en-gNB in order to transfer the EN-DC SON Configuration container to an eNB.

Direction: eNB → en-gNB or en-gNB → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	ignore
EN-DC SON Configuration Transfer	O		OCTET STRING	Contains the *EN-DC SON Configuration Transfer* IE as defined in TS 36.413 [4].	YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

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

Direction: MeNB → 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	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	reject
UE Security Capabilities	C-ifSCGBearerOption		9.2.29		YES	reject
SeNB Security Key	C-ifSCGBearerOption		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	M		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	O		PLMN Identity 9.2.4	The serving PLMN of the SCG in the SeNB.	YES	ignore
E-RABs To Be Added List		*1*			YES	reject
>E-RABs To Be Added Item		*1 .. <maxnoofBearers>*			EACH	reject
>>CHOICE Bearer Option	M					
>>>SCG Bearer						
>>>>E-RAB ID	M		9.2.23		–	
>>>>E-RAB Level QoS Parameters	M		9.2.9	Includes necessary QoS parameters	–	
>>>>DL Forwarding	O		9.2.5		–	
>>>>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	O		Correlation ID 9.2.84		–	
>>>>SIPTO Correlation ID	O		Correlation ID 9.2.84		–	
>>>Split Bearer						
>>>>E-RAB ID	M		9.2.23		–	
>>>>E-RAB Level QoS Parameters	M		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	O		9.2.52		YES	reject
SeNB UE X2AP ID	O		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	reject

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

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.

Direction: SeNB → 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
E-RABs Admitted To Be Added List		*1*			YES	ignore
>E-RABs Admitted To Be Added Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>CHOICE Bearer Option	M					
>>>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	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	–	
>>>>UL Forwarding GTP Tunnel Endpoint	O		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	O		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	O		9.2.7		YES	ignore
GW Transport Layer Address	O		BIT STRING (1..160, ...)	Indicating GW Transport Layer Address.	YES	ignore
SIPTO L-GW Transport Layer Address	O		BIT STRING (1..160, ...)	Indicating SIPTO L-GW Transport Layer Address.	YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	reject
Tunnel Information for BBF	O		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 → 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
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	O		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.

Direction: MeNB → 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	M		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	O		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	O		OCTET STRING	Includes the *SCG-ConfigInfo* message as defined in TS 36.331 [9]	-	
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	O		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.

Direction: MeNB → 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	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	O		9.2.73		YES	ignore
Serving PLMN	O		PLMN Identity 9.2.4	The serving PLMN of the SCG in the SeNB.	YES	ignore
UE Context Information		*0..1*			YES	reject
>UE Security Capabilities	O		9.2.29		–	
>SeNB Security Key	O		9.2.72		–	
>SeNB UE Aggregate Maximum Bit Rate	O		UE Aggregate Maximum Bit Rate 9.2.12		–	
>E-RABs To Be Added List		*0..1*			–	
>>E-RABs To Be Added Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>>CHOICE *Bearer Option*	M					
>>>>*SCG Bearer*						
>>>>>E-RAB ID	M		9.2.23		–	
>>>>>E-RAB Level QoS Parameters	M		9.2.9	Includes necessary QoS parameters	–	
>>>>>DL Forwarding	O		9.2.5		–	
>>>>>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	O		Correlation ID 9.2.84		–	
>>>>>SIPTO Correlation ID	O		Correlation ID 9.2.84		–	
>>>>*Split Bearer*						
>>>>>E-RAB ID	M		9.2.23		–	
>>>>>E-RAB Level QoS Parameters	M		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.	–	
>E-RABs To Be Modified List		*0..1*			–	
>>E-RABs To Be Modified Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>>CHOICE *Bearer Option*	M					
>>>>*SCG Bearer*						
>>>>>E-RAB ID	M		9.2.23		–	
>>>>>E-RAB Level QoS Parameters	O		9.2.9	Includes QoS parameters to be modified	–	

>>>>>S1 UL GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	SGW endpoint of the S1 transport bearer. For delivery of UL PDUs.	–	
>>>>*Split Bearer*						
>>>>>E-RAB ID	M		9.2.23		–	
>>>>>E-RAB Level QoS Parameters	O		9.2.9	Includes QoS parameters to be modified	–	
>>>>>MeNB GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2 transport bearer. For delivery of UL PDUs.	–	
>E-RABs To Be Released List		*0..1*			–	
>>E-RABs To Be Released Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>>CHOICE *Bearer Option*	M					
>>>>*SCG Bearer*						
>>>>>E-RAB ID	M		9.2.23		–	
>>>>>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	O		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	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	–	
MeNB to SeNB Container	O		OCTET STRING	Includes the *SCG-ConfigInfo* message as defined in TS 36.331 [9]	YES	ignore
CSG Membership Status	O		9.2.52		YES	reject
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	O		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

9.1.3.6 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.

Direction: SeNB → 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	ignore
SeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	ignore
E-RABs Admitted List		*0..1*			YES	ignore
>E-RABs Admitted To Be Added List		*1*			–	
>>E-RABs Admitted To Be Added Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>>CHOICE *Bearer Option*	M					
>>>>*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	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	–	
>>>>>UL Forwarding GTP Tunnel Endpoint	O		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		*0..1*			–	
>>E-RABs Admitted To Be Modified Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>>CHOICE *Bearer Option*	M					
>>>>*SCG Bearer*						
>>>>>E-RAB ID	M		9.2.23		–	
>>>>>S1 DL GTP Tunnel Endpoint	O		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	O		GTP Tunnel Endpoint 9.2.1	Endpoint of the X2 transport bearer at the SeNB.	–	
>E-RABs Admitted To Be Released List		*0..1*			–	
>>E-RABs Admitted To Be Released Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>>CHOICE *Bearer Option*	M					
>>>>*SCG Bearer*						
>>>>>E-RAB ID	M		9.2.23		–	
>>>>*Split Bearer*						
>>>>>E-RAB ID	M		9.2.23		–	
E-RABs Not Admitted List	O		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	O		OCTET STRING	Includes the *SCG-Config* message as defined in TS 36.331 [9]	YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID Extension	O		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.

Direction: SeNB → 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	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
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID Extension	O		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 → 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	O		9.2.73		YES	ignore
E-RABs To Be Released List		*0..1*			YES	ignore
>E-RABs To Be Released Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>Cause	M		9.2.6		–	
SeNB to MeNB Container	O		OCTET STRING	Includes the *SCG-Config* message as defined in TS 36.331 [9]	YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	O		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.

Direction: MeNB → 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	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
MeNB to SeNB Container	O		OCTET STRING	Includes the *SCG-ConfigInfo* message as defined in TS 36.331 [9]	YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	ignore

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.

Direction: MeNB → 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	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	O		OCTET STRING	Includes the *SCG-ConfigInfo* message as defined in TS 36.331 [9]	YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID Extension	O		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 → 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	O		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	reject
Cause	O		9.2.6		YES	ignore
E-RABs To Be Released List		*0..1*			YES	ignore
> E-RABs To Be Released Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>CHOICE *Bearer Option*	M					
>>>*SCG Bearer*						
>>>>E-RAB ID	M		9.2.23		–	
>>>>UL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	–	
>>>>DL Forwarding GTP Tunnel Endpoint	O		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	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer. used for forwarding of DL PDUs	–	
UE Context Kept Indicator	O		9.2.85		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	reject
MakeBeforeBreak Indicator	O		ENUMERATED (True, …,)		YES	ignore

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.

Direction: SeNB → 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
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	O		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.

Direction: MeNB → 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	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 to be Released List		*0..1*			YES	ignore
>E-RABs To Be Released Item		*1 .. <maxnoofBearers>*			–	
>>CHOICE *Bearer Option*	M					
>>>SCG Bearer						
>>>>E-RAB ID	M		9.2.23		–	
>>>>UL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	–	
>>>>DL Forwarding GTP Tunnel Endpoint	O		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	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	–	
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID Extension	O		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.

Direction: SeNB → 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	ignore
SeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	ignore
E-RABs Subject to Counter Check List		*1*			YES	ignore
>E-RABs Subject to Counter Check Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		-	
>>UL COUNT	M	*INTEGER(0.. 4294967295)*		Indicates the value of uplink COUNT associated to this E-RAB.	-	
>>DL COUNT	M	*INTEGER(0.. 4294967295)*		Indicates the value of downlink COUNT associated to this E-RAB.	-	
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID Extension	O		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

9.1.4 Messages for E-UTRAN-NR Dual Connectivity Procedures

9.1.4.1 SGNB ADDITION REQUEST

This message is sent by the MeNB to the en-gNB to request the preparation of resources for EN-DC operation for a specific UE

Direction: MeNB → en-gNB.

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
NR UE Security Capabilities	M		9.2.107		YES	reject
SgNB Security Key	M		9.2.101	The S-KgNB which is provided by the MeNB, see TS 33.401 [18].	YES	reject
SgNB UE Aggregate Maximum Bit Rate	M		UE Aggregate Maximum Bit Rate 9.2.12	The UE Aggregate Maximum Bit Rate is split into MeNB UE Aggregate Maximum Bit Rate and SgNB UE Aggregate Maximum Bit Rate which are enforced by MeNB and en-gNB respectively.	YES	reject
Selected PLMN	O		PLMN Identity 9.2.4	The selected PLMN of the SCG in the en-gNB.	YES	ignore
Handover Restriction List	O		9.2.3		YES	ignore
E-RABs To Be Added List		*1*			YES	reject
>E-RABs To Be Added Item		*1 .. <maxnoofBearers>*			EACH	reject
>>E-RAB ID	M		9.2.23		–	
>>DRB ID	M		9.2.122		–	
>>EN-DC Resource Configuration	M		EN-DC Resource Configuration 9.2.108	Indicates the PDCP and Lower Layer MCG/SCG configuration.	–	
>>CHOICE *Resource Configuration*	M					
>>>*PDCP present in SN*				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "present".		
>>>>Full E-RAB Level QoS Parameters	M		E-RAB Level QoS Parameters 9.2.9	Includes the E-RAB level QoS parameters as received on S1-MME.	–	
>>>>Maximum MCG admittable E-RAB Level QoS Parameters	C-ifMCGandSCGpresent_GBR		GBR QoS Information 9.2.10	Includes the GBR QoS Information admittable by the MCG.	–	
>>>>DL Forwarding	O		9.2.5		–	
>>>>MeNB DL GTP Tunnel Endpoint at MCG	C-ifMCGpresent		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2-U transport bearer at MCG. For delivery of DL PDCP PDUs.	–	
>>>>S1 UL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SGW endpoint of the S1-U transport bearer. For delivery of UL PDUs from the en-gNB.	–	

>>>>RLC Mode	O		RLC Mode 9.2.119	Indicates the RLC mode at the MeNB for PDCP transfer to en-gNB.	YES	ignore
>>>PDCP not present in SN				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "not present".		
>>>>Requested SCG E-RAB Level QoS Parameters	M		E-RAB Level QoS Parameters 9.2.9	Includes E-RAB level QoS parameters requested to be provided by the SCG.	–	
>>>>MeNB UL GTP Tunnel Endpoint at PDCP	M		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2-U transport bearer. For delivery of UL PDCP PDUs.	–	
>>>>Secondary MeNB UL GTP Tunnel Endpoint at PDCP	O		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2-U transport bearer. For delivery of UL PDCP PDUs in case of PDCP duplication.	–	
>>>>RLC Mode	M		RLC Mode 9.2.119	Indicates the RLC mode to be used in the assisting node.	–	
>>>>UL Configuration	C-ifMCGandSCGpresent		9.2.118	Information about UL usage in the en-gNB.	–	
>>>>UL PDCP SN Length	O		PDCP SN Length 9.2.133	Indicates the PDCP SN length of the bearer for the UL.	YES	ignore
>>>>DL PDCP SN Length	O		PDCP SN Length 9.2.133	Indicates the PDCP SN length of the bearer for the DL.	YES	ignore
>>>>Duplication activation	O		9.2.137	Indicated the initial staus of PDCP duplication.	YES	ignore
MeNB to SgNB Container	M		OCTET STRING	Includes the *CG-ConfigInfo* message as defined in TS 38.331 [31].	YES	reject
SgNB UE X2AP ID	O		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
Expected UE Behaviour	O		9.2.70		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject
Requested split SRBs	O		ENUMERATED (srb1, srb2, srb1&2, ...)	Indicates that resources for Split SRB are requested.	YES	reject
MeNB Resource Coordination Information	O		9.2.116	Information used to coordinate resources utilisation between MeNB and en-gNB.	YES	ignore

SGNB Addition Trigger Indication	O		ENUMERATED (SN change, inter-eNB HO, intra-eNB HO, ...)	This IE indicates the trigger for SGNB Addition procedure.	YES	reject
Subscriber Profile ID for RAT/Frequency priority	O		9.2.25		YES	ignore
MeNB Cell ID	M		ECGI 9.2.14	Indicates the cell ID for PCell in MeNB.	YES	reject
Desired Activity Notification Level	O		9.2.141		YES	ignore
Trace Activation	O		9.2.2		YES	ignore
Location Information at SgNB reporting	O		ENUMERATED (pscell, ...)	Indicates that the user's location information is to be provided.	YES	ignore
Masked IMEISV	O		9.2.69		YES	ignore

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

Condition	Explanation
ifMCGandSCGpresent	This IE shall be present if, for the E-RAB requested to be added, the *MCG resources* and *SCG resources* IEs in the *EN-DC Resource Configuration* IE are set to the value "present".
ifMCGpresent	This IE shall be present if, for the E-RAB requested to be added, the *MCG resources* IE in the *EN-DC Resource Configuration* IE is set to the value "present".
C-ifMCGandSCGpresent_GBR	This IE shall be present if, for the E-RAB requested to be added, the *MCG resources* and *SCG resources* IEs in the *EN-DC Resource Configuration* IE are set to the value "present", and *GBR QoS Information* IE is present in *Full E-RAB Level QoS Parameters* IE.

9.1.4.2 SGNB ADDITION REQUEST ACKNOWLEDGE

This message is sent by the en-gNB to confirm the MeNB about the SgNB addition preparation.

Direction: en-gNB → 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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
E-RABs Admitted To Be Added List		*1*			YES	ignore
>E-RABs Admitted To Be Added Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>EN-DC Resource Configuration	M		EN-DC Resource Configuration 9.2.108	Indicates the PDCP and Lower Layer MCG/SCG configuration.	–	
>>CHOICE *Resource Configuration*	M					
>>>PDCP present in SN				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "present".		
>>>>S1 DL GTP Tunnel Endpoint at the SgNB	M		GTP Tunnel Endpoint 9.2.1	en-gNB endpoint of the S1 transport bearer. For delivery of DL PDUs.	–	
>>>>SgNB UL GTP Tunnel Endpoint at PDCP	C-ifMCGpresent		GTP Tunnel Endpoint 9.2.1	en-gNB endpoint of the X2-U transport bearer at PDCP. For delivery of UL PDCP PDUs.	–	
>>>>RLC Mode	C-ifMCGpresent		RLC Mode 9.2.119	Indicates the RLC mode.	–	
>>>>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	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	–	
>>>>Requested MCG E-RAB Level QoS Parameters	C-ifMCGandSCGpresent_GBRpresent		E-RAB Level QoS Parameters 9.2.9	Includes E-RAB level QoS parameters requested to be provided by the MCG.	–	
>>>>UL Configuration	C-ifMCGandSCGpresent		9.2.118	Information about UL usage in the MeNB.	–	
>>>>UL PDCP SN Length	O		PDCP SN Length 9.2.133	Indicates the PDCP SN length of the bearer for the UL.	YES	ignore
>>>>DL PDCP SN Length	O		PDCP SN Length 9.2.133	Indicates the PDCP SN length of the bearer for the DL.	YES	ignore

>>>PDCP not present in SN				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "not present".		
>>>>SgNB DL GTP Tunnel Endpoint at SCG	M		GTP Tunnel Endpoint 9.2.1	SgNB endpoint of the X2-U transport bearer at the SCG. For delivery of DL PDCP PDUs.	–	
>>>>Secondary SgNB DL GTP Tunnel Endpoint at SCG	O		GTP Tunnel Endpoint 9.2.1	SgNB endpoint of the X2-U transport bearer at the SCG. For delivery of DL PDCP PDUs in case of PDCP duplication	–	
>>>>LCID	O		9.2.138	LCID for the primary path in case of PDCP duplication	YES	ignore
E-RABs Not Admitted List	O		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
SgNB to MeNB Container	M		OCTET STRING	Includes the *CG-Config* message as defined in TS 38.331[31].	YES	reject
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
Admitted split SRBs	O		ENUMERATED (srb1, srb2, srb1&2, ...)	Indicates admitted SRBs	YES	reject
SgNB Resource Coordination Information	O		9.2.117	Information used to coordinate resources utilisation between en-gNB and MeNB.	YES	ignore
RRC config indication	O		9.2.132	Indicates the type of RRC configuration used at the en-gNB.	YES	reject
Location Information at SgNB	O		9.2.142	Contains information to support localisation of the UE	YES	ignore

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

Condition	Explanation
ifMCGpresent	This IE shall be present if, for the E-RAB admitted to be added, the *MCG resources* IE in the *EN-DC Resource Configuration* IE is set to the value "present".
ifMCGandSCGpresent	This IE shall be present if, for the E-RAB admitted to be added, the *MCG resources* and *SCG resources* IEs in the *EN-DC Resource Configuration* IE are set to the value "present".

C-ifMCGandSCGpresent_GBRpresent	This IE shall be present if, for the E-RAB admitted to be added, the *MCG resources* and *SCG resources* IEs in the *EN-DC Resource Configuration* IE are set to the value "present", and the *GBR QoS Information* IE is present in the *Requested MCG E-RAB Level QoS Parameters* IE.

9.1.4.3 SGNB ADDITION REQUEST REJECT

This message is sent by the en-gNB to inform the MeNB that the SgNB Addition Preparation has failed.

Direction: en-gNB → 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
SgNB UE X2AP ID	O		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
Cause	M		9.2.6		YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject

9.1.4.4 SGNB RECONFIGURATION COMPLETE

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

Direction: MeNB → en-gNB.

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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
Response Information	M				YES	ignore
>CHOICE *Response Type*	M					
>>Configuration successfully applied						
>>>MeNB to SgNB Container	O		OCTET STRING	Includes the NR *RRCReconfiguration Complete* message as defined in TS 38.331 [31].	-	
>>Configuration rejected						
>>>Cause	M		9.2.6		-	
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject

9.1.4.5 SGNB MODIFICATION REQUEST

This message is sent by the MeNB to the en-gNB to request the preparation to modify en-gNB resources for a specific UE, to query for the current SCG configuration, or to provide the S-RLF-related information to the en-gNB.

Direction: MeNB → en-gNB.

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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
Cause	M		9.2.6		YES	ignore
Selected PLMN	O		PLMN Identity 9.2.4	The selected PLMN of the SCG in the en-gNB.	YES	ignore
Handover Restriction List	O		9.2.3		YES	ignore
SCG Configuration Query	O		9.2.103		YES	ignore
UE Context Information		*0..1*			YES	reject
>NR UE Security Capabilities	O		9.2.107		–	
>SgNB Security Key	O		9.2.101		–	
>SgNB UE Aggregate Maximum Bit Rate	O		UE Aggregate Maximum Bit Rate 9.2.12		–	
>E-RABs To Be Added List		*0..1*			–	
>>E-RABs To Be Added Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>>E-RAB ID	M		9.2.23		–	
>>>DRB ID	M		9.2.122		–	
>>>EN-DC Resource Configuration	M		EN-DC Resource Configuration 9.2.108	Indicates the PDCP and Lower Layer MCG/SCG configuration.	–	
>>>CHOICE *Resource Configuration*	M					
>>>>*PDCP present in SN*				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "present".	–	
>>>>>Full E-RAB Level QoS Parameters	M		E-RAB Level QoS Parameters 9.2.9	Includes E-RAB level QoS parameters as received on S1-MME.	–	
>>>>>Maximum MCG admittable E-RAB Level QoS Parameters	C-ifMCGandSCGpresent_GBR		GBR QoS Information 9.2.10	Includes the GBR QoS Information admittable by the MCG.	–	
>>>>>DL Forwarding	O		9.2.5		–	
>>>>>MeNB DL GTP Tunnel Endpoint at MCG	C-ifMCGpresent		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2-U transport bearer at MCG. For delivery of DL PDCP PDUs.	–	
>>>>>S1 UL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SGW endpoint of the S1-U transport bearer. For delivery of UL PDUs from the en-gNB.	–	

>>>>>RLC Mode	O		RLC Mode 9.2.119	Indicates the RLC mode at the MeNB for PDCP transfer to en-gNB.	YES	ignore
>>>>PDCP not present in SN				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "present".		
>>>>>Requested SCG E-RAB Level QoS Parameters	M		E-RAB Level QoS Parameters 9.2.9	Includes necessary E-RAB level QoS parameters requested to be provided by the SCG.	–	
>>>>>MeNB UL GTP Tunnel Endpoint at PDCP	M		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2-U transport bearer. For delivery of UL PDCP PDUs.	–	
>>>>>Secondary MeNB UL GTP Tunnel Endpoint at PDCP	O		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2-U transport bearer. For delivery of UL PDCP PDUs in case of PDCP duplication.	–	
>>>>>RLC Mode	M		RLC Mode 9.2.119	Indicates the RLC mode to be used in the assisting node.	–	
>>>>>UL Configuration	C-ifMCGandSCGpresent		9.2.118	Information about UL usage in the en-gNB.	–	
>>>>>UL PDCP SN Length	O		PDCP SN Length 9.2.133	Indicates the PDCP SN length of the bearer for the UL.	YES	ignore
>>>>>DL PDCP SN Length	O		PDCP SN Length 9.2.133	Indicates the PDCP SN length of the bearer for the DL.	YES	ignore
>>>>>Duplication activation	O		9.2.137	Indicated the initial staus of PDCP duplication.	YES	ignore
>E-RABs To Be Modified List		*0..1*			–	
>>E-RABs To Be Modified Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>>E-RAB ID	M		9.2.23		–	
>>>EN-DC Resource Configuration	M		EN-DC Resource Configuration 9.2.108	Indicates the PDCP and Lower Layer MCG/SCG configuration.	–	
>>>CHOICE *Resource Configuration*	M					
>>>>PDCP present in SN				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "present".		

>>>>>Full E-RAB Level QoS Parameters	O		E-RAB Level QoS Parameters 9.2.9	Includes E-RAB level QoS parameters to be modified as received on S1-MME	–	
>>>>>Maximum MCG admittable E-RAB Level QoS Parameters	O		GBR QoS Information 9.2.10	Includes the GBR QoS information admittable by the MCG	–	
>>>>>MeNB GTP Tunnel Endpoint at MCG	O		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2-U transport bearer at MCG. For delivery of DL PDCP PDUs.	–	
>>>>>S1 UL GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	SGW endpoint of the S1-U transport bearer. For delivery of UL PDUs from the en-gNB.	–	
>>>>>RLC Status	O		9.2.131	Indicates the RLC has been re-established..		
>>>>*PDCP not present in SN*				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "not present".		
>>>>>Requested SCG E-RAB Level QoS Parameters	O		E-RAB Level QoS Parameters 9.2.9	Includes E-RAB level QoS parameters requested to be provided by the SCG.	–	
>>>>>MeNB UL GTP Tunnel Endpoint at PDCP	O		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2-U transport bearer. For delivery of UL PDCP PDUs.	–	
>>>>>UL Configuration	O		9.2.118	Information about UL usage in the en-gNB.	–	
>>>>>UL PDCP SN Length	O		PDCP SN Length 9.2.133	Shall be ignored by the en-gNB if received.	YES	ignore
>>>>>DL PDCP SN Length	O		PDCP SN Length 9.2.133	Shall be ignored by the en-gNB if received.	YES	ignore
>>>>>Secondary MeNB UL GTP Tunnel Endpoint at PDCP	O		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2-U transport bearer. For delivery of UL PDCP PDUs in case of PDCP duplication.	YES	ignore
>E-RABs To Be Released List		*0..1*			–	
>>E-RABs To Be Released Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>>EN-DC Resource Configuration	M		EN-DC Resource Configuration 9.2.108	Indicates the PDCP and Lower Layer MCG/SCG configuration.	–	
>>>CHOICE *Resource Configuration*	M					

>>>>*PDCP present in SN*				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "present".		
>>>>>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	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer. used for forwarding of UL PDUs	–	
>>>>*PDCP not present in SN*				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "not present".		
>Subscriber Profile ID for RAT/Frequency priority	O		9.2.25		-	
MeNB to SgNB Container	O		OCTET STRING	Includes the *CG-ConfigInfo* message as defined in TS 38.331 [31].	YES	reject
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
MeNB Resource Coordination Information	O		9.2.116	Information used to coordinate resources utilisation between MeNB and en-gNB.	YES	ignore
Requested split SRBs	O		ENUMERATED (srb1, srb2, srb1&2, ...)	Indicates that resources for Split SRB are requested.	YES	ignore
Requested split SRBs release	O		ENUMERATED (srb1, srb2, srb1&2, ...)	Indicates that resources for Split SRB are requested to be released.	YES	ignore
Desired Activity Notification Level	O		9.2.141		YES	ignore
Location Information at SgNB reporting	O		ENUMERATED (pscell, ...)	Indicates that the user's location information is to be provided.	YES	ignore
MeNB Cell ID	O		ECGI 9.2.14	Indicates the cell ID for PCell in MeNB.	YES	ignore

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

Condition	Explanation
ifMCGandSCGpresent	This IE shall be present if, for the E-RAB requested to be added, the *MCG resources* and *SCG resources* IEs in the *EN-DC Resource Configuration* IE are set to the value "present".

ifMCGpresent	This IE shall be present if, for the E-RAB requested to be added, the *MCG resources* IE in the *EN-DC Resource Configuration* IE is set to the value "present".
C-ifMCGandSCGpresent_GBR	This IE shall be present if, for the E-RAB requested to be added, the *MCG resources* and *SCG resources* IEs in the *EN-DC Resource Configuration* IE are set to the value "present", and *GBR QoS Information* IE is present in *Full E-RAB Level QoS Parameters* IE.

9.1.4.6 SGNB MODIFICATION REQUEST ACKNOWLEDGE

This message is sent by the en-gNB to confirm the MeNB's request to modify the en-gNB resources for a specific UE.

Direction: en-gNB → 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	ignore
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	ignore
E-RABs Admitted To Be Added List		*0..1*			YES	ignore
>E-RABs Admitted To Be Added Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>EN-DC Resource Configuration	M		EN-DC Resource Configuration 9.2.108	Indicates the PDCP and Lower Layer MCG/SCG configuration.	–	
>>CHOICE *Resource Configuration*	M					
>>>PDCP present in SN				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "present".		
>>>>S1 DL GTP Tunnel Endpoint at the SgNB	M		GTP Tunnel Endpoint 9.2.1	SgNB endpoint of the S1 transport bearer. For delivery of DL PDUs.	–	
>>>>SgNB UL GTP Tunnel Endpoint at PDCP	C-ifMCGpresent		GTP Tunnel Endpoint 9.2.1	SgNB endpoint of the X2-U transport bearer at PDCP. For delivery of UL PDCP PDUs.	–	
>>>>RLC Mode	C-ifMCGpresent		RLC Mode 9.2.119	Indicates the RLC mode to be used at the assisting node.	–	
>>>>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	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	–	
>>>>Requested MCG E-RAB Level QoS Parameters	C-ifMCGandSCGpresent_GBRpresent		E-RAB Level QoS Parameters 9.2.9	Includes E-RAB level QoS parameters requested to be provided by the MCG.	–	
>>>>UL Configuration	C-ifMCGandSCGpresent		9.2.118	Information about UL usage in the MeNB.	–	
>>>>UL PDCP SN Length	O		PDCP SN Length 9.2.133	Indicates the PDCP SN length of the bearer for the UL.	YES	ignore
>>>>DL PDCP SN Length	O		PDCP SN Length 9.2.133	Indicates the PDCP SN length of the bearer for the DL.	YES	ignore
>>>PDCP not present in SN				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "not present".		

>>>>SgNB DL GTP Tunnel Endpoint at SCG	M		GTP Tunnel Endpoint 9.2.1	Endpoint of the X2-U transport bearer at the SCG. For delivery of DL PDCP PDUs.	–	
>>>>Secondary SgNB DL GTP Tunnel Endpoint at SCG	O		GTP Tunnel Endpoint 9.2.1	Endpoint of the X2-U transport bearer at the SCG. For delivery of DL PDCP PDUs in case of PDCP duplication.	–	
>>>>LCID	O		9.2.138	LCID for the primary path in case of PDCP duplication configured.	YES	ignore
E-RABs Admitted To Be Modified List		*0..1*			YES	ignore
>E-RABs Admitted To Be Modified Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>EN-DC Resource Configuration	M		EN-DC Resource Configuration 9.2.108	Indicates the PDCP and Lower Layer MCG/SCG configuration.	–	
>>CHOICE *Resource Configuration*	M					
>>>*PDCP present in SN*				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "present".		
>>>>S1 DL GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	SgNB endpoint of the S1 transport bearer. For delivery of DL PDUs.	–	
>>>>SgNB UL GTP Tunnel Endpoint at PDCP	O		GTP Tunnel Endpoint 9.2.1	SgNB endpoint of the X2-U transport bearer at PDCP. For delivery of UL PDCP PDUs.	–	
>>>>Requested MCG E-RAB Level QoS Parameters	O		E-RAB Level QoS Parameters 9.2.9	Includes E-RAB level QoS parameters requested to be provided by the MCG.	–	
>>>>UL Configuration	O		9.2.118	Information about UL usage in the MeNB.	–	
>>>>UL PDCP SN Length	O		PDCP SN Length 9.2.133	Shall be ignored by the MeNB if received.	YES	ignore
>>>>DL PDCP SN Length	O		PDCP SN Length 9.2.133	Shall be ignored by the MeNB if received.	YES	ignore
>>>*PDCP not present in SN*				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "not present".		
>>>>SgNB DL GTP Tunnel Endpoint at SCG	O		GTP Tunnel Endpoint 9.2.1	SgNB endpoint of the X2-U transport bearer at the SCG. For delivery of DL PDCP PDUs.	–	

>>>>Secondary SgNB DL GTP Tunnel Endpoint at SCG	O		GTP Tunnel Endpoint 9.2.1	Endpoint of the X2-U transport bearer at the SCG. For delivery of DL PDCP PDUs in case of PDCP duplication.	YES	ignore
>>>>RLC Status	O		9.2.131	Indicates the RLC has been re-established.	YES	ignore
E-RABs Admitted To Be Released List		*0..1*			YES	ignore
>E-RABs Admitted To Be Released Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>EN-DC Resource Configuration	M		EN-DC Resource Configuration 9.2.108	Indicates the PDCP and Lower Layer MCG/SCG configuration.	–	
>>CHOICE *Resource Configuration*	M			Note: no further information contained in the IE container		
E-RABs Not Admitted List	O		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
SgNB to MeNB Container	O		OCTET STRING	Includes the NR *CG-Config* message as defined in TS 38.331 [31].	YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore
SgNB Resource Coordination Information	O		9.2.117	Information used to coordinate resources utilisation between en-gNB and MeNB.	YES	ignore
Admitted split SRBs	O		ENUMERATED (srb1, srb2, srb1&2, ...)	Indicates admitted SRBs	YES	ignore
Admitted split SRBs release	O		ENUMERATED (srb1, srb2, srb1&2, ...)	Indicates admitted SRBs release	YES	ignore
RRC config indication	O		9.2.132	Indicates the type of RRC configuration used at the en-gNB.	YES	reject
Location Information at SgNB	O		9.2.142	Contains information to support localisation of the UE	YES	ignore

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

Condition	Explanation
ifMCGandSCGpresent	This IE shall be present if, for the E-RAB admitted to be added, the *MCG resources* and *SCG resources* IEs in the *EN-DC Resource Configuration* IE are set to the value "present".
ifMCGpresent	This IE shall be present if, for the E-RAB admitted to be added, the *MCG resources* IE in the *EN-DC Resource Configuration* IE is set to the value "present".

C-ifMCGandSCGpresent_GBRpresent	This IE shall be present if, for the E-RAB admitted to be added, the *MCG resources* and *SCG resources* IEs in the *EN-DC Resource Configuration* IE are set to the value "present", and the *GBR QoS Information* IE is present in the *Requested MCG E-RAB Level QoS Parameters* IE.

9.1.4.7 SGNB MODIFICATION REQUEST REJECT

This message is sent by the en-gNB to inform the MeNB that the MeNB initiated SgNB Modification Preparation has failed.

Direction: en-gNB → 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	ignore
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	ignore
Cause	M		9.2.6		YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	ignore

9.1.4.8 SGNB MODIFICATION REQUIRED

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

Direction: en-gNB → 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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
Cause	M		9.2.6		YES	ignore
PDCP Change Indication	O		9.2.109		YES	ignore
E-RABs To Be Released List		*0..1*			YES	ignore
>E-RABs To Be Released Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>Cause	M		9.2.6		–	
>>RLC Mode	O		RLC Mode 9.2.119	Indicates the RLC mode at the en-gNB for PDCP transfer to MeNB.	YES	ignore
SgNB to MeNB Container	O		OCTET STRING	Includes the NR *CG-Config* message as defined in TS 38.331 [31].	YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
E-RABs To Be Modified List		*0..1*			YES	ignore
>E-RABs To Be Modified Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>EN-DC Resource Configuration	M		EN-DC Resource Configuration 9.2.108	Indicates the PDCP and Lower Layer MCG/SCG configuration.	–	
>>CHOICE *Resource Configuration*	M					
>>>PDCP present in SN				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "present".		
>>>>Requested MCG E-RAB Level QoS Parameters	O		E-RAB Level QoS Parameters 9.2.9	Includes E-RAB level QoS parameters requested to be provided by the MCG.	–	
>>>>UL Configuration	O		9.2.118	Information about UL usage in the MeNB.	–	
>>>>UL PDCP SN Length	O		PDCP SN Length 9.2.133	Shall be ignored by the MeNB if received.	YES	ignore
>>>>DL PDCP SN Length	O		PDCP SN Length 9.2.133	Shall be ignored by the MeNB if received.	YES	ignore

>>>>SgNB UL GTP Tunnel Endpoint at PDCP	O		GTP Tunnel Endpoint 9.2.1	SgNB endpoint of the X2-U transport bearer at PDCP. For delivery of UL PDCP PDUs.	–	
>>>>S1 DL GTP Tunnel Endpoint at the SgNB	O		GTP Tunnel Endpoint 9.2.1	en-gNB endpoint of the S1 transport bearer. For delivery of DL PDUs.	–	
>>>>New DRB ID Request	O		ENUMERATED (True, …,)		YES	ignore
>>>*PDCP not present in SN*				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "not present".		
>>>>SgNB DL GTP Tunnel Endpoint at SCG	O		GTP Tunnel Endpoint 9.2.1	SgNB endpoint of the X2-U transport bearer at the SCG. For delivery of DL PDCP PDUs.	–	
>>>>Secondary SgNB DL GTP Tunnel Endpoint at SCG	O		GTP Tunnel Endpoint 9.2.1	SgNB endpoint of the X2-U transport bearer at the SCG. For delivery of DL PDCP PDUs for PDCP duplication.	–	
>>>>RLC Status	O		9.2.131	Indicates the RLC has been re-established..		
>>>>LCID	O		9.2.138	Indicate the LCID of the primary path in case of PDCP duplication	YES	ignore
SgNB Resource Coordination Information	O		9.2.117	Information used to coordinate resources utilisation between the en-gNB and the MeNB.	YES	ignore
RRC config indication	O		9.2.132	Indicates the type of RRC configuration used at the en-gNB.	YES	reject
Location Information at SgNB	O		9.2.142	Contains information to support localisation of the UE	YES	ignore

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

9.1.4.9 SGNB MODIFICATION CONFIRM

This message is sent by the MeNB to inform the en-gNB about the successful modification.

Direction: MeNB → en-gNB.

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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	ignore
E-RABs Admitted To Be Modified List		*0..1*			YES	ignore
>E-RABs Admitted To Be Modified Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>EN-DC Resource Configuration	M		EN-DC Resource Configuration 9.2.108	Indicates the PDCP and Lower Layer MCG/SCG configuration.	–	
>>CHOICE *Resource Configuration*	M					
>>>PDCP not present in SN				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "not present".		
>>>>Secondary MeNB UL GTP Tunnel Endpoint at PDCP	O		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2-U transport bearer at the PDCP. For delivery of UL PDCP PDUs for PDCP duplication.	–	
>>>>UL PDCP SN Length	O		PDCP SN Length 9.2.133	Shall be ignored by the en-gNB if received.	YES	ignore
>>>>DL PDCP SN Length	O		PDCP SN Length 9.2.133	Shall be ignored by the en-gNB if received.	YES	ignore
MeNB to SgNB Container	O		OCTET STRING	Includes the NR *RRCReconfigurationComplete* message as defined in TS 38.331 [31].	YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	ignore
MeNB Resource Coordination Information	O		9.2.116	Information used to coordinate resources utilisation between the MeNB and the en-gNB.	YES	ignore

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

9.1.4.10 SGNB MODIFICATION REFUSE

This message is sent by the MeNB to inform the en-gNB that the SgNB initiated SgNB Modification has failed.

Direction: MeNB → en-gNB.

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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	ignore
Cause	M		9.2.6		YES	ignore
MeNB to SgNB Container	O		OCTET STRING	Includes the *CG-ConfigInfo* message as defined in TS 38.331 [31].	YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	ignore

9.1.4.11 SGNB RELEASE REQUEST

This message is sent by the MeNB to the en-gNB to request the release of resources.

Direction: MeNB → en-gNB.

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
SgNB UE X2AP ID	O		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
Cause	M		9.2.6		YES	ignore
E-RABs To Be Released List		*0..1*			YES	ignore
>E-RABs To Be Released Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>EN-DC Resource Configuration	M		EN-DC Resource Configuration 9.2.108	Indicates the PDCP and Lower Layer MCG/SCG configuration.	–	
>>CHOICE *Resource Configuration*	M					
>>>*PDCP present in SN*				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "present".		
>>>>UL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	–	
>>>>DL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer. used for forwarding of DL PDUs	–	
>>>*PDCP not present in SN*				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "not present".		
UE Context Kept Indicator	O		9.2.85		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject

MeNB to SgNB Container	O		OCTET STRING	Includes the *CG-ConfigInfo* message as defined in TS 38.331 [31].	YES	reject

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

9.1.4.12 SGNB RELEASE REQUEST ACKNOWLEDGE

This message is sent by the en-gNB to the MeNB to confirme the request to release en-gNB resources.

Direction: en-gNB → MeNB.

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	ignore
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject
E-RABs Admitted To Be Released List		*0..1*			YES	ignore
>E-RABs Admitted To Be Released Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>RLC Mode	M		RLC Mode 9.2.119	Indicates the RLC mode at the en-gNB for PDCP transfer to MeNB.	–	

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

9.1.4.13 SGNB RELEASE REQUEST REJECT

This message is sent by the en-gNB to the MeNB to reject the request to release en-gNB resources.

Direction: en-gNB → MeNB.

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	ignore
SgNB UE X2AP ID	O		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	ignore
Cause	M		9.2.6		YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject

9.1.4.14 SGNB RELEASE REQUIRED

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

Direction: en-gNB → 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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
Cause	M		9.2.6		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject
E-RABs To Be Released List		*0..1*			YES	ignore
>E-RABs To Be Released Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		–	
>>RLC Mode	M		RLC Mode 9.2.119	Indicates the RLC mode at the en-gNB for PDCP transfer to MeNB.	–	

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

9.1.4.15 SGNB RELEASE CONFIRM

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

Direction: MeNB → en-gNB.

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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	ignore
E-RABs to be Released List		*0..1*			YES	ignore
>E-RABs To Be Released Item		*1 .. <maxnoofBearers>*			–	
>>E-RAB ID	M		9.2.23		–	
>>EN-DC Resource Configuration	M		EN-DC Resource Configuration 9.2.108	Indicates the PDCP and Lower Layer MCG/SCG configuration.	–	
>>CHOICE *Resource Configuration*	M					
>>>PDCP present in SN				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "present".		
>>>>UL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	–	
>>>>DL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	–	
>>>PDCP not present in SN				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "not present".		
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore

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

9.1.4.16 SGNB COUNTER CHECK REQUEST

This message is sent by the en-gNB to request the verification of the value of the PDCP COUNTs associated with the bearers established in the en-gNB.

Direction: en-gNB → 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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
E-RABs Subject to Counter Check List		*1*			YES	ignore
>E-RABs Subject to Counter Check Item		*1 .. <maxnoofBearers>*			EACH	ignore
>>E-RAB ID	M		9.2.23		-	
>>UL COUNT	M	*INTEGER(0.. 4294967295)*		Indicates the value of uplink COUNT associated to this E-RAB.	-	
>>DL COUNT	M	*INTEGER(0.. 4294967295)*		Indicates the value of downlink COUNT associated to this E-RAB.	-	
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore

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

9.1.4.17 SGNB CHANGE REQUIRED

This message is sent by the en-gNB to the MeNB to request the change of en-gNB for a specific UE.

Direction: en-gNB → 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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
Target SgNB ID Information	M		9.2.102		YES	reject
Cause	M		9.2.6		YES	ignore
SgNB to MeNB Container	O		OCTET STRING	Includes the *CG-Config* message as defined in TS 38.331 [31].	YES	reject
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject

9.1.4.18 SGNB CHANGE CONFIRM

This message is sent by the MeNB to inform the en-gNB about the successful change.

Direction: MeNB → en-gNB.

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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	ignore
E-RABs to be Released List		*0..1*			YES	ignore
>E-RABs To Be Released Item		*1 .. <maxnoofBearers>*			–	
>>E-RAB ID	M		9.2.23		–	
>>EN-DC Resource Configuration	M		EN-DC Resource Configuration 9.2.108	Indicates the PDCP and Lower Layer MCG/SCG configuration.	–	
>>CHOICE *Resource Configuration*	M					
>>>PDCP present in SN				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "present".		
>>>>UL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	–	
>>>>DL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	–	
>>>PDCP not present in SN				This choice tag is used if the *PDCP at SgNB* IE in the *EN-DC Resource Configuration* IE is set to the value "not present".		
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore

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

9.1.4.19 SGNB CHANGE REFUSE

This message is sent by the MeNB to inform the en-gNB that the SgNB initiated SgNB Change has failed.

Direction: MeNB → en-gNB.

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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	ignore
Cause	M		9.2.6		YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject

9.1.4.20 SECONDARY RAT DATA USAGE REPORT

This message is sent by the en-gNB to report data volumes for secondary RAT.

Direction: en-gNB → 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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
Secondary RAT Usage Report List	M		9.2.120		YES	reject
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject

9.1.4.21 RRC TRANSFER

This message is sent by the MeNB to the en-gNB or by the en-gNB to the MeNB to transfer an RRC message.

Direction: MeNB → en-gNB or en-gNB → 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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
Split SRB		*0..1*				
>RRC Container	O		OCTET STRING	Contains a PDCP-C PDU encapsulating an RRC message as defined in subclause 6.2.1 of TS 36.331 [9] and ciphered with the key of the MeNB	YES	reject
>SRB Type	M		ENUMERATED (srb1, srb2, ...)	The SRB type	YES	reject
>Delivery Status	O		9.2.104	DL RRC delivery status of split SRB	YES	reject
NR UE Report		*0..1*				
>RRC Container	M		OCTET STRING	Includes the UL-DCCH-Message as defined in subclause 6.2.1 of TS 38.331 [31] containing the *MeasurementReport* message or *FailureInformation* message.	YES	reject
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject

9.1.4.22 PARTIAL RESET REQUIRED

This message is sent by an initiating node to a neighbouring node, both nodes able to interact for EN-DC, to release all the resources for selected UEs.

Direction: en-gNB → MeNB, MeNB → en-gNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigne Criticalit
Message Type	M		9.2.13		YES	reject
UEs to be Reset List		*1*			YES	reject
>UEs To Be Reset Item		*1 .. <maxnoofUEs>*				
>>MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB.		
>>SgNB UE X2AP ID	O		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.		
>>MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.		
Cause	M		9.2.6		YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

Range bound	Explanation
maxnoofUEs	Maximum no. of UEs. Value is 8192.

9.1.4.23 PARTIAL RESET CONFIRM

This message is sent by an initiating node to a neighbouring node, both nodes able to interact for EN-DC, to confirm the release all the resources for selected UEs.

Direction: en-gNB → MeNB, MeNB → en-gNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
UEs Admitted to be Reset List		*1*			YES	reject
>UEs Admitted To Be Reset Item		*1 .. <maxnoofUEsinengNBDU>*				
>>MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB.		
>>SgNB UE X2AP ID	O		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.		
>>MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.		
Interface Instance Indication	O		9.2.143		YES	reject

Range bound	Explanation
maxnoofUEsinengNBDU	Maximum no. of UEs. Value is 8192.

9.1.4.24 E-UTRA – NR CELL RESOURCE COORDINATION REQUEST

Direction: eNB → en-gNB, en-gNB → eNB.

This message is sent by a neighbouring eNB to a peer en-gNB or by a neighbouring en-gNB to a peer eNB, both nodes able to interact for EN-DC, to express the desired resource allocation for data traffic, for the sake of E-UTRA - NR Cell Resource Coordination.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
CHOICE *Initiating Node Type*	M				-	
>eNB						
>>Data Traffic Resource Indication	M		9.2.126	Indicates resource allocations for data traffic.	YES	reject
>>Spectrum Sharing Group ID	M		INTEGER (1.. maxCellineNB)	Indicates the E-UTRA cells involved in resource coordination with the NR cells affiliated with the same ***Spectrum Sharing Group ID***.	YES	reject
>>List of E-UTRA Cells in E-UTRA Coordination Request		*0 .. <maxCellineNB>*		List of applicable E-UTRA cells.	YES	reject
>>>EUTRA Cell ID	M		ECGI 9.2.14		-	
>en-gNB						
>>Data Traffic Resource Indication	M		9.2.126	Indicates resource allocations for data traffic.	YES	reject
>>List of E-UTRA Cells in NR Coordination Request		*1 .. <maxCellineNB>*		List of applicable E-UTRA cells	YES	reject
>>>EUTRA Cell ID	M		ECGI 9.2.14		–	
>>Spectrum Sharing Group ID	M		INTEGER (1.. maxCellineNB)	Indicates the NR cells involved in resource coordination with the E-UTRA cells affiliated with the same ***Spectrum Sharing Group ID***.	YES	reject
>>List of NR Cells in NR Coordination Request		*0 .. <* maxnoNRcellsSpectrumSharingwithE-UTRA >		List of applicable NR cells	YES	reject
>>>NR-Cell ID	M		NR-CGI 9.2.105		-	
Interface Instance Indication	O		9.2.143		YES	reject

Range bound	Explanation
maxCellineNB	Maximum no. of E-UTRA cells in eNB. Value is 256.
maxnoNRcellsSpectrumSharingwithE-UTRA	Maximum no. of NR cells affiliated to a Spectrum Sharing Group ID involved in cell resource coordination with a number of E-UTRA cells affiliated with the same Spectrum Sharing Group ID. Value is 64.

9.1.4.25 E-UTRA – NR CELL RESOURCE COORDINATION RESPONSE

This message is sent by a neighbouring eNB to a peer en-gNB or by a neighbouring en-gNB to a peer eNB, both nodes able to interact for EN-DC, as a response to the E-UTRA – NR CELL RESOURCE COORDINATION REQUEST.

Direction: eNB → en-gNB, en-gNB → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
CHOICE *Responding NodeType*	M				-	
>eNB						
>>Data Traffic Resource Indication	M		9.2.126	Indicates resource allocations for data traffic.	YES	reject
>>Spectrum Sharing Group ID	M		INTEGER (1.. maxCellineNB)	Indicates the E-UTRA cells involved in resource coordination with the NR cells affiliated with the same *Spectrum Sharing Group ID.*	YES	reject
>>List of E-UTRA Cells in E-UTRA Coordination Response		*0 .. <maxCellineNB >*		List of applicable E-UTRA cells	YES	reject
>>>EUTRA Cell ID	M		ECGI 9.2.14		-	
>en-gNB						
>>Data Traffic Resource Indication	M		9.2.126	Indicates resource allocations for data traffic.	YES	reject
>>Spectrum Sharing Group ID	M		INTEGER (1.. maxCellineNB)	Indicates the NR cells involved in resource coordination with the E-UTRA cells affiliated with the same *Spectrum Sharing Group ID.*	YES	reject
>>List of NR Cells in NR Coordination Response		*0 .. < maxnoNRcellsSpectrumSharingwithE-UTRA >*		List of applicable NR cells	YES	reject
>>>NR Cell ID	M		NR-CGI 9.2.105		-	
Interface Instance Indication	O		9.2.143		YES	reject

Range bound	Explanation
maxCellineNB	Maximum no. of E-UTRA cells in eNB. Value is 256.
maxnoNRcellsSpectrumSharingwithE-UTRA	Maximum no. of NR cells affiliated to a Spectrum Sharing Group ID involved in cell resource coordination with a number of E-UTRA cells affiliated with the same Spectrum Sharing Group ID. Value is 64.

9.1.4.26 SGNB ACTIVITY NOTIFICATION

This message is sent by the en-gNB to inform the MeNB that resources for E-RABs controlled by the en-gNB have not been used or are in use again.

Direction: en-gNB → 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
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
UE Context level user plane activity report	O		User plane traffic activity report 9.2.130		YES	ignore
E-RAB Activity Notify Item List		*0..<maxnoofBearers>*			EACH	ignore
>E-RAB ID	M		9.2.23		–	
>User plane traffic activity report	M		9.2.130		–	
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject

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

9.1.4.27 GNB STATUS INDICATION

This message is sent by the en-gNB to indicate to the eNB its status of overload.

Direction: en-gNB → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	ignore
gNB Overload Information	M		ENUMERATED (overloaded, not-overloaded, ...)		YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

9.1.4.28 TRACE START

This message is sent by the MeNB to initiate a trace session for a UE.

Direction: MeNB → en-gNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB.	YES	reject
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
Trace Activation	M		9.2.2		YES	ignore

9.1.4.29 DEACTIVATE TRACE

This message is sent by the MeNB to deactivate a trace session.

Direction: MeNB → en-gNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB.	YES	reject
SgNB UE X2AP ID	M		en-gNB UE X2AP ID 9.2.100	Allocated at the en-gNB.	YES	reject
E-UTRAN Trace ID	M		OCTET STRING (SIZE(8))	As per E-UTRAN Trace ID in *Trace Activation* IE	YES	ignore

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.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Transport Layer Address	M		BIT STRING (1..160, ...)	For details on the Transport Layer Address, see TS 36.424 [8], TS 36.414 [19]	–	
GTP TEID	M		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	M		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, fourth bit = F1-C, fifth bit = E1. 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, MinimumWithoutVendorSpecificExtension, MediumWithoutVendorSpecificExtension, MaximumWithoutVendorSpecificExtension, ...)	Defined in TS 32.421 [7]	–	
Trace Collection Entity IP Address	M		BIT STRING (1..160,…)	For details on the Transport Layer Address, see TS 36.424 [8], TS 36.414 [19]	–	
MDT Configuration	O		9.2.56		YES	ignore
UE Application layer measurement configuration	O		9.2.121		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..<maxnoofEPLMNs>*		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	M		9.2.4		–	
Forbidden TAs		*0..<maxnoofEPLMNsPlusOne>*		intra E-UTRAN roaming restrictions	–	
>PLMN Identity	M		9.2.4	The PLMN of forbidden TACs	–	
>Forbidden TACs		*1..<maxnoofForbTACs>*			–	
>>TAC	M		OCTET STRING(2)	The forbidden TAC	–	
Forbidden LAs		*0..<maxnoofEPLMNsPlusOne>*		inter-3GPP RAT roaming restrictions	–	
>PLMN Identity	M		9.2.4		–	
>Forbidden LACs		*1..<maxnoofForbLACs>*			–	
>>LAC	M		OCTET STRING(2)		–	
Forbidden inter RATs	O		ENUMERATED(ALL, GERAN, UTRAN, CDMA2000, …,GERAN and UTRAN, CDMA2000 and UTRAN)	inter-3GPP and 3GPP2 RAT access restrictions. "ALL" means that all RATs mentioned in the enumeration of this IE are restricted.	–	
NR restriction in EPS as secondary RAT	O		ENUMERATED(NRrestrictedinEPSasSecondaryRAT, …)	Restriction to use NR when the NR is used as secondary RAT in EN-DC.	YES	ignore

Core Network Type Restrictions		*0..<maxnoofEPLMNsPlusOne>*		Includes any of the Serving PLMN or any PLMN of the Equivalent PLMNs listed in the *Mobility Restriction List* IE for which core network type restriction applies as specified in TS 23.501 [38].	YES	ignore
>PLMN Identity	M		9.2.4			
>Core Network Type	M		ENUMERATED (5GCForbidden, …, EPCForbidden)	The indication indicates whether the UE is restricted to connect to 5GC or to EPC for this PLMN.		
NR Restriction in 5GS	O		ENUMERATED(NRrestrictedin5GS, …)	Restriction to use NR when the NR connects to 5GS.	YES	ignore
Last NG-RAN PLMN Identity	O		9.2.4	Indicates the NG-RAN PLMN from where the UE formerly handed over to EPS and which is preferred in case of subsequent mobility to 5GS.	YES	ignore

Range bound	Explanation
maxnoofEPLMNs	Maximum no. of equivalent PLMN Ids. Value is 15.
maxnoofEPLMNsPlusOne	Maximum no. of equivalent PLMN Ids 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	M			
>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, $T_{RELOCprep}$ 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,$T_{DCoverall}$ Expiry, T_{DCprep} 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, MCG Mobility, SCG Mobility, Count reaches max value, Unknown Old en-gNB UE X2AP ID, PDCP Overload)	
>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 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 Protection Algorithms Not Supported	The target eNB is unable to support any of the encryption and/or integrity protection algorithms supported by the UE, or the en-gNB is unable to support any of the NR encryption and/or integrity protection algorithms supported by the UE for EN-DC operation.
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 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 $T_{DCoverall}$.
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 and EN-DC 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 and EN-DC only.

Resource Optimisation	The reason for requesting this action is to improve the load distribution with the neighbour cells. In the current version of this specification applicable for Dual Connectivity and EN-DC 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 and EN-DC 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 and EN-DC 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 and EN-DC only.
Invalid QoS combination	The action was failed because of invalid QoS combination. In the current version of this specification applicable for Dual Connectivity and EN-DC 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 and EN-DC 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 and EN-DC only.
RRM purpose	The procedure is initiated due to node internal RRM purposes. In the current version of this specification applicable for Dual Connectivity and EN-DC 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 and EN-DC 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/en-gNB didn't see activity on the DRB recently. In the current version of this specification applicable for Dual Connectivity and EN-DC 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 and EN-DC only.
Failure in the Radio Interface Procedure	Radio interface procedure has failed. In the current version of this specification applicable for Dual Connectivity and EN-DC 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 and EN-DC only.
MCG Mobility	The procedure is initiated due to mobility related at MCG radio resource.
SCG Mobility	The procedure is initiated due to mobility related at SCG radio resource.
Count reaches max value	Indicates the PDCP COUNT for UL or DL reached the max value and the bearer may be released.
Unknown Old en-gNB UE X2AP ID	The action failed because the Old en-gNB UE X2AP ID or the SeNB UE X2AP ID is unknown.
PDCP Overload	The procedure is initiated due to PDCP resource limitation.

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 Resources	eNB has insufficient user plane processing resources available.
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/en-gNB 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	O		INTEGER (0..255)	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	O		ENUMERATED(initiating message, successful outcome, unsuccessful outcome)	The Triggering Message is used only if the Criticality Diagnostics is part of Error Indication procedure.
Procedure Criticality	O		ENUMERATED(reject, ignore, notify)	This Procedure Criticality is used for reporting the Criticality of the Triggering message (Procedure).
Information Element Criticality Diagnostics		*0..<maxNrOfErrors>*		
>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	M		INTEGER (0..65535)	The IE ID of the not understood or missing IE
>Type Of Error	M		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 (0..503, …)	Physical Cell ID	–	
Cell ID	M		ECGI 9.2.14		–	
TAC	M		OCTET STRING(2)	Tracking Area Code	–	
Broadcast PLMNs		*1..<maxnoof BPLMNs>*		Broadcast PLMNs	–	
>PLMN Identity	M		9.2.4		–	
CHOICE *EUTRA-Mode-Info*	M				–	
>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	–	
>>>DL EARFCN	M		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	M		Transmission Bandwidth 9.2.27		–	
>>>UL EARFCN Extension	O		EARFCN Extension 9.2.65	If this IE is present, the value signalled in the *UL EARFCN* IE is ignored.	YES	reject
>>>DL EARFCN Extension	O		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	O		Offset of NB-IoT Channel Number to EARFCN 9.2.94	Corresponds to M_{DL} in TS 36.104 [16]	YES	reject
>>>Offset of NB-IoT Channel Number to UL EARFCN	O		Offset of NB-IoT Channel Number to EARFCN 9.2.94	Corresponds to M_{UL} in TS 36.104 [16]	YES	reject
>>>NRS-NSSS-PowerOffset	O		ENUMERATED (-3, 0, 3, …)	NRS to NSSS power ratio, as defined in TS6.213 [11].	YES	Ignore

>>>NSSS-NumOccasionDifferentPrecoder	O		ENUMERATED (2, 4, 8, …)	The number of consecutive NSSS occasions that use different precoders for NSSS transmission, as defined in TS6.213 [11].	YES	ignore
>TDD					–	
>>TDD Info		*1*			–	
>>>EARFCN	M		9.2.26	Corresponds to N_{DL}/N_{UL} in TS 36.104 [16]	–	
>>>Transmission Bandwidth	M		Transmission 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]. In NB-IOT, sa0 and sa6 are not applicable.	–	
>>>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	M		ENUMERATED (Normal, Extended,…)		–	
>>>Additional Special Subframe Info	O			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	M		ENUMERATED (Normal, Extended,…)		–	

>>>>Cyclic Prefix UL	M		ENUMERATED (Normal, Extended,…)		–	
>>>EARFCN Extension	O		9.2.65	If this IE is present, the value signalled in the *EARFCN* IE is ignored.	YES	reject
>>>Additional Special Subframe Extension Info	O			Special subframe configuration information defined in TS 36.211 [10]. Only for newly defined configuration of special subframe from Release 14.	YES	ignore
>>>>Additional Special Subframe Patterns Extension	M		ENUMERATED (ssp10, …)		–	
>>>>Cyclic Prefix DL	M		ENUMERATED (Normal, Extended,…)		–	
>>>>Cyclic Prefix UL	M		ENUMERATED (Normal, Extended,…)		–	
Number of Antenna Ports	O		9.2.43		YES	ignore
PRACH Configuration	O		PRACH Configuration 9.2.50		YES	ignore
MBSFN Subframe Info		*0..<maxnoof MBSFN>*		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 (0..7, ...)		–	
>Subframe Allocation	M		9.2.51		–	
CSG ID	O		9.2.53		YES	ignore
MBMS Service Area Identity List		*0..<maxnoof MBMSServiceAreaIdentities >*		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	O		9.2.60		YES	ignore
FreqBandIndicatorPriority	O		ENUMERATED (not-broadcasted, broadcasted, ...)	This IE indicates that the eNodeB supports *FreqBandIndicationPriority*, and whether *FreqBandIndicatorPriority* is broadcasted in SIB 1 (see TS 36.331 [9])	YES	ignore

BandwidthReducedSI	O		ENUMERATED (scheduled, ...)	This IE indicates that the SystemInformationBlockType1-BR is scheduled in the cell (see TS 36.331 [9])	YES	ignore
Protected E-UTRA Resource Indication	O		9.2.125	This IE indicates which E-UTRA control/reference signal resources are protected and are not subject to E-UTRA - NR Cell Resource Coordination.	YES	ignore
Broadcast PLMN Identity Info List E-UTRA		*0..<maxnoofBPLMNs-1>*		This IE corresponds to the *cellAccessRelatedInfo* IE in *SIB1* as specified in TS 36.331 [9]. The PLMN Identities and associated information contained in this IE shall be provided in the same order as broadcast in SIB1.	YES	ignore
>Broadcast PLMNs		*1..<maxnoofBPLMNs>*			–	
>>PLMN Identity	M		9.2.4		–	
>TAC	M		OCTET STRING(2)		–	
>E-UTRA Cell Identity	M		BIT STRING (28)		–	

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.
maxnoofMBMSServiceAreaIdentities	Maximum no. of MBMS Service Area Identities. Value is 256.
maxnoofBPLMNs-1	Maximum no. of extended broadcast PLMN Ids minus 1. Value is 5.

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 (0..255)	QoS Class Identifier defined in TS 23.401 [12]. Logical range and coding specified in TS 23.203 [13].	–	
Allocation and Retention Priority	M		9.2.31		–	
GBR QoS Information	O		9.2.10	This IE applies to GBR bearers only and shall be ignored otherwise.	–	
Downlink Maximum Packet Loss Rate	O		Packet Loss Rate 9.2.124	This IE applies only to bearers with specific QCI (see TS 23.401 [12]) and indicates the maximum allowed packet loss rate for downlink as specified in TS 23.401 [12].	YES	ignore
Uplink Maximum Packet Loss Rate	O		Packet Loss Rate 9.2.124	This IE applies only to bearers with specific QCI (see TS 23.401 [12]) and indicates the maximum allowed packet loss rate for uplink as specified in TS 23.401 [12].	YES	ignore

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: For LTE DC, 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	M		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]. If the *Extended E-RAB Maximum Bit Rate Downlink* IE is included, the *E-RAB Maximum Bit Rate Downlink* IE shall be ignored.	–	
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]. If the *Extended E-RAB Maximum Bit Rate Uplink* IE is included, the *E-RAB Maximum Bit Rate Uplink* IE shall be ignored.	–	
E-RAB Guaranteed Bit Rate Downlink	M		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]. If the *Extended E-RAB Guaranteed Bit Rate Downlink* IE is included, the *E-RAB Guaranteed Bit Rate Downlink* IE shall be ignored.	–	
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]. If the *Extended E-RAB Guaranteed Bit Rate Uplink* IE is included, the *E-RAB Guaranteed Bit Rate Uplink* IE shall be ignored.	–	
Extended E-RAB Maximum Bit Rate Downlink	O		Extended Bit Rate 9.2.99	Maximum Bit Rate in DL (i.e. from EPC to E-UTRAN) for the bearer. Details in TS 23.401 [12].	–	

Extended E-RAB Maximum Bit Rate Uplink	O		Extended Bit Rate 9.2.99	Maximum Bit Rate in UL (i.e. from E-UTRAN to EPC) for the bearer. Details in TS 23.401 [12].	–	
Extended E-RAB Guaranteed Bit Rate Downlink	O		Extended Bit Rate 9.2.99	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].	–	
Extended E-RAB Guaranteed Bit Rate Uplink	O		Extended Bit Rate 9.2.99	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 or by UE in sidelink 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	M		INTEGER (0..10,000,000,000)	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 Rate Downlink	M		Bit Rate 9.2.11	If the *Extended UE Aggregate Maximum Bit Rate Downlink* IE is included, the *UE Aggregate Maximum Bit Rate Downlink* IE shall be ignored.	–	
UE Aggregate Maximum Bit Rate Uplink	M		Bit Rate 9.2.11	If the *Extended UE Aggregate Maximum Bit Rate Uplink* IE is included, the *UE Aggregate Maximum Bit Rate Uplink* IE shall be ignored.	–	
Extended UE Aggregate Maximum Bit Rate Downlink	O		Extended Bit Rate 9.2.99	UE Aggregate Maximum Bit Rate in DL. Details in TS 23.401 [12].	–	
Extended UE Aggregate Maximum Bit Rate Uplink	O		Extended Bit Rate 9.2.99	UE Aggregate Maximum Bit Rate in UL. Details in TS 23.401 [12].	–	

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 (0..255)	
Type of Message	M		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	M		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 (0..4095)		–	
HFN	M		INTEGER (0..1048575)		–	

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	M		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>*		
>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 (1..110, …)	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 (6..110, …)	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 *RNTP (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 *Enhanced RNTP* IE is included.	–	
RNTP Threshold	M		ENUMERATED (-∞, -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		ENUMERATED (1, 2, 4, …)	*P* (number of antenna ports for cell-specific reference signals) defined in TS 36.211 [10]	–	
P_B	M		INTEGER (0..3, …)	P_B is defined in TS 36.213 [11].	–	
PDCCH Interference Impact	M		INTEGER (0..4, …)	Measured by Predicted Number Of Occupied PDCCH OFDM Symbols (see TS 36.211 [10]). Value 0 means "no prediction is available".	–	
Enhanced RNTP	O				YES	ignore

>*Enhanced RNTP Bitmap*	M		BIT STRING (12..8800, …)	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 $2\times N_{\mathrm{RB}}^{\mathrm{DL}}$. $N_{\mathrm{RB}}^{\mathrm{DL}}$ is defined in TS 36.211 [10]. The Enhanced RNTP pattern is continuously repeated.		
>*RNTP High Power Threshold*	M		ENUMERATED (-∞, -11, -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, …)	Defined as the $\mathrm{RNTP}_{\mathrm{threshold}}$ in TS 36.213 [11].		
>Enhanced RNTP Start Time		0..1				
>>Start SFN	M		INTEGER (0..1023, …)	SFN of the radio frame containing the first subframe when the *Enhanced RNTP* IE is valid.		
>>Start Subframe Number	M		INTEGER (0..9, …)	Subframe number, within the radio frame indicated by the *Start SFN* IE, of the first subframe when the *Enhanced RNTP* 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	M		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	M		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*	M		BIT STRING (20)	Equal to the 20 leftmost bits of the value of the *E-UTRAN Cell Identifier* IE contained in the *ECGI* IE (see section 9.2.14) identifying each cell controlled by the eNB	–	
>*Home eNB ID*	M		BIT STRING (28)	Equal to the value of the *E-UTRAN Cell Identifier* IE contained in the *ECGI* IE (see section 9.2.14) identifying the cell controlled by the eNB	–	
>*Short Macro eNB ID*	M		BIT STRING (SIZE(18))	Equal to the 18 leftmost bits of the value of the *E-UTRAN Cell Identifier* IE contained in the *ECGI* IE (see section 9.2.14) identifying each cell controlled by the eNB.	–	
>*Long Macro eNB ID*	M		BIT STRING (SIZE(21))	Equal to the 21 leftmost bits of the value of the *E-UTRAN Cell Identifier* IE contained in the *ECGI* IE (see section 9.2.14) identifying each 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	M		INTEGER (0..15, ...)	

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].

NOTE: If X2-C signalling transport is shared among multiple interface instances, the value of the eNB UE X2AP ID, combined with the eNB UE X2AP ID Extension, if applicable, is allocated so that it can be associated with an X2-C interface instance.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
eNB UE X2AP ID	M		INTEGER (0..4095)	

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	M		INTEGER (1..256)	

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 (0..maxEARFCN)	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.

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 Reference	Semantics Description
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..<maxnoofBearers>*			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	M		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 (0..7)	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	M		INTEGER (0..15)	**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(shall not trigger pre-emption, may trigger pre-emption)	**Descr.:** This IE indicates the pre-emption 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 pre-emption 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	M		ENUMERATED(Possible, …)	

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]) and the usage of PDCCH CCEs for Downlink and Uplink scheduling.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL GBR PRB usage	M		INTEGER (0..100)	
UL GBR PRB usage	M		INTEGER (0..100)	
DL non-GBR PRB usage	M		INTEGER (0..100)	
UL non-GBR PRB usage	M		INTEGER (0..100)	
DL Total PRB usage	M		INTEGER (0..100)	
UL Total PRB usage	M		INTEGER (0..100)	
DL scheduling PDCCH CCE usage	O		INTEGER (0..100)	
UL scheduling PDCCH CCE usage	O		INTEGER (0..100)	

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
Last Visited Cell List		*1..<maxnoofCells>*		Most recent information is added to the top of this list	–	
>Last Visited Cell Information	M		9.2.39		–	

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 cell specific information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CHOICE *Last Visited Cell Information*	M				-	
>E-UTRAN Cell					-	
>>Last Visited E-UTRAN Cell Information	M		9.2.40		-	
>UTRAN Cell					-	
>>Last Visited UTRAN Cell Information	M		OCTET STRING	Defined in TS 25.413 [24]		
>GERAN Cell					-	
>>Last Visited GERAN Cell Information	M		9.2.41		-	
>NG-RAN Cell					-	
>>Last Visited NG-RAN Cell Information	M		OCTET STRING	Defined in TS 38.413 [39]. (see subclause 9.3.1.97).		

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	M		ECGI 9.2.14		-	
Cell Type	M		9.2.42		-	
Time UE stayed in Cell	M		INTEGER (0..4095)	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	O		INTEGER (0..40950)	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	O		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 GERAN Cell Information*	M				-	
>Undefined	M		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, an2, an4,...)	an1 = One antenna port 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	O		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 (1..100,...)	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 (0..100)	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	M		INTEGER (-20..20)	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 eNB_2 at the moment the MOBILITY CHANGE FAILURE message is sent.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Handover Trigger Change Lower Limit	M		INTEGER (-20..20)	The actual value is IE value * 0.5 dB.
Handover Trigger Change Upper Limit	M		INTEGER (-20..20)	The actual value is IE 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 reference	Semantics description	Criticality	Assigned Criticality
RootSequenceIndex	M		INTEGER (0..837)	See section 5.7.2. in TS 36.211 [10]	–	
ZeroCorrelationZoneConfiguration	M		INTEGER (0..15)	See section 5.7.2. in 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 (0..94)	See section 5.7.1 of TS 36.211 [10]	–	
PRACH-ConfigurationIndex	O		INTEGER (0..63)	Mandatory for TDD, 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 Allocation*	M			
>*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	M		BIT STRING (SIZE(40))	Indicates a subset of the ABS Pattern Info above, and is used to configure specific measurements towards the UE.
>TDD				
>>ABS Pattern Info	M		BIT STRING (1..70, ...)	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 6; 70 for UL/DL subframe configuration 0. UL/DL subframe configuration defined in TS 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	M		BIT STRING (1..70, ...)	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	M		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	M		ENUMERATED(Immediate MDT only, Immediate MDT and Trace, …)		–	
CHOICE *Area Scope of MDT*	M				–	
>*Cell Based*					–	
>>**Cell ID List for MDT**		*1..<maxnoofCellIDforMDT>*			–	
>>>ECGI	M		9.2.14		–	
>*TA Based*					–	
>>**TA List for MDT**		*1..<maxnoofTAforMDT>*			–	
>>>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..<maxnoofTAforMDT>*				
>>>TAC	M		OCTET STRING (2)	Tracking Area Code		
>>>PLMN Identity	M		9.2.4			
Measurements to Activate	M		BITSTRING (SIZE(8))	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".	–	
M1 Reporting Trigger	M		ENUMERATED (periodic, A2event-triggered, …, A2event-triggered periodic)	This IE shall be ignored if the *Measurements to Activate* IE has the first bit set to "0".	–	
M1 Threshold Event A2	C-ifM1A2trigger			Included in case of event-triggered or event-triggered periodic reporting for measurement M1	–	
>CHOICE *Threshold*	M				–	
>>*RSRP*					–	
>>>Threshold RSRP	M		INTEGER (0..97)	This IE is defined in TS 36.331 [9].	–	
>>*RSRQ*					–	
>>>Threshold RSRQ	M		INTEGER (0..34)	This IE is defined in TS 36.331 [9].	–	

M1 Periodic reporting	C-ifperiodic MDT			Included in case of periodic or event-triggered periodic reporting for measurement M1	–	
>Report interval	M		ENUMERATED (ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, min1, min6, min12, min30, min60)	This IE is defined in TS 36.331 [9].	–	
>Report amount	M		ENUMERATED (1, 2, 4, 8, 16, 32, 64, infinity)	Number of reports	–	
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	O		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	O		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
Bluetooth Measurement Configuration	O		9.2.134		YES	ignore
WLAN Measurement Configuration	O		9.2.135		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 (0..100)	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 eNB_2 for DL traffic needing protection by ABS from inter-cell interference for DL scheduling, or allocated by the eNB_2 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*	M		–	–
>*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 (1..70)	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 Allowed	M		ENUMERATED (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..<maxnoofBands>*			–	
>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(uplink, 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 reference	Semantics description
M5 Collection Period	M		ENUMERATED (ms1024, ms2048, ms5120, ms10240, min1, …)	
M5 Links to log	M		ENUMERATED(uplink, 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 >*		
>PLMN Identity	M		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 Reference	Semantics Description
EARFCN Extension	M		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 reference	Semantics description	Criticality	Assigned Criticality
PDCP-SN Extended	M		INTEGER (0..32767)		-	
HFN Modified	M		INTEGER (0..131071)		-	

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	M		Global eNB ID 9.2.22		-	
Target eNB ID	O		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	M		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/en-gNB 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	O		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	O		INTEGER (1..30|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	O		INTEGER (1..30|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	O		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 Key	M		BIT STRING (SIZE(256))	The S-KeNB which is provided by the MeNB, 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 Indication	M		ENUMERATED (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 .. <maxnoofCoMPHypothesisSet>*		
>CoMP Hypothesis Set	M		9.2.75	
>Benefit Metric	M		INTEGER (-101..100, …)	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		*0..1*		
>Start SFN	M		INTEGER (0..1023, …)	SFN of the radio frame containing the first subframe when the *CoMP Information* IE is valid.
>Start Subframe Number	M		INTEGER (0..9, …)	Subframe number, within the radio frame indicated by the *Start SFN* IE, of the first subframe when the *CoMP Information* 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..<maxnoofCoMPCells>*		
>Cell ID	M		ECGI 9.2.14	ID of the cell for which the *CoMP Hypothesis* IE is applied.
>CoMP Hypothesis	M		BIT STRING (6..4400, …)	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 Item		*1 .. <maxUEReport>*		
>RSRP Measurement Result		*1 .. <maxCellReport>*		
>>RSRP Cell ID	M		ECGI 9.2.14	ID of the cell on which the RSRP is measured.
>>RSRP Measured	M		INTEGER (0..97, ...)	Measured RSRP. Defined in TS 36.331 [9].
>UE ID	O		BIT STRING (SIZE(16))	ID assigned by eNB_2 for 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	O		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	O		INTEGER (0..3)	See TS 36.213 [23, Table 5.2-1]
>>P_A_list		*0 .. <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	O		ENUMERATED (authorized, not authorized, ...)	Indicates whether the UE is authorized for ProSe Direct Discovery	-	
ProSe Direct Communication	O		ENUMERATED (authorized, not authorized, ...)	Indicates whether the UE is authorized for ProSe Direct Communication	-	
ProSe UE-to-Network Relaying	O		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>*		
>UE ID	M		BIT STRING (SIZE(16))	ID assigned by eNB2 for the UE.
>CSI Report per CSI Process		1 .. <maxCSIProcess>		
>>CSI Process Configuration Index	M		INTEGER (1..7, …)	Indicates one of the possible CSI Process configurations in the serving cell.
>>CSI Report per CSI Process Item		1.. <maxCSIReport>		
>>>RI	M		INTEGER (1..8, …)	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 $N_{\mathrm{RB}}^{\mathrm{DL}}$.
>>>Subband CQI List		*0 .. <maxSubband>*		
>>>>Subband CQI	M		9.2.81	
>>>>Subband Index	M		INTEGER (0..27, …)	

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 0	M		INTEGER (0..15, …)	Value defined in TS 36.213 [11].
CHOICE *Wideband CQI Codeword 1*	O			
>4-bit CQI	M		INTEGER (0..15, …)	Value defined in TS 36.213 [11].
>3-bit spatial differential CQI	M		INTEGER (0..7, …)	Value defined in TS 36.213 [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 Codeword 0*	M			
>4-bit CQI	M		INTEGER (0..15, …)	Value defined in TS 36.213 [11].
>2-bit Subband differential CQI	M		INTEGER (0..3, …)	Value defined in TS 36.213 [11].
>2-bit differential CQI	M		INTEGER (0..3, …)	Value defined in TS 36.213 [11].
CHOICE *Subband CQI Codeword 1*	O			
>4-bit CQI	M		INTEGER (0..15, …)	Value defined in TS 36.213 [11].
>3-bit spatial differential CQI	M		INTEGER (0..7, …)	Value defined in TS 36.213 [11].
>2-bit Subband differential CQI	M		INTEGER (0..3, …)	Value defined in TS 36.213 [11].
>2-bit differential CQI	M		INTEGER (0..3, …)	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 (0..262143)		–	
HFN for PDCP-SN Length 18	M		INTEGER (0..16383)		–	

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 (32..256))	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/SgNB Change procedure, as specified in TS 36.300 [15] or TS37.340 [32].

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 associcated 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].

NOTE: If X2-C signalling transport is shared among multiple interface instances, the value of the eNB UE X2AP ID, combined with the eNB UE X2AP ID Extension, is allocated so that it can be associated with an X2-C interface instance.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
eNB UE X2AP ID Extension	M		INTEGER (0..4095,…)	

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	M		ENUMERATED(uplink, 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 (1..60, …)	Unit: minutes
M7 Links to log	M		ENUMERATED(uplink, 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 reference	Semantics description
Transport Layer Address	M		BIT STRING (1..160, ...)	eNB's Transport Layer Address.
UDP Port Numbers	O		OCTET STRING (SIZE(2))	UDP Port Numbers if NAT/NAPT is deployed in the 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 (1..8, …)	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*	M			
>Resume ID not truncated				
>>Resume ID not truncated	M		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 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	M		ENUMERATED (non IP, …)	

9.2.93 V2X Services Authorized

This IE provides information on the authorization status of the UE to use the sidelink for V2X services.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Vehicle UE	O		ENUMERATED (authorized, not authorized, ...)	Indicates whether the UE is authorized as Vehicle UE	-	
Pedestrian UE	O		ENUMERATED (authorized, not authorized, ...)	Indicates whether the UE is authorized as Pedestrian UE	-	

9.2.94 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 EARFCN	M		ENUMERATED (-10,-9,-8,-7,-6,-5,-4,-3,-2,-1,-0.5,0,1,2,3,4,5,6,7,8,9,...)	

9.2.95 WT ID

This IE is used to identify a WT.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE *WT ID Type*	M			
>WT ID Type 1				
>>PLMN ID	M		PLMN Identity 9.2.4	
>>Short WT ID	M		BIT STRING (24)	
>WT ID Type 2				
>>Long WT ID	M		BIT STRING (48)	

9.2.96 WT UE XwAP ID

The WT UE XwAP ID is allocated by the WT and uniquely identifies a UE over the Xw interface.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
WT UE XwAP ID	M		OCTET STRING (SIZE(3))	

9.2.97 UE Sidelink Aggregate Maximum Bit Rate

This IE indicates the aggregate maximum bit rate for all radio bearers per UE in the sidelink for V2X services.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Sidelink Aggregate Maximum Bit Rate	M		Bit Rate 9.2.11	Value 0 shall be considered as a logical error by the receiving eNB.

9.2.98 NR Neighbour Information

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
NR Neighbour Information		*1 .. <maxnoofNR Neighbours>*			–	
>NR Neighbour Information						
>>NRPCI	M		INTEGER (0..1007)	NR Physical Cell ID	–	
>>NR CGI	M		9.2.111		–	
>>5GS-TAC	O		OCTET STRING (3)	Broadcast 5GS Tracking Area Code	–	
>>Configured TAC	O		OCTET STRING (2)	This is the TAC configured in the en-gNB, different from the 5GS TAC broadcast in the NR cell and enables application of Roaming and Access Restrictions for EN-DC as specified in TS 37.340 [32].	–	
>>Measurement Timing Configuration	M		OCTET STRING	Contains the MeasurementTimingConfiguration inter-node message for the neighbour cell, as defined in TS 38.331 [31].	–	
>>CHOICE *NR-Neighbour-Mode-Info*	M				–	
>>>*FDD*						
>>>>**FDD Info**		*1*			–	
>>>>>UL ARFCNFreqInfo	M		NR ARFCN Frequency Info 9.2.106		–	
>>>>>DL ARFCNFreqInfo	M		NR ARFCN Frequency Info 9.2.106		–	
>>>*TDD*						
>>>>**TDD Info**		*1*			–	
>>>>>ARFCNNRFreqInfo	M		NR ARFCN Frequency Info 9.2.106		–	

Range bound	Explanation
maxnoofNRNeighbours	Maximum no. of neighbour NR cells associated to a given served cell. Value is 1024.

9.2.99 Extended 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 bearer, or an aggregated maximum bit rate.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Extended Bit Rate			INTEGER (10,000,000,001..4,000,000,000,000,...)	The unit is: bit/s

9.2.100 en-gNB UE X2AP ID

This information element uniquely identifies an UE over the X2 interface within an en-gNB.

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

NOTE: If X2-C signalling transport is shared among multiple interface instances, the value of the en-gNB UE X2AP ID is allocated so that it can be associated with an X2-C interface instance.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
en-gNB UE X2AP ID	M		INTEGER (0.. 2^{32} -1)	

9.2.101 SgNB Security Key

The *SgNB Security Key* IE is used to apply security in the en-gNB as defined in TS 33.401 [18].

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

9.2.102 Target SgNB ID Information

This IE contains the target SgNB ID used by MeNB to find the target en-gNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Target SgNB ID	M		Global en-gNB ID 9.2.112			

9.2.103 SCG Configuration Query

The *SCG Configuration Query* IE is used to request the en-gNB to provide current SCG configuration.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
SCG Configuration Query	M		ENUMERATED (True, …)	

9.2.104 Delivery Status

This IE defines the Delivery Status IE of RRC Transfer message.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Highest successfully delivered NR PDCP Sequence Number	M	$0..2^{12}-1$	INTEGER ($0..2^{12}-1$)	Highest successfully delivered NR PDCP SN, as defined in 38.323 [33].	–	

9.2.105 Void

Void

9.2.106 NR Frequency Info

The NR Frequency Info defines the carrier frequency and bands 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
NRARFCN	M		INTEGER (0..maxNRARFCN)	RF Reference Frequency as defined in TS 38.104 [37] section 5.4.2.1. The frequency provided in this IE identifies the absolute frequency position of the reference resource block (Common RB 0) of the carrier. Its lowest subcarrier is also known as Point A.
Frequency Band List		*1*		
>Frequency Band Item		*1..<maxnoofNrCellBands>*		
>>NR Frequency Band	M		INTEGER (1.. 1024, ...)	Primary NR Operating Band as defined in TS38.104 [37] section 5.4.2.3. The value 1 corresponds e n1, value 2 corresponds to NR operating band n2, etc.
>>Supported SUL band List		*0..<maxnoofNrCellBands>*		
>>>Supported SUL band Item	M		INTEGER (1.. 1024, ...)	Supplementary NR Operating Band as defined in TS 38.104 [37] section 5.4.2.3 that can be used for SUL duplex mode as per TS 38.101-1 table 5.2.-1. The value 80 corresponds to NR operating band n80, value 81 corresponds to NR operating band n81, etc.
SUL Information	O		9.2.123	

Range bound	Explanation
maxNRARFCN	Maximum value of NRARFCNs. Value is 3279165.
maxnoofNrCellBands	Maximum no. of frequency bands supported for a NR cell. Value is 32.

9.2.107 NR UE Security Capabilities

This IE defines the supported algorithms for encryption and integrity protection in NR as defined in TS 33.401 [18].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NR Encryption Algorithms	M		BIT STRING (SIZE(16, …))	Each position in the bitmap represents an encryption algorithm: "all bits equal to 0" – UE supports no other NR algorithm than NEA0, "first bit" – 128-NEA1, "second bit" – 128-NEA2, "third bit" – 128-NEA3, 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].
NR Integrity Protection Algorithms	M		BIT STRING (SIZE(16, …))	Each position in the bitmap represents an integrity protection algorithm: "all bits equal to 0" – UE supports no other NR algorithm than NIA0, "first bit" – 128-NIA1, "second bit" – 128-NIA2, "third bit" – 128-NIA3, 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].

9.2.108 EN-DC Resource Configuration

This IE contains the EN-DC resource configuration for an E-RAB, indicating the presence of PDCP at the en-gNB and Lower Layers at MCG and SCG.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDCP at SgNB	M		ENUMERATED (present, not present)		–	
MCG resources	M		ENUMERATED (present, not present)		–	
SCG resources	M		ENUMERATED (present, not present)		–	

9.2.109 PDCP Change Indication

The *PDCP Change Indication* IE is used to require the MeNB to either initiate the security key update or to perform PDCP data recovery towards the UE (see TS 37.340 [15]).

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
PDCP Change Indication	M		ENUMERATED (S-KgNB update required, PDCP data recovery required, …)	The value of S-KgNB update required indicates that the security key in en-gNB needs to be updated. The value of PDCP data recovery required indicates that MeNB needs to perform PDCP data recovery.

9.2.110 Served NR Cell Information

This IE contains cell configuration information of an NR 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
NR-PCI	M		INTEGER (0..1007)	NR Physical Cell ID	–	
Cell ID	M		NR CGI 9.2.111		–	
5GS-TAC	O		OCTET STRING (3)	Broadcast 5GS Tracking Area Code	–	
Configured TAC	O		OCTET STRING (2)	This is the TAC configured in the en-gNB, different from the 5GS TAC broadcast in the NR cell and enables application of Roaming and Access Restrictions for EN-DC as specified in TS 37.340 [32].	–	
Served PLMNs		*1..<maxnoofBPLMNs>*		Broadcast PLMNs. If more than maxnoofBPLMNs are needed for NR, they are provided by the *Additional PLMNs* IE.	–	
>PLMN Identity	M		9.2.4		–	
CHOICE *NR-Mode-Info*	M				–	
>FDD						
>>FDD Info		*1*			–	
>>>UL FreqInfo	M		NR Frequency Info 9.2.106		–	
>>>DL FreqInfo	M		NR Frequency Info 9.2.106		–	
>>>UL Transmission Bandwidth	M		NR Transmission Bandwidth 9.2.114		–	
>>>DL Transmission Bandwidth	M		NR Transmission Bandwidth 9.2.114		–	
>TDD						
>>TDD Info		*1*			–	
>>>NRFreqInfo	M		NR Frequency Info 9.2.106		–	
>>>Transmission Bandwidth	M		NR Transmission Bandwidth 9.2.114		–	
Measurement Timing Configuration	M		OCTET STRING	Contains the *MeasurementTimingConfiguration* inter-node message for the served cell, as defined in TS 38.331 [31].	–	
Additional PLMNs		*0..<maxnoofAdditionalPLMNs>*		Additional PLMNs in addition to the Served PLMNs	YES	reject
>PLMN Identity	M		9.2.4		–	
Broadcast PLMN Identity Info List NR		*0..<maxnoofextBPLMNs-1>*		This IE corresponds to the *PLMN-IdentityInfoList* IE in *SIB1* as specified in TS 38.331 [31]. The PLMN Identities and associated information contained in this IE shall be provided in the same order as broadcast in SIB1.	YES	ignore

>Broadcast PLMNs		*1..<maxnoofextBPLMNs>*			–	
>>PLMN Identity	M		9.2.4		–	
>5GS-TAC	O		OCTET STRING (3)		–	
>NR Cell Identity	M		BIT STRING (SIZE(36))		–	

Range bound	Explanation
maxnoofBPLMNs	Maximum no. of broadcast PLMN Ids. Value is 6.
maxnoofAdditionalPLMNs	Maximum no. additional PLMN Ids. Value is 6.
maxnoofextBPLMNs	Maximum no. of extended broadcast PLMN Ids. Value is 12.
maxnoofextBPLMNs-1	Maximum no. of extended broadcast PLMN Ids minus 1. Value is 11.

9.2.111 NR CGI

The NR Cell Global Identifier (NR CGI) is used to globally identify an NR cell (see TS 38.401 [34]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.2.4	
NR Cell Identity	M		BIT STRING (36)	The leftmost bits of the *NR Cell Identity* IE value correspond to the value of the *en-gNB ID* IE contained in the *Global en-gNB ID* IE (defined in section 9.2.112) identifying the en-gNB that controls the cell.

9.2.112 Global en-gNB ID

This IE is used to globally identify an en-gNB (see TS 37.340 [32]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.2.4	
CHOICE *en-gNB ID*	M			
>en-gNB ID				
>>en-gNB ID	M		BIT STRING (SIZE(22..32))	Equal to the leftmost bits of the *NR Cell Identity* IE contained in the *NR CGI* IE of each cell served by the en-gNB.

9.2.113 Void

9.2.114 NR Transmission Bandwidth

The *NR Transmission Bandwidth* IE is used to indicate the UL or DL transmission bandwidth.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
NR SCS	M		ENUMERATED (scs15, scs30, scs60, scs120, …)	The values scs15, scs30, scs60 and scs120 corresponds to the sub carrier spacing in TS 38.104 [37].
NR NRB	M		ENUMERATED (nrb11, nrb18, nrb24, nrb25, nrb31, nrb32, nrb38, nrb51, nrb52, nrb65, nrb66, nrb78, nrb79, nrb93, nrb106, nrb107, nrb121, nrb132, nrb133, nrb135, nrb160, nrb162, nrb189, nrb216, nrb217, nrb245, nrb264, nrb270, nrb273, ...)	This IE is used to indicate the UL or DL transmission bandwidth expressed in units of resource blocks "N_{RB}" (TS 38.104 [37]). The values nrb11, nrb18, etc. correspond to the number of resource blocks "N_{RB}" 11, 18, etc.

9.2.115 Cell Assistance Information

The *Cell Assistance Information* IE is used by the eNB to request information about NR cells.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Cell Assistance Type	M			This IE may be refined.
>Limited List				
>>List of Requested NR Cells		*1 .. < maxCellinengNB >*		Included when the eNB requests a limited list of served NR cells.
>>>NR CGI	M		9.2.111	NR cell for which served NR cell information is requested.
>Full List				
>>Complete Information Request Indicator	M		ENUMERATED (allServedNRCells, …)	Included when the eNB requests the complete list of served NR cells.

Range bound	Explanation
maxCellinengNB	Maximum no. cells that can be served by an en-gNB. Value is 16384.

9.2.116 MeNB Resource Coordination Information

The *MeNB Resource Coordination Information* IE is LTE resource allocation at MeNB and used at the en-gNB to coordinate resource utilisation between the MeNB and the en-gNB.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
EUTRA Cell ID	M		ECGI 9.2.14	This IE indicates the PCell.	–	
UL Coordination Information	M		BIT STRING (6..4400, …)	Each position in the bitmap represents a PRB pair in a subframe; value "0" indicates "PCell resource not intended to be used for transmission by the sending node", value "1" indicates "PCell resource intended to be used for transmission by the sending node". The bit string spans from the first PRB pair of the first represented subframe to the last PRB pair of the same subframe and then moves to the following PRBs in the following subframes in the same order. Each position is applicable only in positions corresponding to UL subframes. The bit string may span across multiple contiguous subframes (maximum 40). The first position of the *UL Coordination Information* corresponds to subframe 0 in a radio frame where *SFN* = 0. The length of the bit string is an integer multiple of $N_{\mathrm{RB}}^{\mathrm{UL}}$. $N_{\mathrm{RB}}^{\mathrm{UL}}$ is defined in TS 36.211 [10]. The UL Coordination Information is continuously repeated.	–	

DL Coordination Information	O		BIT STRING (6..4400, …)	Each position in the bitmap represents a PRB pair in a subframe; value "0" indicates "PCell resource not intended to be used for transmission by the sending node", value "1" indicates "PCell resource intended to be used for transmission by the sending node". The bit string spans from the first PRB pair of the first represented subframe to the last PRB pair of the same subframe and then moves to the following PRBs in the following subframes in the same order. Each position is applicable only in positions corresponding to DL subframes. The bit string may span across multiple contiguous subframes (maximum 40). The first position of the *DL Coordination Information* corresponds to the receiving node's subframe 0 in a receiving node's radio frame where *SFN* = 0. The length of the bit string is an integer multiple of N_{RB}^{DL}. N_{RB}^{DL} is defined in TS 36.211 [10]. The DL Coordination Information is continuously repeated.	–	
NR CGI	O		9.2.111	This IE indicates the assumed PSCell.	YES	ignore
MeNB Coordination Assistance Information	O		9.2.139		YES	reject

9.2.117 SgNB Resource Coordination Information

The *SgNB Resource Coordination Information* IE indicates resources within the bandwidth of the PCell which are not available for use by the MeNB and is used at the MeNB to coordinate resource utilisation between the en-gNB and the MeNB.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
NR CGI	M		9.2.111	This IE indicates the PSCell.	–	
UL Coordination Information	M		BIT STRING (6..4400, …)	Each position in the bitmap represents a PRB pair in a subframe; value "0" indicates "PCell resource not intended to be used for transmission by the sending node", value "1" indicates "PCell resource intended to be used for transmission by the sending node". The bit string spans from the first PRB pair of the first represented subframe to the last PRB pair of the same subframe and then moves to the following PRBs in the following subframes in the same order. Each position is applicable only in positions corresponding to UL subframes. The bit string may span across multiple contiguous subframes (maximum 40). The first position of the *UL Coordination Information* corresponds to the receiving node's subframe 0 in a receiving node's radio frame where *SFN* = 0. The length of the bit string is an integer multiple of $N_{\mathrm{RB}}^{\mathrm{UL}}$. $N_{\mathrm{RB}}^{\mathrm{UL}}$ is defined in TS 36.211 [10]. The UL Coordination Information is continuously repeated.	–	

DL Coordination Information	O		BIT STRING (6..4400, …)	Each position in the bitmap represents a PRB pair in a subframe; value "0" indicates "PCell resource not intended to be used for transmission by the sending node", value "1" indicates "PCell resource intended to be used for transmission by the sending node". The bit string spans from the first PRB pair of the first represented subframe to the last PRB pair of the same subframe and then moves to the following PRBs in the following subframes in the same order. Each position is applicable only in positions corresponding to DL subframes. The bit string may span across multiple contiguous subframes (maximum 40). The first position of the *DL Coordination Information* corresponds to the receiving node's subframe 0 in a receiving node's radio frame where *SFN* = 0. The length of the bit string is an integer multiple of N_{RB}^{DL}. N_{RB}^{DL} is defined in TS 36.211 [10]. The DL Coordination Information is continuously repeated.	–	
EUTRA Cell ID	O		ECGI 9.2.14	Reference cell for *UL Coordination Information* IE and *DL Coordination Information* IE.	YES	ignore
SgNB Coordination Assistance Information	O		9.2.140		YES	reject

9.2.118 UL Configuration

This IE indicates how the UL PDCP is configured for the assisting node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UL UE Configuration	M		ENUMERATED (no-data, shared, only, ...)	Indicates how the UE uses the UL at the assisting node.

9.2.119 RLC Mode

The *RLC Mode* IE indicates the RLC Mode used for an E-RAB.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
RLC Mode	M		ENUMERATED (RLC-AM, RLC-UM-Bidirectional, RLC-UM-Unidirectional-UL, RLC-UM-Unidirectionall-DL, …)	

9.2.120 Secondary RAT Usage Report List

This IE provides information on the NR resources used with EN-DC as specified in TS 37.340 [32].

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Secondary RAT usage report Item		1 .. < maxnoofbearers >			EACH	reject
>E-RAB ID	M		9.2.23		-	
>Secondary RAT Type	M		ENUMERATED (nR, …)		-	
>E-RAB Usage Report List		1			-	
>>E-RAB Usage Report Item		1.. <maxnooftimeperiods >			EACH	ignore
>>>Start timestamp	M		OCTET STRING (SIZE(4))	UTC time encoded in the same format as the first four octets of the 64-bit timestamp format as defined in section 6 of IETF RFC 5905 [35]. It indicates the start time of the collecting period of the included *Usage Count UL* IE and *Usage Count DL* IE.	-	
>>>End timestamp	M		OCTET STRING (SIZE(4))	UTC time encoded in the same format as the first four octets of the 64-bit timestamp format as defined in section 6 of IETF RFC 5905 [35]. It indicates the end time of the collecting period of the included *Usage Count UL* IE and *Usage Count DL* IE.	-	
>>>Usage count UL	M		INTEGER (0..2^{64}-1)	The unit is: octets.	-	
>>>Usage count DL	M		INTEGER (0..2^{64}-1)	The unit is: octets.	-	

Range bound	Explanation
maxnoofbearers	Maximum no. of E-RABs. Value is 256.
maxnooftimeperiods	Maximum no. of time reporting periods. Value is 2.

9.2.121 UE Application layer measurement configuration

The IE defines configuration information for the QoE Measurement Collection (QMC) function.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigne Criticali
Container for application layer measurement configuration	M		Octet string (1..1000)	Indicates application layer measurement configuration, see Annex L in [36].	-	
CHOICE *Area Scope of QMC*	M				-	
>*Cell based*						
>>**Cell ID List for QMC**		*1 .. <maxnoofCellIDforQMC>*				
>>>E-CGI	M		9.2.1.38		-	
>*TA based*						
>>**TA List for QMC**		*1 .. <maxnoofTAforQMC>*				
>>>TAC	M		9.2.3.7	The TAI is derived using the current serving PLMN.	-	
>*TAI based*					-	
>>**TAI List for QMC**		*1 .. <maxnoofTAforQMC>*			-	
>>>TAI	M		9.2.3.16		-	
>*PLMN area based*						
>>**PLMN List for QMC**		*1 .. <maxnoofPLMNforQMC>*				
>>>PLMN Identity	M		9.2.3.8		-	
Service Type	M		ENUMERATED (QMC for streaming service, QMC for MTSI service, ...)	This IE indicates the service type of UE application layer measurements.	-	

Range bound	Explanation
maxnoofCellIDforQMC	Maximum no. of Cell ID subject for QMC scope. Value is 32.
maxnoofTAforQMC	Maximum no. of TA subject for QMC scope. Value is 8.
maxnoofPLMNforQMC	Maximum no. of PLMNs in the PLMN list for QMC scope. Value is 16.

9.2.122 DRB ID

This information element uniquely identifies a DRB over the X2 interface within an en-gNB.

The usage of this IE is defined in TS 36.331 [9].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB ID	M		INTEGER (1.. 32)	

9.2.123 SUL Information

This IE provides information about the SUL carrier.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
SUL ARFCN	M		INTEGER (0..maxNRARFCN)	RF Reference Frequency as defined in TS 38.104 [37] section 5.4.2.1. The frequency provided in this IE identifies the absolute frequency position of the reference resource block (Common RB 0) of the SUL carrier. Its lowest subcarrier is also known as Point A.
SUL Transmission Bandwidth	M		NR Transmission Bandwidth 9.2.114	

Range bound	Explanation
maxNRARFCN	Maximum value of NRARFCNs. Value is 3279165.

9.2.124 Packet Loss Rate

This IE indicates the packet loss rate.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Packet Loss Rate	M		INTEGER(0..1000)	Ratio of lost packets per number of packets sent, expressed in tenth of percent.	-	-

9.2.125 Protected E-UTRA Resource Indication

This IE indicates the resources allocated for E-UTRA DL and UL reference and control signals (hereby referred to as protected resources). This information is used in the process of E-UTRA – NR Cell Resource Coordination.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Activation SFN	M		INTEGER (0..1023)	Indicates from which SFN of the receiving node the resource allocation is valid.		
Protected Resource List		*1*		The protected resource pattern is continuously repeated, and it is valid until stated otherwise or until replaced by a new pattern. The pattern does not apply in reserved subframes.	YES	ignore
>Protected Resource List Item		*1..<maxnoofProtectedResourcePatterns>*		Each item describes one transmission pattern. A pattern may comprise several control signals.	-	
>>Resource Type	M		ENUMERATED (downlinknonCRS,CRS, uplink…)	Indicates whether the protected resource is E-UTRA DL non-CRS, E-UTRA CRS or E-UTRA UL.	-	

>>Intra-PRB Protected Resource Footprint	M		BIT STRING (84, ...)	The bitmap of REs occupied by the protected signal within one PRB. Each position in the bitmap represents an RE in one PRB; value “0” indicates "resource not protected", value “1” indicates "resource protected ". The first bit of the string corresponds to the RE with the smallest time and frequency index in the PRB, where the indexing first goes into the frequency domain. The length of the bit string equals the product of N_{RB}^{SC} and the length of PRB in time dimension, measured in REs. N_{RB}^{SC} is defined in TS 36.211 [10]. The intra-PRB pattern consisting of all "1"s is equivalent to PRB-level granularity.		

>>Protected Footprint Frequency Pattern	M		BIT STRING(6..110, ...)	The bit string indicates in which PRBs inside carrier bandwidth the Intra-PRB Protected Resource Footprint applies. How often in time dimension this frequency pattern applies, depends on time periodicity of Intra-PRB Protected Resource Footprint. The first bit of the bit string corresponds to the PRB occupying the lowest subcarrier frequencies of the carrier bandwidth, where the indexing first goes into the frequency domain. Each position in the string represents a PRB; value "0" indicates " Intra-PRB Protected Resource Footprint does not appear in PRB", value "1" indicates "Intra-PRB Protected Resource Footprint appears in PRB". The length of the bit string equals the number of PRBs in the carrier bandwidth.	-	
>>Protected Footprint Time Pattern	M			The description of time periodicity of the Intra-PRB Protected Resource Footprint.		

>>>Protected Footprint Time-periodicity	M		INTEGER(1..320, ...)	Periodicity with which the periodic Intra-PRB Protected Resource Footprint repeats in time-dimension (1= every PRB (i.e. slot), 2=every other PRB (i.e. slot) etc.	-	
>>>Protected Footprint Start Time	M		INTEGER(1..20, ...)	The time-position of the PRB inside the frame in which the periodic Intra-PRB Protected Resource Footprint appears for the first time. The value "1" corresponds to the receiving node's slot 0 in subframe 0 in the receiving node's radio frame where SFN = Activation SFN.	-	
MBSFN Control Region Length	O		INTEGER(0..3)	Length of control region in MBSFN subframes. Expressed in REs, in the time dimension.		
PDCCH Region Length	M		INTEGER(1..3)	Length of PDCCH region in regular subframes. Expressed in REs, in the time dimension.		

Range bound	Explanation
maxnoofProtectedResourcePatterns	Maximum no. protected resource patterns. Value is 16.

9.2.126 Data Traffic Resource Indication

This IE indicates the intended data traffic resource allocation for E-UTRA - NR Cell Resource Coordination.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Activation SFN	M		INTEGER (0..1023)	Indicates from which SFN of the receiving node the agreement is valid.		
CHOICE *Shared Resource Type*	M				-	
>UL Only Sharing						
>>UL Resource Bitmap	M		Data Traffic Resources 9.2.127		-	
>UL and DL Sharing						
>>CHOICE *UL Resources*	M					
>>>Unchanged			NULL			
>>>Changed						
>>>>UL Resource Bitmap	M		Data Traffic Resources 9.2.127			
>>CHOICE *DL* Resources	M					
>>>Unchanged			NULL			
>>>Changed						
>>>>DL Resource Bitmap	M		Data Traffic Resources 9.2.127			
Reserved Subframe Pattern	O		9.2.128	Indicates subframes in which the resource allocation does not hold.		

9.2.127 Data Traffic Resources

The *Data Traffic Resources* IE indicates the intended data traffic resource allocation for E-UTRA - NR Cell Resource Coordination.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Data Traffic Resources	M		BIT STRING (6..17600)	The indication of resources allocated to E-UTRA PDSCH/PUSCH. Each position in the bit string represents a PRB pair in a subframe; value "0" indicates "resource not intended to be used for transmission", value "1" indicates "resource intended to be used for transmission ". The first bit of the bit string corresponds to the PRB pair occupying the lowest subcarrier frequencies of the carrier, where the indexing first goes into the frequency domain. The bit string may span across multiple contiguous subframes. The first position of the Data Traffic Resources corresponds to the receiving node's subframe 0 in a receiving node's radio frame where SFN = Activation SFN. **The length of the bit string is an integer multiple of N_{RB}^{DL} or N_{RB}^{UL}, defined in TS 36.211 [10].**

9.2.128 Reserved Subframe Pattern

The *Reserved Subframe Pattern* IE indicates the pattern of subframes in which the *Protected E-UTRA Resource Indication* and *Data Traffic Resource Indication* do not hold.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Subframe Type	M		ENUMERATED(MBSFN,non-MBSFN, …)	Indicates what type of non-regular subframes the *Reserved Subframe Pattern* refers to (e.g. MBSFN).
Reserved Subframe Pattern	M		BIT STRING (10..160)	Each position in the bitmap represents a subframe. Value ‘0’ indicates "regular subframe". Value '1' indicates "reserved subframe". For MBSFN subframes, the exception refers only to the non-control region of the subframe. The bit string may span across multiple contiguous subframes. The first position of the Subframe Configuration IE corresponds to the receiving node's subframe 0 in a receiving node's radio frame where SFN = Activation SFN. The IE is ignored if received by the eNB.
MBSFN Control Region Length	O		INTEGER(0..3)	Length of control region in MBSFN subframes. Expressed in REs, in the time dimension.

9.2.129 Aerial UE subscription information

This information element is used by the eNB to know if the UE is allowed to use aerial UE function, refer to TS 23.401[12].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Aerial UE subscription information	M		ENUMERATED (allowed, not allowed, ...)	

9.2.130 User plane traffic activity report

This IE is used to indicate user plane traffic activity.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
User plane traffic activity report	M		ENUMERATED (inactive, re-activated, …)	"re-activated" shall be only set after "inactive" has been reported for the concerned reporting object

9.2.131 RLC Status

This IE indicates about the RLC configuration change included in the container towards the UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Reestablishment Indication	O		ENUMERATED (reestablished, ...)	Indicates that following the change of the radio status, the RLC has been re-established.

9.2.132 RRC config indication

This IE is used to indicate the type of RRC configuration used at the en-gNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RRC config indication	M		ENUMERATED (full config, delta config, ...)	

9.2.133 PDCP SN Length

The *PDCP SN Length* IE is used to indicate the PDCP SN length configuration of the bearer.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
PDCP SN Length	M		ENUMERATED (12bits, 18bits, …)	This IE indicates the PDCP sequence number size.

9.2.134 Bluetooth Measurement Configuration

This IE defines the parameters for Bluetooth measurement collection.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Bluetooth Measurement Configuration	M		ENUMERATED (Setup, …)	
Bluetooth Measurement Configuration Name List		*0..1*		
>Bluetooth Measurement Configuration Name Item IEs		*1 .. <maxnoofBluetoothName>*		
>>Bluetooth Measurement Configuration Name	M		OCTET STRING (SIZE (1..248))	
BT RSSI	O		ENUMERATED (True, …)	In case of Immediate MDT, it corresponds to M8 measurement as defined in 37.320 [31].

Range bound	Explanation
maxnoofBluetoothname	Maximum no. of Bluetooth local name used for Bluetooth measurement collection, the maximum value is 4.

9.2.135 WLAN Measurement Configuration

This IE defines the parameters for WLAN measurement collection.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
WLAN Measurement Configuration	M		ENUMERATED (Setup, …)	
WLAN Measurement Configuration Name List		*0..1*		
>WLAN Measurement Configuration Name Item IEs		*1 .. <maxnoofWLANName>*		
>>WLAN Measurement Configuration Name	M		OCTET STRING (SIZE (1..32))	
WLAN RSSI	O		ENUMERATED (True, …)	In case of Immediate MDT, it corresponds to M8 as defined in 37.320 [31].
WLAN RTT	O		ENUMERATED (True, …)	For Immediate MDT, it corresponds to M9 as defined in 37.320 [31].

Range bound	Explanation
maxnoofWLANname	Maximum no. of WLAN SSID used for WLAN measurement collection, the maximum value is 4.

9.2.136 Subscription Based UE Differentiation Information

This IE is generated by the MME based on the UE subscription information, it provides the Subscription Based UE differentiation Information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Periodic Communication Indicator	O		ENUMERATED(periodically, on demand, …)	This IE indicates whether the UE communicates periodically or not, e.g. only on demand.
Periodic Time	O		INTEGER (1..3600, …)	This IE indicates the interval time of periodic communication, the unit is: second
Scheduled Communication Time		*0..1*		This IE indicates the time zone and day of the week when the UE is available for communication.
>>Day of Week	O		BIT STRING (SIZE(7))	If Day-Of-Week is not provided this shall be interpreted as every day of the week. Each position in the bitmap represents a day of the week: first bit = Mon, second bit =Tue, third bit =Wed, and so on. Value '1' indicates 'scheduled. Value '0' indicates 'not scheduled'.
>>Time of Day Start	O		INTEGER (0..86399, …)	This IE indicates the time to start of the day, each value represent the corresponding second since 00:00 of the day. If Time-Of-Day-Start is not provided, starting time shall be set to start of the day(s) indicated by Day-Of-Week.
>>Time of Day End	O		INTEGER (0..86399, …)	This IE indicates the time to start of the day, each value represent the corresponding second since 00:00 of the day. The value of this IE should be bigger than the value of *Time of Day Start* IE. If Time-Of-Day-End is not provided, ending time is end of the day(s) indicated by Day-Of-Week.
Stationary Indication	O		ENUMERATED(stationary, mobile, …)	
Traffic Profile	O		ENUMERATED(single packet, dual packets, multiple packets, …)	"single packet" indicates single packet transmission (UL or DL), "dual packets" indicates dual packet transmission (UL with subsequent DL, or DL with subsequent UL), "multiple packets" indicates multiple packets transmission.
Battery Indication	O		ENUMERATED(battery powered, battery powered not rechargeable or replaceable, not battery powered, …)	"battery powered" indicates that the UE is battery powered and the battery is rechargeable/replaceable, "battery powered not rechargeable or replaceable" indicates that the UE is battery powered but the battery is not rechargeable/replaceable, "not battery powered" indicates that the UE is not battery powered.

9.2.137 Duplication activation

The *Duplication Activation* IE indicates whether UL PDCP Duplication is activated or not.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Duplication Activation	M		ENUMERATED (Active, Inactive, …)	

9.2.138 LCID

This IE uniquely identifies a LCID for the associated DRB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
LCID	M		INTEGER (1..32, ...)	Corresponds to the *LogicalChannelIdentity* defined in TS 38.331 [8].

9.2.139 MeNB Coordination Assistance Information

The *MeNB Coordination Assistance Information* IE is provided by the MeNB and used by the SgNB to determine further coordination of resource utilisation between the en-gNB and the MeNB.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
MeNB Coordination Assistance Information	M		ENUMERATED(Coordination Not Required, …)	The absence of this IE indicates that the resource coordination is required.

9.2.140 SgNB Coordination Assistance Information

The *SgNB Coordination Assistance Information* IE is provided by the SgNB and used by the MeNB to determine further coordination of resource utilisation between the en-gNB and the MeNB.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
SgNB Coordination Assistance Information	M		ENUMERATED(Coordination Not Required, …)	The absence of this IE indicates that the resource coordination is required.

9.2.141 Desired Activity Notification Level

This IE contains information on which level activity notification shall be performed.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Desired Activity Notification Level	O		ENUMERATED (None, E-RAB, UE-level, …)	

9.2.142 Location Information at SgNB

The *Location Information at SgNB* IE enables the SgNB to provide the MeNB with information that supports localisation of the UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PSCell ID	M		NR CGI 9.2.111	PSCell of the UE	–	

9.2.143 Interface Instance Indication

The Interface Instance Indication identifies the interface instance the X2AP message is destined for.

NOTE: The Interface Instance Indication is allocated so that it can be associated with an X2-C interface instance. The Interface Instance Indication may identify more than one interface instance.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Interface Instance Indication	M		INTEGER (0..255, ...)	

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

```
-- ASN1START
```

```
-- **************************************************************
--
-- 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,
    SgNBAdditionRequest,
    SgNBAdditionRequestAcknowledge,
    SgNBAdditionRequestReject,
    SgNBReconfigurationComplete,
    SgNBModificationRequest,
    SgNBModificationRequestAcknowledge,
    SgNBModificationRequestReject,
    SgNBModificationRequired,
    SgNBModificationConfirm,
    SgNBModificationRefuse,
    SgNBReleaseRequest,
    SgNBReleaseRequestAcknowledge,
    SgNBReleaseRequestReject,
    SgNBReleaseRequired,
    SgNBReleaseConfirm,
    SgNBCounterCheckRequest,
    SgNBChangeRequired,
    SgNBChangeConfirm,
    SgNBChangeRefuse,
    RRCTransfer,
    ENDCX2SetupRequest,
    ENDCX2SetupResponse,
    ENDCX2SetupFailure,
    ENDCConfigurationUpdate,
    ENDCConfigurationUpdateAcknowledge,
    ENDCConfigurationUpdateFailure,
    SecondaryRATDataUsageReport,
    ENDCCellActivationRequest,
    ENDCCellActivationResponse,
    ENDCCellActivationFailure,
    ENDCPartialResetRequired,
```

```
    ENDCPartialResetConfirm,
    EUTRANRCellResourceCoordinationRequest,
    EUTRANRCellResourceCoordinationResponse,
    SgNBActivityNotification,
    ENDCX2RemovalRequest,
    ENDCX2RemovalResponse,
    ENDCX2RemovalFailure,
    DataForwardingAddressIndication,
    GNBStatusIndication,
    ENDCConfigurationTransfer,
    DeactivateTrace,
    TraceStart


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,
    id-sgNBAdditionPreparation,
    id-sgNBReconfigurationCompletion,
    id-meNBinitiatedSgNBModificationPreparation,
    id-sgNBinitiatedSgNBModification,
    id-meNBinitiatedSgNBRelease,
    id-sgNBinitiatedSgNBRelease,
    id-sgNBChange,
    id-sgNBCounterCheck,
    id-rRCTransfer,
```

```
    id-endcX2Setup,
    id-endcConfigurationUpdate,
    id-secondaryRATDataUsageReport,
    id-endcCellActivation,
    id-endcPartialReset,
    id-eUTRANRCellResourceCoordination,
    id-SgNBActivityNotification,
    id-endcX2Removal,
    id-dataForwardingAddressIndication,
    id-gNBStatusIndication,
    id-endcConfigurationTransfer,
    id-deactivateTrace,
    id-traceStart



FROM X2AP-Constants;

-- ************************************************************
--
-- Interface Elementary Procedure Class
--
-- ************************************************************

X2AP-ELEMENTARY-PROCEDURE ::= CLASS {
    &InitiatingMessage              ,
    &SuccessfulOutcome              OPTIONAL,
    &UnsuccessfulOutcome                OPTIONAL,
    &procedureCode          ProcedureCode   UNIQUE,
    &criticality            Criticality     DEFAULT ignore
}
WITH SYNTAX {
    INITIATING MESSAGE      &InitiatingMessage
    [SUCCESSFUL OUTCOME     &SuccessfulOutcome]
    [UNSUCCESSFUL OUTCOME       &UnsuccessfulOutcome]
    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}),
    value           X2AP-ELEMENTARY-PROCEDURE.&InitiatingMessage    ({X2AP-ELEMENTARY-PROCEDURES}{@procedureCode})
}

SuccessfulOutcome ::= SEQUENCE {
    procedureCode   X2AP-ELEMENTARY-PROCEDURE.&procedureCode        ({X2AP-ELEMENTARY-PROCEDURES}),
    criticality     X2AP-ELEMENTARY-PROCEDURE.&criticality          ({X2AP-ELEMENTARY-PROCEDURES}{@procedureCode}),
    value           X2AP-ELEMENTARY-PROCEDURE.&SuccessfulOutcome    ({X2AP-ELEMENTARY-PROCEDURES}{@procedureCode})
}

UnsuccessfulOutcome ::= SEQUENCE {
    procedureCode   X2AP-ELEMENTARY-PROCEDURE.&procedureCode        ({X2AP-ELEMENTARY-PROCEDURES}),
    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                                       |
    sgNBAdditionPreparation                                 |
    meNBinitiatedSgNBModificationPreparation                    |
    sgNBinitiatedSgNBModification                           |
    meNBinitiatedSgNBRelease                                    |
    sgNBinitiatedSgNBRelease                                    |
    sgNBChange                                              |
    endcX2Setup                                             |
    endcConfigurationUpdate                                 |
    endcCellActivation                                      |
    endcPartialReset                                            |
    eUTRANRCellResourceCoordination                         |
    endcX2Removal                                           ,
```

```
    ...
}

X2AP-ELEMENTARY-PROCEDURES-CLASS-2 X2AP-ELEMENTARY-PROCEDURE ::= {
    snStatusTransfer                        |
    uEContextRelease                        |
    handoverCancel                          |
    errorIndication                         |
    resourceStatusReporting                 |
    loadIndication                          |
    privateMessage                          |
    rLFIndication                           |
    handoverReport                          |
    x2Release                               |
    x2APMessageTransfer                     |
    seNBReconfigurationCompletion           |
    meNBinitiatedSeNBRelease                |
    seNBCounterCheck                        |
    sgNBReconfigurationCompletion           |
    sgNBCounterCheck                            |
    rRCTransfer                             |
    secondaryRATDataUsageReport             |
    sgNBActivityNotification                    |
    dataForwardingAddressIndication         |
    gNBStatusIndication                     |
    endcConfigurationTransfer               |
    deactivateTrace                         |
    traceStart                              ,
    ...

}

-- ************************************************************
--
-- Interface Elementary Procedures
--
-- ************************************************************

handoverPreparation X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      HandoverRequest
    SUCCESSFUL OUTCOME      HandoverRequestAcknowledge
    UNSUCCESSFUL OUTCOME    HandoverPreparationFailure
    PROCEDURE CODE          id-handoverPreparation
    CRITICALITY             reject
}

snStatusTransfer X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SNStatusTransfer
    PROCEDURE CODE          id-snStatusTransfer
    CRITICALITY             ignore
}

uEContextRelease X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UEContextRelease
```

```
    PROCEDURE CODE          id-uEContextRelease
    CRITICALITY             ignore
}


handoverCancel X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      HandoverCancel
    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
    CRITICALITY             ignore
}

reset   X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ResetRequest
    SUCCESSFUL OUTCOME      ResetResponse
    PROCEDURE CODE          id-reset
    CRITICALITY             reject
}

x2Setup X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      X2SetupRequest
    SUCCESSFUL OUTCOME      X2SetupResponse
    UNSUCCESSFUL OUTCOME    X2SetupFailure
    PROCEDURE CODE          id-x2Setup
    CRITICALITY             reject
}


loadIndication X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      LoadInformation
    PROCEDURE CODE          id-loadIndication
    CRITICALITY             ignore
}

eNBConfigurationUpdate      X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ENBConfigurationUpdate
    SUCCESSFUL OUTCOME      ENBConfigurationUpdateAcknowledge
    UNSUCCESSFUL OUTCOME    ENBConfigurationUpdateFailure
    PROCEDURE CODE          id-eNBConfigurationUpdate
    CRITICALITY             reject
}

resourceStatusReportingInitiation   X2AP-ELEMENTARY-PROCEDURE ::= {
```

```
    INITIATING MESSAGE              ResourceStatusRequest
    SUCCESSFUL OUTCOME              ResourceStatusResponse
    UNSUCCESSFUL OUTCOME            ResourceStatusFailure
    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
}

privateMessage          X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PrivateMessage
    PROCEDURE CODE          id-privateMessage
    CRITICALITY             ignore
}

mobilitySettingsChange  X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      MobilityChangeRequest
    SUCCESSFUL OUTCOME      MobilityChangeAcknowledge
    UNSUCCESSFUL OUTCOME    MobilityChangeFailure
    PROCEDURE CODE          id-mobilitySettingsChange
    CRITICALITY             reject
}

cellActivation  X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      CellActivationRequest
    SUCCESSFUL OUTCOME      CellActivationResponse
    UNSUCCESSFUL OUTCOME    CellActivationFailure
    PROCEDURE CODE          id-cellActivation
    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
    SUCCESSFUL OUTCOME      SeNBAdditionRequestAcknowledge
    UNSUCCESSFUL OUTCOME    SeNBAdditionRequestReject
    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
    PROCEDURE CODE          id-meNBinitiatedSeNBModificationPreparation
    CRITICALITY             reject
}

seNBinitiatedSeNBModification   X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SeNBModificationRequired
    SUCCESSFUL OUTCOME      SeNBModificationConfirm
    UNSUCCESSFUL OUTCOME    SeNBModificationRefuse
    PROCEDURE CODE          id-seNBinitiatedSeNBModification
    CRITICALITY             reject
}

meNBinitiatedSeNBRelease    X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SeNBReleaseRequest
    PROCEDURE CODE          id-meNBinitiatedSeNBRelease
    CRITICALITY             ignore
}

seNBinitiatedSeNBRelease    X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SeNBReleaseRequired
    SUCCESSFUL OUTCOME      SeNBReleaseConfirm
    PROCEDURE CODE          id-seNBinitiatedSeNBRelease
    CRITICALITY             reject
}

seNBCounterCheck    X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SeNBCounterCheckRequest
    PROCEDURE CODE          id-seNBCounterCheck
    CRITICALITY             reject
}

x2Removal   X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      X2RemovalRequest
    SUCCESSFUL OUTCOME      X2RemovalResponse
    UNSUCCESSFUL OUTCOME    X2RemovalFailure
    PROCEDURE CODE          id-x2Removal
    CRITICALITY             reject
```

```
}

retrieveUEContext   X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      RetrieveUEContextRequest
    SUCCESSFUL OUTCOME      RetrieveUEContextResponse
    UNSUCCESSFUL OUTCOME    RetrieveUEContextFailure
    PROCEDURE CODE          id-retrieveUEContext
    CRITICALITY             reject
}

sgNBAdditionPreparation     X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SgNBAdditionRequest
    SUCCESSFUL OUTCOME      SgNBAdditionRequestAcknowledge
    UNSUCCESSFUL OUTCOME    SgNBAdditionRequestReject
    PROCEDURE CODE          id-sgNBAdditionPreparation
    CRITICALITY             reject
}

sgNBReconfigurationCompletion   X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SgNBReconfigurationComplete
    PROCEDURE CODE          id-sgNBReconfigurationCompletion
    CRITICALITY             ignore
}

meNBinitiatedSgNBModificationPreparation    X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SgNBModificationRequest
    SUCCESSFUL OUTCOME      SgNBModificationRequestAcknowledge
    UNSUCCESSFUL OUTCOME    SgNBModificationRequestReject
    PROCEDURE CODE          id-meNBinitiatedSgNBModificationPreparation
    CRITICALITY             reject
}

sgNBinitiatedSgNBModification       X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SgNBModificationRequired
    SUCCESSFUL OUTCOME      SgNBModificationConfirm
    UNSUCCESSFUL OUTCOME    SgNBModificationRefuse
    PROCEDURE CODE          id-sgNBinitiatedSgNBModification
    CRITICALITY             reject
}

meNBinitiatedSgNBRelease    X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SgNBReleaseRequest
    SUCCESSFUL OUTCOME      SgNBReleaseRequestAcknowledge
    UNSUCCESSFUL OUTCOME    SgNBReleaseRequestReject
    PROCEDURE CODE          id-meNBinitiatedSgNBRelease
    CRITICALITY             ignore
}

sgNBinitiatedSgNBRelease    X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SgNBReleaseRequired
    SUCCESSFUL OUTCOME      SgNBReleaseConfirm
    PROCEDURE CODE          id-sgNBinitiatedSgNBRelease
    CRITICALITY             reject
}
```

```
sgNBCounterCheck    X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SgNBCounterCheckRequest
    PROCEDURE CODE          id-sgNBCounterCheck
    CRITICALITY             reject
}

sgNBChange  X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SgNBChangeRequired
    SUCCESSFUL OUTCOME      SgNBChangeConfirm
    UNSUCCESSFUL OUTCOME    SgNBChangeRefuse
    PROCEDURE CODE          id-sgNBChange
    CRITICALITY             reject
}

rRCTransfer X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      RRCTransfer
    PROCEDURE CODE          id-rRCTransfer
    CRITICALITY             reject
}

endcX2Setup X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ENDCX2SetupRequest
    SUCCESSFUL OUTCOME      ENDCX2SetupResponse
    UNSUCCESSFUL OUTCOME    ENDCX2SetupFailure
    PROCEDURE CODE          id-endcX2Setup
    CRITICALITY             reject
}


endcConfigurationUpdate     X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ENDCConfigurationUpdate
    SUCCESSFUL OUTCOME      ENDCConfigurationUpdateAcknowledge
    UNSUCCESSFUL OUTCOME    ENDCConfigurationUpdateFailure
    PROCEDURE CODE          id-endcConfigurationUpdate
    CRITICALITY             reject
}

secondaryRATDataUsageReport X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SecondaryRATDataUsageReport
    PROCEDURE CODE          id-secondaryRATDataUsageReport
    CRITICALITY             reject
}

endcCellActivation  X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ENDCCellActivationRequest
    SUCCESSFUL OUTCOME      ENDCCellActivationResponse
    UNSUCCESSFUL OUTCOME    ENDCCellActivationFailure
    PROCEDURE CODE          id-endcCellActivation
    CRITICALITY             reject
}

endcPartialReset    X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ENDCPartialResetRequired
```

```
    SUCCESSFUL OUTCOME      ENDCPartialResetConfirm
    PROCEDURE CODE          id-endcPartialReset
    CRITICALITY             reject
}

eUTRANRCellResourceCoordination X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      EUTRANRCellResourceCoordinationRequest
    SUCCESSFUL OUTCOME      EUTRANRCellResourceCoordinationResponse
    PROCEDURE CODE          id-eUTRANRCellResourceCoordination
    CRITICALITY             reject
}

sgNBActivityNotification    X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SgNBActivityNotification
    PROCEDURE CODE          id-SgNBActivityNotification
    CRITICALITY             reject
}


endcX2Removal   X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ENDCX2RemovalRequest
    SUCCESSFUL OUTCOME      ENDCX2RemovalResponse
    UNSUCCESSFUL OUTCOME    ENDCX2RemovalFailure
    PROCEDURE CODE          id-endcX2Removal
    CRITICALITY             reject
}

dataForwardingAddressIndication X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      DataForwardingAddressIndication
    PROCEDURE CODE          id-dataForwardingAddressIndication
    CRITICALITY             ignore
}

gNBStatusIndication     X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      GNBStatusIndication
    PROCEDURE CODE          id-gNBStatusIndication
    CRITICALITY             ignore
}

endcConfigurationTransfer   X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ENDCConfigurationTransfer
    PROCEDURE CODE          id-endcConfigurationTransfer
    CRITICALITY             ignore
}

deactivateTrace X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      DeactivateTrace
    PROCEDURE CODE          id-deactivateTrace
    CRITICALITY             ignore
}

traceStart X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      TraceStart
    PROCEDURE CODE          id-traceStart
```

```
    CRITICALITY             ignore
}

END
-- ASN1STOP
```

9.3.4 PDU Definitions

```
-- ASN1START
-- **************************************************************
--
-- PDU definitions for X2AP.
--
-- **************************************************************

X2AP-PDU-Contents {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) x2ap (2) version1 (1) x2ap-PDU-Contents (1) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- **************************************************************
--
-- IE parameter types from other modules.
--
-- **************************************************************

IMPORTS
    ABSInformation,
    ABS-Status,
    AS-SecurityInformation,
    BearerType,
    Cause,
    CompositeAvailableCapacityGroup,
    Correlation-ID,
    COUNTvalue,
    CellReportingIndicator,
    AerialUEsubscriptionInformation,
    CriticalityDiagnostics,
    CRNTI,
    CSGMembershipStatus,
    CSG-Id,
    DeactivationIndication,
    DL-Forwarding,
    DynamicDLTransmissionInformation,
    ECGI,
    E-RAB-ID,
    E-RAB-Level-QoS-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-Request,
    RelativeNarrowbandTxPower,
    RadioResourceStatus,
    RLC-Status,
    RRCConnReestabIndicator,
    RRCConnSetupIndicator,
    UE-RLF-Report-Container,
    UEAppLayerMeasConfig,
    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,
    UEsToBeResetList,
    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,
    V2XServicesAuthorized,
    X2BenefitValue,
    ResumeID,
    EUTRANCellIdentifier,
    MakeBeforeBreakIndicator,
    WTID,
    WT-UE-XwAP-ID,
    UESidelinkAggregateMaximumBitRate,
    SgNBSecurityKey,
    MeNBtoSgNBContainer,
    SgNBtoMeNBContainer,
    SplitSRBs,
    RRCContainer,
    SRBType,
    GlobalGNB-ID,
    GNB-ID,
    SCGConfigurationQuery,
    SplitSRB,
    NRUeReport,
    EN-DC-ResourceConfiguration,
    TAC,
    NRFreqInfo,
    NRCGI,
    NRPCI,
    NRUESecurityCapabilities,
    PDCPChangeIndication,
    ULConfiguration,
    SgNB-UE-X2AP-ID,
    SecondaryRATUsageReportList,
    ActivationID,
    MeNBResourceCoordinationInformation,
    SgNBResourceCoordinationInformation,
    NR-TxBW,
```

```
    BroadcastPLMNs-Item,
    AdditionalPLMNs-Item,
    RLCMode,
    GBR-QosInformation,
    DRB-ID,
    FiveGS-TAC,
    SULInformation,
    Packet-LossRate,
    ResourceType,
    DataTrafficResourceIndication,
    SpectrumSharingGroupID,
    RRC-Config-Ind,
    SGNB-Addition-Trigger-Ind,
    UserPlaneTrafficActivityReport,
    ERABActivityNotifyItemList,
    PDCPSnLength,
    Subscription-Based-UE-DifferentiationInfo,
    LCID,
    DuplicationActivation,
    GNBOverloadInformation,
    NewDRBIDrequest,
    DesiredActNotificationLevel,
    LocationInformationSgNB,
    LocationInformationSgNBReporting,
    EndcSONConfigurationTransfer,
    NRNeighbour-Information,
    InterfaceInstanceIndication,
    BPLMN-ID-Info-NR


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-AerialUEsubscriptionInformation,
    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-RLC-Status,
    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-HistoryInformation,
    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-ContextInformationSeNBModReq,
    id-E-RABs-ToBeAdded-ModReqItem,
    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-ModReqd,
    id-E-RABs-ToBeReleased-ModReqdItem,
    id-E-RABs-ToBeReleased-List-RelReq,
    id-E-RABs-ToBeReleased-RelReqItem,
```

```
    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-ContextReferenceAtWT,
    id-UE-ContextKeptIndicator,
    id-UEs-ToBeReset,
    id-UEs-Admitted-ToBeReset,
    id-WT-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-V2XServicesAuthorized,
    id-resumeID,
    id-UE-ContextInformationRetrieve,
    id-E-RABs-ToBeSetupRetrieve-Item,
    id-NewEUTRANCellIdentifier,
    id-MakeBeforeBreakIndicator,
    id-UESidelinkAggregateMaximumBitRate,
    id-uL-GTPtunnelEndpoint,
    id-SgNBSecurityKey,
    id-SgNBUEAggregateMaximumBitRate,
    id-E-RABs-ToBeAdded-SgNBAddReqList,
    id-MeNBtoSgNBContainer,
    id-SgNB-UE-X2AP-ID,
    id-RequestedSplitSRBs,
    id-E-RABs-ToBeAdded-SgNBAddReq-Item,
    id-E-RABs-Admitted-ToBeAdded-SgNBAddReqAckList,
    id-SgNBtoMeNBContainer,
    id-AdmittedSplitSRBs,
    id-E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item,
    id-ResponseInformationSgNBReconfComp,
```

```
    id-UE-ContextInformation-SgNBModReq,
    id-E-RABs-ToBeAdded-SgNBModReq-Item,
    id-E-RABs-ToBeModified-SgNBModReq-Item,
    id-E-RABs-ToBeReleased-SgNBModReq-Item,
    id-E-RABs-Admitted-ToBeAdded-SgNBModAckList,
    id-E-RABs-Admitted-ToBeModified-SgNBModAckList,
    id-E-RABs-Admitted-ToBeReleased-SgNBModAckList,
    id-E-RABs-Admitted-ToBeAdded-SgNBModAck-Item,
    id-E-RABs-Admitted-ToBeModified-SgNBModAck-Item,
    id-E-RABs-Admitted-ToBeReleased-SgNBModAck-Item,
    id-E-RABs-Admitted-ToBeReleased-SgNBRelReqAckList,
    id-E-RABs-Admitted-ToBeReleased-SgNBRelReqAck-Item,
    id-E-RABs-ToBeReleased-SgNBModReqdList,
    id-E-RABs-ToBeModified-SgNBModReqdList,
    id-E-RABs-ToBeReleased-SgNBModReqd-Item,
    id-E-RABs-ToBeModified-SgNBModReqd-Item,
    id-E-RABs-ToBeReleased-SgNBChaConfList,
    id-E-RABs-ToBeReleased-SgNBChaConf-Item,
    id-E-RABs-ToBeReleased-SgNBRelReqList,
    id-E-RABs-ToBeReleased-SgNBRelReq-Item,
    id-E-RABs-ToBeReleased-SgNBRelConfList,
    id-E-RABs-ToBeReleased-SgNBRelConf-Item,
    id-E-RABs-ToBeReleased-SgNBRelReqdList,
    id-E-RABs-ToBeReleased-SgNBRelReqd-Item,
    id-E-RABs-SubjectToSgNBCounterCheck-List,
    id-E-RABs-SubjectToSgNBCounterCheck-Item,
    id-Target-SgNB-ID,
    id-RRCContainer,
    id-SRBType,
    id-HandoverRestrictionList,
    id-SCGConfigurationQuery,
    id-SplitSRB,
    id-NRUeReport,
    id-InitiatingNodeType-EndcX2Setup,
    id-InitiatingNodeType-EndcConfigUpdate,
    id-RespondingNodeType-EndcX2Setup,
    id-RespondingNodeType-EndcConfigUpdate,
    id-NRUESecurityCapabilities,
    id-PDCPChangeIndication,
    id-ServedEUTRAcellsENDCX2ManagementList,
    id-ServedEUTRAcellsToModifyListENDCConfUpd,
    id-ServedEUTRAcellsToDeleteListENDCConfUpd,
    id-ServedNRcellsToModifyListENDCConfUpd,
    id-ServedNRcellsToDeleteListENDCConfUpd,
    id-CellAssistanceInformation,
    id-Globalen-gNB-ID,
    id-ServedNRcellsENDCX2ManagementList,
    id-Old-SgNB-UE-X2AP-ID,
    id-UE-ContextReferenceAtSgNB,
    id-SecondaryRATUsageReportList,
    id-ActivationID,
    id-ServedNRCellsToActivate,
    id-ActivatedNRCellList,
    id-MeNBResourceCoordinationInformation,
```

```
    id-SgNBResourceCoordinationInformation,
    id-UEAppLayerMeasConfig,
    id-SelectedPLMN,
    id-SubscriberProfileIDforRFP,
    id-InitiatingNodeType-EutranrCellResourceCoordination,
    id-RespondingNodeType-EutranrCellResourceCoordination,
    id-DataTrafficResourceIndication,
    id-SpectrumSharingGroupID,
    id-ListofEUTRACellsinEUTRACoordinationReq,
    id-ListofEUTRACellsinEUTRACoordinationResp,
    id-ListofEUTRACellsinNRCoordinationReq,
    id-ListofNRCellsinNRCoordinationReq,
    id-ListofNRCellsinNRCoordinationResp,
    id-RRCConfigIndication,
    id-SGNB-Addition-Trigger-Ind,
    id-RequestedSplitSRBsrelease,
    id-AdmittedSplitSRBsrelease,
    id-E-RABs-AdmittedToBeModified-SgNBModConfList,
    id-E-RABs-AdmittedToBeModified-SgNBModConf-Item,
    id-UEContextLevelUserPlaneActivity,
    id-ERABActivityNotifyItemList,
    id-MeNBCell-ID,
    id-InitiatingNodeType-EndcX2Removal,
    id-RespondingNodeType-EndcX2Removal,
    id-uLpDCPSnLength,
    id-dL-Forwarding,
    id-E-RABs-DataForwardingAddress-List,
    id-E-RABs-DataForwardingAddress-Item,
    id-Subscription-Based-UE-DifferentiationInfo,
    id-RLCMode-transferred,
    id-dLPDCPSnLength,
    id-secondarysgNBDLGTPTEIDatPDCP,
    id-secondarymeNBULGTPTEIDatPDCP,
    id-lCID,
    id-duplicationActivation,
    id-GNBOverloadInformation,
    id-new-drb-ID-req,
    id-NRNeighbourInfoToModify,
    id-DesiredActNotificationLevel,
    id-LocationInformationSgNB,
    id-LocationInformationSgNBReporting,
    id-endcSONConfigurationTransfer,
    id-EUTRANTraceID,
    id-additionalPLMNs-Item,
    id-InterfaceInstanceIndication,
    id-BPLMN-ID-Info-NR,


    maxCellineNB,
    maxnoofBearers,
    maxnoofPDCP-SN,
    maxFailedMeasObjects,
    maxnoofCellIDforMDT,
    maxnoofTAforMDT,
```

```
    maxCellinengNB,
    maxnoofCellIDforQMC,
    maxnoofTAforQMC,
    maxnoofPLMNforQMC,
    maxnoofProtectedResourcePatterns,
    maxnoNRcellsSpectrumSharingWithE-UTRA,
    maxnoofNrCellBands

FROM X2AP-Constants;

-- **************************************************************
--
-- HANDOVER REQUEST
--
-- **************************************************************

HandoverRequest ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container    {{HandoverRequest-IEs}},
    ...
}

HandoverRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-Old-eNB-UE-X2AP-ID                          CRITICALITY reject  TYPE UE-X2AP-ID                                PRESENCE mandatory}|
    { 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}|
    { ID id-MobilityInformation                         CRITICALITY ignore  TYPE MobilityInformation                       PRESENCE optional}|
    { ID id-Masked-IMEISV                               CRITICALITY ignore  TYPE Masked-IMEISV                             PRESENCE optional}|
    { ID id-UE-HistoryInformationFromTheUE              CRITICALITY ignore  TYPE UE-HistoryInformationFromTheUE            PRESENCE optional}|
    { ID id-ExpectedUEBehaviour                         CRITICALITY ignore  TYPE ExpectedUEBehaviour                       PRESENCE optional}|
    { 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}|
    { ID id-V2XServicesAuthorized                       CRITICALITY ignore  TYPE V2XServicesAuthorized                     PRESENCE optional}|
    { ID id-UE-ContextReferenceAtWT                     CRITICALITY ignore  TYPE UE-ContextReferenceAtWT                   PRESENCE optional}|
    { ID id-NRUESecurityCapabilities                        CRITICALITY ignore  TYPE NRUESecurityCapabilities                  PRESENCE optional}|
    { ID id-UE-ContextReferenceAtSgNB                   CRITICALITY ignore  TYPE UE-ContextReferenceAtSgNB                 PRESENCE optional}|
    { ID id-AerialUEsubscriptionInformation             CRITICALITY ignore  TYPE AerialUEsubscriptionInformation           PRESENCE optional}|
    { ID id-Subscription-Based-UE-DifferentiationInfo   CRITICALITY ignore  TYPE Subscription-Based-UE-DifferentiationInfo  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,
    iE-Extensions                       ProtocolExtensionContainer { {UE-ContextInformation-ExtIEs} } OPTIONAL,
    ...
}

UE-ContextInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
{ ID id-ManagementBasedMDTallowed           CRITICALITY ignore  EXTENSION ManagementBasedMDTallowed             PRESENCE optional }|
{ ID id-ManagementBasedMDTPLMNList          CRITICALITY ignore  EXTENSION MDTPLMNList                          PRESENCE optional }|
{ ID id-UESidelinkAggregateMaximumBitRate   CRITICALITY ignore  EXTENSION UESidelinkAggregateMaximumBitRate     PRESENCE optional},
    ...
}

E-RABs-ToBeSetup-List ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeSetup-ItemIEs} }

E-RABs-ToBeSetup-ItemIEs    X2AP-PROTOCOL-IES ::= {
    { 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-QoS-Parameters      E-RAB-Level-QoS-Parameters,
    dL-Forwarding                   DL-Forwarding                                       OPTIONAL,
    uL-GTPtunnelEndpoint            GTPtunnelEndpoint,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeSetup-ItemExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeSetup-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-BearerType      CRITICALITY reject  EXTENSION BearerType        PRESENCE optional},
    ...
}

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 ::= {
    ...
}

UE-ContextReferenceAtWT ::= SEQUENCE {
    wTID                    WTID,
    wT-UE-XwAP-ID           WT-UE-XwAP-ID,
    iE-Extensions           ProtocolExtensionContainer { {UE-ContextReferenceAtWT-ItemExtIEs} } OPTIONAL,
    ...
```

```
}

UE-ContextReferenceAtWT-ItemExtIEs  X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

UE-ContextReferenceAtSgNB ::= SEQUENCE {
    source-GlobalSgNB-ID            GlobalGNB-ID,
    sgNB-UE-X2AP-ID             SgNB-UE-X2AP-ID,
    iE-Extensions               ProtocolExtensionContainer { {UE-ContextReferenceAtSgNB-ItemExtIEs} } OPTIONAL,
    ...
}

UE-ContextReferenceAtSgNB-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- HANDOVER REQUEST ACKNOWLEDGE
--
-- **************************************************************

HandoverRequestAcknowledge ::= SEQUENCE {
    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                     CRITICALITY ignore  TYPE UE-ContextKeptIndicator                    PRESENCE optional}|
    { 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}|
    { ID id-WT-UE-ContextKeptIndicator                  CRITICALITY ignore  TYPE UE-ContextKeptIndicator                    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 ::= {
    { ID id-E-RABs-Admitted-Item    CRITICALITY ignore  TYPE E-RABs-Admitted-Item   PRESENCE mandatory  }
}

E-RABs-Admitted-Item ::= SEQUENCE {
    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 {
    protocolIEs     ProtocolIE-Container    {{HandoverPreparationFailure-IEs}},
    ...
}

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}|
    { ID id-Old-eNB-UE-X2AP-ID-Extension    CRITICALITY ignore  TYPE UE-X2AP-ID-Extension       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                       CRITICALITY ignore  TYPE TargetCellInUTRAN                    PRESENCE conditional} -
- 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 {
    protocolIEs     ProtocolIE-Container    {{SNStatusTransfer-IEs}},
    ...
}

SNStatusTransfer-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 reject  TYPE UE-X2AP-ID                            PRESENCE mandatory}|
    { ID id-E-RABs-SubjectToStatusTransfer-List     CRITICALITY ignore  TYPE E-RABs-SubjectToStatusTransfer-List   PRESENCE mandatory}|
    { 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}|
    { ID id-SgNB-UE-X2AP-ID                         CRITICALITY ignore  TYPE SgNB-UE-X2AP-ID                          PRESENCE optional},
    ...
}

E-RABs-SubjectToStatusTransfer-List ::= SEQUENCE (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,
    uL-COUNTvalue                   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                        CRITICALITY ignore  EXTENSION COUNTValueExtended                       PRESENCE optional}|
    { 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 ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{UEContextRelease-IEs}},
    ...
}

UEContextRelease-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 reject  TYPE UE-X2AP-ID                         PRESENCE mandatory}|
    { 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}|
    { ID id-SIPTO-BearerDeactivationIndication  CRITICALITY ignore  TYPE SIPTOBearerDeactivationIndication  PRESENCE optional}|
    { ID id-SgNB-UE-X2AP-ID                     CRITICALITY ignore  TYPE SgNB-UE-X2AP-ID                    PRESENCE optional},
    ...
}


-- **************************************************************
--
-- HANDOVER CANCEL
--
-- **************************************************************

HandoverCancel ::= SEQUENCE {
    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        CRITICALITY reject  TYPE UE-X2AP-ID-Extension    PRESENCE optional}|
    { 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}|
    { ID id-CriticalityDiagnostics              CRITICALITY ignore  TYPE CriticalityDiagnostics      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 ignore  TYPE UE-X2AP-ID-Extension        PRESENCE optional}|
```

```
    { ID id-Old-SgNB-UE-X2AP-ID               CRITICALITY ignore  TYPE SgNB-UE-X2AP-ID               PRESENCE optional}|
    { ID id-InterfaceInstanceIndication       CRITICALITY reject  TYPE InterfaceInstanceIndication   PRESENCE optional},
    ...
}

-- **************************************************************
--
-- RESET REQUEST
--
-- **************************************************************

ResetRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ResetRequest-IEs}},
    ...
}

ResetRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-Cause                           CRITICALITY ignore  TYPE Cause                         PRESENCE mandatory}|
    { ID id-InterfaceInstanceIndication     CRITICALITY reject  TYPE InterfaceInstanceIndication  PRESENCE optional},
    ...
}

-- **************************************************************
--
-- RESET RESPONSE
--
-- **************************************************************

ResetResponse ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ResetResponse-IEs}},
    ...
}

ResetResponse-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics       PRESENCE optional }|
    { ID id-InterfaceInstanceIndication     CRITICALITY reject  TYPE InterfaceInstanceIndication    PRESENCE optional},
    ...
}

-- **************************************************************
--
-- X2 SETUP REQUEST
--
-- **************************************************************

X2SetupRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{X2SetupRequest-IEs}},
    ...
}

X2SetupRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-GlobalENB-ID            CRITICALITY reject  TYPE GlobalENB-ID           PRESENCE mandatory}|
    { 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 {
    protocolIEs     ProtocolIE-Container    {{X2SetupResponse-IEs}},
    ...
}

X2SetupResponse-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-GlobalENB-ID                CRITICALITY reject  TYPE GlobalENB-ID           PRESENCE mandatory}|
    { ID id-ServedCells                 CRITICALITY reject  TYPE ServedCells            PRESENCE mandatory}|
    { ID id-GUGroupIDList               CRITICALITY reject  TYPE GUGroupIDList          PRESENCE optional}|
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics PRESENCE optional}|
    { ID id-LHN-ID                      CRITICALITY ignore  TYPE LHN-ID                 PRESENCE optional},
    ...
}



-- **************************************************************
--
-- 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      TYPE CriticalityDiagnostics         PRESENCE optional },

    ...
}



-- **************************************************************
--
-- LOAD INFORMATION
--
-- **************************************************************
```

```
LoadInformation ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{LoadInformation-IEs}},
    ...
}

LoadInformation-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-CellInformation             CRITICALITY ignore  TYPE CellInformation-List       PRESENCE mandatory} ,
    ...
}

CellInformation-List ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ProtocolIE-Single-Container { {CellInformation-ItemIEs} }

CellInformation-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-CellInformation-Item    CRITICALITY ignore  TYPE CellInformation-Item   PRESENCE mandatory  }
}

CellInformation-Item ::= SEQUENCE {
    cell-ID                         ECGI,
    ul-InterferenceOverloadIndication       UL-InterferenceOverloadIndication                               OPTIONAL,
    ul-HighInterferenceIndicationInfo       UL-HighInterferenceIndicationInfo                               OPTIONAL,
    relativeNarrowbandTxPower               RelativeNarrowbandTxPower                                       OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { {CellInformation-Item-ExtIEs} }    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           CRITICALITY ignore  EXTENSION SubframeAssignment                PRESENCE optional }|
{ ID id-ExtendedULInterferenceOverloadInfo  CRITICALITY ignore  EXTENSION ExtendedULInterferenceOverloadInfo PRESENCE optional }|
{ ID id-CoMPInformation                     CRITICALITY ignore  EXTENSION CoMPInformation                   PRESENCE optional }|
{ ID id-DynamicDLTransmissionInformation    CRITICALITY ignore  EXTENSION DynamicDLTransmissionInformation  PRESENCE optional },
    ...
}

-- **************************************************************
--
-- 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         CRITICALITY reject  TYPE ServedCellsToModify            PRESENCE optional}|
    { ID id-ServedCellsToDelete         CRITICALITY reject  TYPE Old-ECGIs                      PRESENCE optional}|
    { ID id-GUGroupIDToAddList          CRITICALITY reject  TYPE GUGroupIDList                  PRESENCE optional}|
    { ID id-GUGroupIDToDeleteList       CRITICALITY reject  TYPE GUGroupIDList                  PRESENCE optional}|
    { ID id-CoverageModificationList    CRITICALITY reject  TYPE CoverageModificationList       PRESENCE optional},
```

```
    ...
}

ServedCellsToModify::= SEQUENCE (SIZE (1..maxCellineNB)) OF ServedCellsToModify-Item

ServedCellsToModify-Item::= SEQUENCE {
    old-ecgi                        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 }|
    { ID id-NRNeighbourInfoToModify         CRITICALITY ignore  EXTENSION NRNeighbour-Information         PRESENCE optional },
    ...
}


Old-ECGIs::= SEQUENCE (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 ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ResourceStatusRequest-IEs}},
    ...
}

ResourceStatusRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-ENB1-Measurement-ID         CRITICALITY reject  TYPE Measurement-ID                PRESENCE mandatory}|
    { ID id-ENB2-Measurement-ID         CRITICALITY ignore  TYPE Measurement-ID                PRESENCE conditional}|-- The IE shall be present if
the Registration Request IE is set to “Stop”, “Partial stop” or to “Add”--
    { ID id-Registration-Request        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},
    ...
}


CellToReport-List       ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ProtocolIE-Single-Container { {CellToReport-ItemIEs} }

CellToReport-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-CellToReport-Item   CRITICALITY ignore  TYPE CellToReport-Item  PRESENCE mandatory}
}

CellToReport-Item ::= SEQUENCE {
    cell-ID                             ECGI,
    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                CRITICALITY reject  TYPE Measurement-ID                   PRESENCE mandatory}|
    { ID id-ENB2-Measurement-ID                CRITICALITY reject  TYPE Measurement-ID                   PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics             CRITICALITY ignore  TYPE CriticalityDiagnostics           PRESENCE optional}|
    { ID id-MeasurementInitiationResult-List   CRITICALITY ignore  TYPE MeasurementInitiationResult-List 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 ::= SEQUENCE {
    cell-ID                                     ECGI,
    measurementFailureCause-List                MeasurementFailureCause-List    OPTIONAL,
    iE-Extensions                               ProtocolExtensionContainer { {MeasurementInitiationResult-Item-ExtIEs} }OPTIONAL,
    ...
}

MeasurementInitiationResult-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

MeasurementFailureCause-List ::= SEQUENCE (SIZE (1..maxFailedMeasObjects)) OF ProtocolIE-Single-Container { {MeasurementFailureCause-ItemIEs} }

MeasurementFailureCause-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeasurementFailureCause-Item    CRITICALITY ignore  TYPE MeasurementFailureCause-Item    PRESENCE mandatory}
}

MeasurementFailureCause-Item ::= SEQUENCE {
    measurementFailedReportCharacteristics          ReportCharacteristics,
    cause                                           Cause,
    iE-Extensions                                   ProtocolExtensionContainer { {MeasurementFailureCause-Item-ExtIEs} } OPTIONAL,
    ...
```

```
}

MeasurementFailureCause-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- RESOURCE STATUS FAILURE
--
-- **************************************************************

ResourceStatusFailure ::= SEQUENCE {
    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                     CRITICALITY reject  TYPE Measurement-ID                       PRESENCE mandatory}|
    { 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 ::= {
    { ID id-CompleteFailureCauseInformation-Item    CRITICALITY ignore  TYPE CompleteFailureCauseInformation-Item  PRESENCE mandatory}
}

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 ::= {
    { ID id-ENB1-Measurement-ID     CRITICALITY reject  TYPE Measurement-ID                PRESENCE mandatory}|
    { ID id-ENB2-Measurement-ID     CRITICALITY reject  TYPE Measurement-ID                PRESENCE mandatory}|
    { ID id-CellMeasurementResult   CRITICALITY ignore  TYPE CellMeasurementResult-List    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                     ECGI,
    hWLoadIndicator             HWLoadIndicator     OPTIONAL,
    s1TNLLoadIndicator          S1TNLLoadIndicator  OPTIONAL,
    radioResourceStatus         RadioResourceStatus OPTIONAL,
    iE-Extensions               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}|
    { ID id-RSRPMRList                      CRITICALITY ignore  EXTENSION RSRPMRList                         PRESENCE optional}|
    { ID id-CSIReportList                   CRITICALITY ignore  EXTENSION CSIReportList                      PRESENCE optional}|
    { ID id-CellReportingIndicator          CRITICALITY ignore  EXTENSION CellReportingIndicator             PRESENCE optional},
    ...
}


-- ****************************************************************
--
-- PRIVATE MESSAGE
--
-- ****************************************************************

PrivateMessage ::= SEQUENCE {
    privateIEs      PrivateIE-Container {{PrivateMessage-IEs}},
    ...
}

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}|
    { ID id-ENB2-Proposed-Mobility-Parameters   CRITICALITY reject  TYPE MobilityParametersInformation          PRESENCE mandatory}|
    { ID id-Cause                               CRITICALITY reject  TYPE Cause                                  PRESENCE mandatory},
    ...
}

-- **************************************************************
--
-- MOBILITY CHANGE ACKNOWLEDGE
--
-- **************************************************************

MobilityChangeAcknowledge ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{MobilityChangeAcknowledge-IEs}},
    ...
}

MobilityChangeAcknowledge-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-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}|
    { ID id-CriticalityDiagnostics                      CRITICALITY ignore  TYPE CriticalityDiagnostics                 PRESENCE optional},
    ...
}

-- **************************************************************
```

```
--
-- RADIO LINK FAILURE INDICATION
--
-- **************************************************************

RLFIndication ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{RLFIndication-IEs}},
    ...
}

RLFIndication-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-FailureCellPCI                              CRITICALITY ignore  TYPE PCI                                      PRESENCE mandatory}|
    { ID id-Re-establishmentCellECGI                    CRITICALITY ignore  TYPE ECGI                                     PRESENCE mandatory}|
    { 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}|
    { ID id-UE-RLF-Report-Container-for-extended-bands  CRITICALITY ignore  TYPE UE-RLF-Report-Container-for-extended-bands  PRESENCE optional},
    ...
}


-- **************************************************************
--
-- CELL ACTIVATION REQUEST
--
-- **************************************************************

CellActivationRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{CellActivationRequest-IEs}},
    ...
}

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                        ECGI,
    iE-Extensions                   ProtocolExtensionContainer { {ServedCellsToActivate-Item-ExtIEs} } OPTIONAL,
    ...
}

ServedCellsToActivate-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- CELL ACTIVATION RESPONSE
```

```
--
-- **************************************************************

CellActivationResponse ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{CellActivationResponse-IEs}},
    ...
}

CellActivationResponse-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-ActivatedCellList       CRITICALITY ignore  TYPE ActivatedCellList             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 {
    protocolIEs     ProtocolIE-Container    {{CellActivationFailure-IEs}},
    ...
}

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 ::= SEQUENCE {
    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 {
    protocolIEs     ProtocolIE-Container    {{X2APMessageTransfer-IEs}},
    ...
}

X2APMessageTransfer-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-RNL-Header  CRITICALITY reject  TYPE RNL-Header             PRESENCE mandatory}|
    { 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” --
    { ID id-SeNBUEAggregateMaximumBitRate   CRITICALITY reject  TYPE UEAggregateMaximumBitRate      PRESENCE mandatory}|
    { ID id-ServingPLMN                     CRITICALITY ignore  TYPE PLMN-Identity                  PRESENCE optional}|
```

```
    { ID id-E-RABs-ToBeAdded-List          CRITICALITY reject  TYPE E-RABs-ToBeAdded-List          PRESENCE mandatory}|
    { ID id-MeNBtoSeNBContainer            CRITICALITY reject  TYPE MeNBtoSeNBContainer            PRESENCE mandatory}|
    { ID id-CSGMembershipStatus            CRITICALITY reject  TYPE CSGMembershipStatus            PRESENCE optional}|
    { ID id-SeNB-UE-X2AP-ID                CRITICALITY reject  TYPE UE-X2AP-ID                     PRESENCE optional}|
    { ID id-SeNB-UE-X2AP-ID-Extension      CRITICALITY reject  TYPE UE-X2AP-ID-Extension           PRESENCE optional}|
    { ID id-ExpectedUEBehaviour            CRITICALITY ignore  TYPE ExpectedUEBehaviour            PRESENCE optional}|
    { 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 ::= {
    { ID id-E-RABs-ToBeAdded-Item   CRITICALITY reject  TYPE E-RABs-ToBeAdded-Item      PRESENCE mandatory},
    ...
}

E-RABs-ToBeAdded-Item ::= CHOICE {
    sCG-Bearer      E-RABs-ToBeAdded-Item-SCG-Bearer,
    split-Bearer    E-RABs-ToBeAdded-Item-Split-Bearer,
    ...
}

E-RABs-ToBeAdded-Item-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    e-RAB-Level-QoS-Parameters      E-RAB-Level-QoS-Parameters,
    dL-Forwarding                   DL-Forwarding                                                   OPTIONAL,
    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 {
    protocolIEs     ProtocolIE-Container    {{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}|
    { ID id-SeNBtoMeNBContainer                 CRITICALITY reject  TYPE 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 ::= {
    { ID id-E-RABs-Admitted-ToBeAdded-Item  CRITICALITY ignore  TYPE E-RABs-Admitted-ToBeAdded-Item    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} }  OPTIONAL,
    ...
}

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 ::= {
    { 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-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics     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},
    ...
}

-- **************************************************************
--
-- 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 {
    success             ResponseInformationSeNBReconfComp-SuccessItem,
    reject-by-MeNB      ResponseInformationSeNBReconfComp-RejectByMeNBItem,
    ...
}

ResponseInformationSeNBReconfComp-SuccessItem ::= SEQUENCE {
    meNBtoSeNBContainer             MeNBtoSeNBContainer OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {ResponseInformationSeNBReconfComp-SuccessItemExtIEs} } OPTIONAL,
```

```
    ...
}

ResponseInformationSeNBReconfComp-SuccessItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

ResponseInformationSeNBReconfComp-RejectByMeNBItem ::= SEQUENCE {
    cause                           Cause,
    meNBtoSeNBContainer             MeNBtoSeNBContainer                                                                 OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {ResponseInformationSeNBReconfComp-RejectByMeNBItemExtIEs} }  OPTIONAL,
    ...
}

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,
    seNB-SecurityKey                SeNBSecurityKey                                                 OPTIONAL,
    seNBUEAggregateMaximumBitRate   UEAggregateMaximumBitRate                                       OPTIONAL,
    e-RABs-ToBeAdded                E-RABs-ToBeAdded-List-ModReq                                    OPTIONAL,
    e-RABs-ToBeModified             E-RABs-ToBeModified-List-ModReq                                 OPTIONAL,
    e-RABs-ToBeReleased             E-RABs-ToBeReleased-List-ModReq                                 OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {UE-ContextInformationSeNBModReqExtIEs} }  OPTIONAL,
    ...
}
```

```
UE-ContextInformationSeNBModReqExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeAdded-List-ModReq ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeAdded-ModReqItemIEs} }

E-RABs-ToBeAdded-ModReqItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeAdded-ModReqItem CRITICALITY ignore  TYPE E-RABs-ToBeAdded-ModReqItem    PRESENCE mandatory},
    ...
}

E-RABs-ToBeAdded-ModReqItem ::= CHOICE {
    sCG-Bearer      E-RABs-ToBeAdded-ModReqItem-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-QoS-Parameters      E-RAB-Level-QoS-Parameters,
    dL-Forwarding                   DL-Forwarding                                                   OPTIONAL,
    s1-UL-GTPtunnelEndpoint         GTPtunnelEndpoint,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeAdded-ModReqItem-SCG-BearerExtIEs} } OPTIONAL,
    ...
}

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-ModReqItem-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-ModReqItem-Split-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeAdded-ModReqItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeModified-List-ModReq ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeModified-ModReqItemIEs} }

E-RABs-ToBeModified-ModReqItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeModified-ModReqItem  CRITICALITY ignore  TYPE E-RABs-ToBeModified-ModReqItem    PRESENCE mandatory},
    ...
}


E-RABs-ToBeModified-ModReqItem ::= CHOICE {
    sCG-Bearer      E-RABs-ToBeModified-ModReqItem-SCG-Bearer,
```

```
    split-Bearer    E-RABs-ToBeModified-ModReqItem-Split-Bearer,
    ...
}

E-RABs-ToBeModified-ModReqItem-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    e-RAB-Level-QoS-Parameters      E-RAB-Level-QoS-Parameters                                      OPTIONAL,
    s1-UL-GTPtunnelEndpoint         GTPtunnelEndpoint                                               OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeModified-ModReqItem-SCG-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeModified-ModReqItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeModified-ModReqItem-Split-Bearer ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    e-RAB-Level-QoS-Parameters      E-RAB-Level-QoS-Parameters                                      OPTIONAL,
    meNB-GTPtunnelEndpoint          GTPtunnelEndpoint                                               OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeModified-ModReqItem-Split-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeModified-ModReqItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-List-ModReq ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeReleased-ModReqItemIEs} }

E-RABs-ToBeReleased-ModReqItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeReleased-ModReqItem  CRITICALITY ignore  TYPE E-RABs-ToBeReleased-ModReqItem    PRESENCE mandatory},
    ...
}

E-RABs-ToBeReleased-ModReqItem ::= CHOICE {
    sCG-Bearer      E-RABs-ToBeReleased-ModReqItem-SCG-Bearer,
    split-Bearer    E-RABs-ToBeReleased-ModReqItem-Split-Bearer,
    ...
}

E-RABs-ToBeReleased-ModReqItem-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    dL-Forwarding-GTPtunnelEndpoint         GTPtunnelEndpoint                                   OPTIONAL,
    uL-Forwarding-GTPtunnelEndpoint         GTPtunnelEndpoint                                   OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-ModReqItem-SCG-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-ModReqItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-ModReqItem-Split-Bearer ::= SEQUENCE {
```

```
    e-RAB-ID                        E-RAB-ID,
    dL-Forwarding-GTPtunnelEndpoint         GTPtunnelEndpoint                                       OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-ModReqItem-Split-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-ModReqItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- SENB MODIFICATION REQUEST ACKNOWLEDGE
--
-- **************************************************************

SeNBModificationRequestAcknowledge ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SeNBModificationRequestAcknowledge-IEs}},
    ...
}

SeNBModificationRequestAcknowledge-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-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}|
    { ID id-E-RABs-Admitted-ToBeReleased-ModAckList     CRITICALITY ignore  TYPE E-RABs-Admitted-ToBeReleased-ModAckList PRESENCE optional}|
    { 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}|
    { 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-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 {
    sCG-Bearer      E-RABs-Admitted-ToBeAdded-ModAckItem-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,
    seNB-GTPtunnelEndpoint          GTPtunnelEndpoint,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-ModAckItem-Split-BearerExtIEs} } OPTIONAL,
    ...
}

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 {
    sCG-Bearer      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,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-Admitted-ToBeModified-ModAckItem-SCG-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeModified-ModAckItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-Admitted-ToBeModified-ModAckItem-Split-Bearer ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    seNB-GTPtunnelEndpoint          GTPtunnelEndpoint                                                       OPTIONAL,
    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 ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-Admitted-ToBeReleased-
ModAckItemIEs} }
```

```
E-RABs-Admitted-ToBeReleased-ModAckItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-Admitted-ToBeReleased-ModAckItem     CRITICALITY ignore  TYPE E-RABs-Admitted-ToReleased-ModAckItem   PRESENCE mandatory}
}

E-RABs-Admitted-ToReleased-ModAckItem ::= CHOICE {
    sCG-Bearer      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                               CRITICALITY ignore  TYPE Cause                   PRESENCE mandatory}|
    { 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 {
    protocolIEs     ProtocolIE-Container        {{SeNBModificationRequired-IEs}},
    ...
}

SeNBModificationRequired-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-E-RABs-ToBeReleased-ModReqd         CRITICALITY ignore  TYPE E-RABs-ToBeReleased-ModReqd   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-ModReqdItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeReleased-ModReqdItem  CRITICALITY ignore     TYPE E-RABs-ToBeReleased-ModReqdItem   PRESENCE mandatory },
    ...
}

E-RABs-ToBeReleased-ModReqdItem ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    cause                           Cause,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-ModReqdItemExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-ModReqdItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- ********************************************************
--
-- SENB MODIFICATION CONFIRM
--
-- ********************************************************

SeNBModificationConfirm ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SeNBModificationConfirm-IEs}},
    ...
}

SeNBModificationConfirm-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-MeNBtoSeNBContainer               CRITICALITY ignore  TYPE MeNBtoSeNBContainer        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},
    ...
}

-- **************************************************************
--
-- SENB MODIFICATION REFUSE
--
-- **************************************************************

SeNBModificationRefuse ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{SeNBModificationRefuse-IEs}},
    ...
}

SeNBModificationRefuse-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                             CRITICALITY ignore  TYPE Cause                   PRESENCE mandatory}|
    { ID id-MeNBtoSeNBContainer               CRITICALITY ignore  TYPE MeNBtoSeNBContainer     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},
    ...
}

-- **************************************************************
--
-- SENB RELEASE REQUEST
--
-- **************************************************************

SeNBReleaseRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{SeNBReleaseRequest-IEs}},
    ...
}

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-RelReq   CRITICALITY ignore  TYPE E-RABs-ToBeReleased-List-RelReq     PRESENCE optional}|
    { ID id-UE-ContextKeptIndicator           CRITICALITY ignore  TYPE UE-ContextKeptIndicator             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-MakeBeforeBreakIndicator          CRITICALITY ignore  TYPE MakeBeforeBreakIndicator            PRESENCE optional},
    ...
}
E-RABs-ToBeReleased-List-RelReq ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeReleased-RelReqItemIEs} }

E-RABs-ToBeReleased-RelReqItemIEs X2AP-PROTOCOL-IES ::= {
```

```
    { ID id-E-RABs-ToBeReleased-RelReqItem      CRITICALITY ignore  TYPE E-RABs-ToBeReleased-RelReqItem    PRESENCE mandatory},
    ...
}

E-RABs-ToBeReleased-RelReqItem ::= CHOICE {
    sCG-Bearer      E-RABs-ToBeReleased-RelReqItem-SCG-Bearer,
    split-Bearer    E-RABs-ToBeReleased-RelReqItem-Split-Bearer,
    ...
}

E-RABs-ToBeReleased-RelReqItem-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    uL-Forwarding-GTPtunnelEndpoint         GTPtunnelEndpoint                                       OPTIONAL,
    dL-Forwarding-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-RelReqItem-Split-Bearer ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    dL-Forwarding-GTPtunnelEndpoint         GTPtunnelEndpoint                                   OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-RelReqItem-Split-BearerExtIEs} } OPTIONAL,
    ...
}

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       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 RELEASE CONFIRM
--
-- **************************************************************

SeNBReleaseConfirm ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SeNBReleaseConfirm-IEs}},
    ...
}

SeNBReleaseConfirm-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-E-RABs-ToBeReleased-List-RelConf        CRITICALITY ignore  TYPE 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 {
    sCG-Bearer      E-RABs-ToBeReleased-RelConfItem-SCG-Bearer,
    split-Bearer    E-RABs-ToBeReleased-RelConfItem-Split-Bearer,
    ...
}

E-RABs-ToBeReleased-RelConfItem-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    uL-Forwarding-GTPtunnelEndpoint         GTPtunnelEndpoint                                       OPTIONAL,
    dL-Forwarding-GTPtunnelEndpoint         GTPtunnelEndpoint                                       OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-RelConfItem-SCG-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-RelConfItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-RelConfItem-Split-Bearer ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    dL-Forwarding-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 REQUEST
--
-- ********************************************************

SeNBCounterCheckRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SeNBCounterCheckRequest-IEs}},
    ...
}

SeNBCounterCheckRequest-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-SubjectToCounterCheck-List   CRITICALITY ignore  TYPE E-RABs-SubjectToCounterCheck-List   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 ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-SubjectToCounterCheckItemIEs} }

E-RABs-SubjectToCounterCheckItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-SubjectToCounterCheckItem    CRITICALITY ignore  TYPE E-RABs-SubjectToCounterCheckItem    PRESENCE mandatory},
    ...
}

E-RABs-SubjectToCounterCheckItem ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    uL-Count                        INTEGER (0..4294967295),
    dL-Count                        INTEGER (0..4294967295),
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-SubjectToCounterCheckItemExtIEs} } OPTIONAL,
    ...
}

E-RABs-SubjectToCounterCheckItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- ********************************************************
--
-- X2 REMOVAL REQUEST
--
-- ********************************************************

X2RemovalRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{X2RemovalRequest-IEs}},
    ...
}

X2RemovalRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-GlobalENB-ID                CRITICALITY reject  TYPE GlobalENB-ID           PRESENCE mandatory}|
    { ID id-X2RemovalThreshold          CRITICALITY reject  TYPE X2BenefitValue         PRESENCE optional},
...
```

```
}


-- **************************************************************
--
-- X2 REMOVAL RESPONSE
--
-- **************************************************************

X2RemovalResponse ::= SEQUENCE {
    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                       CRITICALITY ignore  TYPE Cause                          PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics         PRESENCE optional},
    ...
}


-- **************************************************************
--
-- RETRIEVE UE CONTEXT REQUEST
--
-- **************************************************************

RetrieveUEContextRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ RetrieveUEContextRequest-IEs}},
    ...
}

RetrieveUEContextRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-New-eNB-UE-X2AP-ID                  CRITICALITY reject  TYPE UE-X2AP-ID            PRESENCE mandatory}|
```

```
    { ID id-SeNB-UE-X2AP-ID-Extension          CRITICALITY reject  TYPE UE-X2AP-ID-Extension   PRESENCE optional}|
    { ID id-resumeID                           CRITICALITY reject  TYPE ResumeID               PRESENCE mandatory}|
    { ID id-ShortMAC-I                         CRITICALITY reject  TYPE ShortMAC-I             PRESENCE mandatory}|
    { ID id-NewEUTRANCellIdentifier            CRITICALITY reject  TYPE EUTRANCellIdentifier   PRESENCE mandatory}|
    {ID id-FailureCellCRNTI                    CRITICALITY reject  TYPE CRNTI                  PRESENCE optional}|
    {ID id-FailureCellPCI                      CRITICALITY reject  TYPE PCI                    PRESENCE optional},
    ...
}

-- **************************************************************
--
-- RETRIEVE UE CONTEXT RESPONSE
--
-- **************************************************************

RetrieveUEContextResponse ::= SEQUENCE {
    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}|
    { ID id-New-eNB-UE-X2AP-ID-Extension                CRITICALITY ignore  TYPE UE-X2AP-ID-Extension                       PRESENCE optional}|
    { 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}|
    { ID id-GUMMEI-ID                                   CRITICALITY reject  TYPE GUMMEI                                     PRESENCE mandatory}|
    { 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}|
    { ID id-Masked-IMEISV                               CRITICALITY ignore  TYPE Masked-IMEISV                              PRESENCE optional}|
    { 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}|
    { ID id-V2XServicesAuthorized                       CRITICALITY ignore  TYPE V2XServicesAuthorized                      PRESENCE optional}|
    { ID id-AerialUEsubscriptionInformation             CRITICALITY ignore  TYPE AerialUEsubscriptionInformation            PRESENCE optional}|
    { ID id-Subscription-Based-UE-DifferentiationInfo   CRITICALITY ignore  TYPE Subscription-Based-UE-DifferentiationInfo  PRESENCE optional},
    ...
}

UE-ContextInformationRetrieve ::= SEQUENCE {
    mME-UE-S1AP-ID                      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 ::= {
{ ID id-UESidelinkAggregateMaximumBitRate   CRITICALITY ignore  EXTENSION UESidelinkAggregateMaximumBitRate     PRESENCE optional},
    ...
}

E-RABs-ToBeSetup-ListRetrieve ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeSetupRetrieve-ItemIEs} }

E-RABs-ToBeSetupRetrieve-ItemIEs    X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeSetupRetrieve-Item   CRITICALITY ignore  TYPE E-RABs-ToBeSetupRetrieve-Item   PRESENCE mandatory},
    ...
}

E-RABs-ToBeSetupRetrieve-Item ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    e-RAB-Level-QoS-Parameters      E-RAB-Level-QoS-Parameters,
    bearerType                      BearerType  OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeSetupRetrieve-ItemExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeSetupRetrieve-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-uL-GTPtunnelEndpoint        CRITICALITY reject  EXTENSION GTPtunnelEndpoint     PRESENCE mandatory}|
    { ID id-dL-Forwarding               CRITICALITY ignore  EXTENSION DL-Forwarding         PRESENCE optional },
    ...
}

-- **************************************************************
--
-- 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}|
    { ID id-New-eNB-UE-X2AP-ID-Extension    CRITICALITY ignore  TYPE UE-X2AP-ID-Extension       PRESENCE optional}|
    { ID id-Cause                           CRITICALITY ignore  TYPE Cause                      PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE optional},
    ...
}

-- **************************************************************
--
-- SGNB ADDITION REQUEST
--
-- **************************************************************

SgNBAdditionRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container {{SgNBAdditionRequest-IEs}},
```

```
    ...
}

SgNBAdditionRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                         CRITICALITY reject  TYPE UE-X2AP-ID                             PRESENCE mandatory}|
    { ID id-NRUESecurityCapabilities                    CRITICALITY reject  TYPE NRUESecurityCapabilities           PRESENCE mandatory}|
    { ID id-SgNBSecurityKey                         CRITICALITY reject  TYPE SgNBSecurityKey                    PRESENCE mandatory}|
    { ID id-SgNBUEAggregateMaximumBitRate           CRITICALITY reject  TYPE UEAggregateMaximumBitRate          PRESENCE mandatory}|
    { ID id-SelectedPLMN                                CRITICALITY ignore  TYPE PLMN-Identity                  PRESENCE optional}|
    { ID id-HandoverRestrictionList                 CRITICALITY ignore  TYPE HandoverRestrictionList            PRESENCE optional}|
    { ID id-E-RABs-ToBeAdded-SgNBAddReqList         CRITICALITY reject  TYPE E-RABs-ToBeAdded-SgNBAddReqList    PRESENCE mandatory}|
    { ID id-MeNBtoSgNBContainer                     CRITICALITY reject  TYPE MeNBtoSgNBContainer                PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                         CRITICALITY reject  TYPE SgNB-UE-X2AP-ID                    PRESENCE optional}|
    { ID id-ExpectedUEBehaviour                     CRITICALITY ignore  TYPE ExpectedUEBehaviour                PRESENCE optional}|
    { ID id-MeNB-UE-X2AP-ID-Extension               CRITICALITY reject  TYPE UE-X2AP-ID-Extension               PRESENCE optional}|
    { ID id-RequestedSplitSRBs                      CRITICALITY reject  TYPE SplitSRBs                          PRESENCE optional}|
    { ID id-MeNBResourceCoordinationInformation     CRITICALITY ignore  TYPE MeNBResourceCoordinationInformation PRESENCE optional}|
    { ID id-SGNB-Addition-Trigger-Ind               CRITICALITY reject  TYPE SGNB-Addition-Trigger-Ind           PRESENCE optional}|
    { ID id-SubscriberProfileIDforRFP               CRITICALITY ignore  TYPE SubscriberProfileIDforRFP          PRESENCE optional}|
    { ID id-MeNBCell-ID                             CRITICALITY reject  TYPE ECGI                               PRESENCE mandatory}|
    { ID id-DesiredActNotificationLevel             CRITICALITY ignore  TYPE DesiredActNotificationLevel        PRESENCE optional}|
    { ID id-TraceActivation                         CRITICALITY ignore  TYPE TraceActivation                    PRESENCE optional}|
    { ID id-LocationInformationSgNBReporting            CRITICALITY ignore  TYPE LocationInformationSgNBReporting       PRESENCE optional}|
    { ID id-Masked-IMEISV                           CRITICALITY ignore  TYPE Masked-IMEISV                      PRESENCE optional},
    ...
}

E-RABs-ToBeAdded-SgNBAddReqList ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeAdded-SgNBAddReq-ItemIEs} }

E-RABs-ToBeAdded-SgNBAddReq-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeAdded-SgNBAddReq-Item        CRITICALITY reject  TYPE E-RABs-ToBeAdded-SgNBAddReq-Item   PRESENCE mandatory},
    ...
}

E-RABs-ToBeAdded-SgNBAddReq-Item ::= SEQUENCE {
    e-RAB-ID                                E-RAB-ID,
    drb-ID                              DRB-ID,
    en-DC-ResourceConfiguration         EN-DC-ResourceConfiguration,
    resource-configuration              CHOICE {
        sgNBPDCPpresent                     E-RABs-ToBeAdded-SgNBAddReq-Item-SgNBPDCPpresent,
        sgNBPDCPnotpresent                  E-RABs-ToBeAdded-SgNBAddReq-Item-SgNBPDCPnotpresent,
        ...
    },
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeAdded-SgNBAddReq-ItemExtIEs} }   OPTIONAL,
    ...
}

E-RABs-ToBeAdded-SgNBAddReq-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeAdded-SgNBAddReq-Item-SgNBPDCPpresent ::= SEQUENCE {
    full-E-RAB-Level-QoS-Parameters             E-RAB-Level-QoS-Parameters,
    max-MCG-admit-E-RAB-Level-QoS-Parameters    GBR-QosInformation                                          OPTIONAL,
```

```
-- This IE shall be present if MCG resource and SCG resources IEs in the EN-DC Resource Configuration IE are set to “present” and GBR QoS
Information IE is present in Full E-RAB Level QoS Parameters IE --
    dL-Forwarding                           DL-Forwarding                                                       OPTIONAL,
    meNB-DL-GTP-TEIDatMCG                   GTPtunnelEndpoint                                                   OPTIONAL,
-- This IE shall be present if MCG resource IE in the EN-DC Resource Configuration IE is set to “present” --
    s1-UL-GTPtunnelEndpoint                 GTPtunnelEndpoint,
    iE-Extensions                 ProtocolExtensionContainer { {E-RABs-ToBeAdded-SgNBAddReq-Item-SgNBPDCPpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeAdded-SgNBAddReq-Item-SgNBPDCPpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-RLCMode-transferred             CRITICALITY ignore  EXTENSION RLCMode              PRESENCE optional},
    ...
}

E-RABs-ToBeAdded-SgNBAddReq-Item-SgNBPDCPnotpresent ::= SEQUENCE {
    requested-SCG-E-RAB-Level-QoS-Parameters       E-RAB-Level-QoS-Parameters,
    meNB-UL-GTP-TEIDatPDCP                         GTPtunnelEndpoint,
    secondary-meNB-UL-GTP-TEIDatPDCP               GTPtunnelEndpoint   OPTIONAL,
    rlc-Mode                                       RLCMode,
    uL-Configuration                               ULConfiguration OPTIONAL,
-- This IE shall be present if MCG resource and SCG resources IEs in the EN-DC Resource Configuration IE are set to “present” --
    iE-Extensions                 ProtocolExtensionContainer { {E-RABs-ToBeAdded-SgNBAddReq-Item-SgNBPDCPnotpresentExtIEs} }     OPTIONAL,
    ...
}

E-RABs-ToBeAdded-SgNBAddReq-Item-SgNBPDCPnotpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-uLpDCPSnLength                         CRITICALITY ignore  EXTENSION PDCPSnLength            PRESENCE optional}|
    { ID id-dLPDCPSnLength                         CRITICALITY ignore  EXTENSION PDCPSnLength            PRESENCE optional}|
    { ID id-duplicationActivation                  CRITICALITY ignore  EXTENSION DuplicationActivation   PRESENCE optional},
    ...
}

-- **************************************************************
--
-- SGNB ADDITION REQUEST ACKNOWLEDGE
--
-- **************************************************************

SgNBAdditionRequestAcknowledge ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SgNBAdditionRequestAcknowledge-IEs}},
    ...
}

SgNBAdditionRequestAcknowledge-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                            CRITICALITY reject  TYPE UE-X2AP-ID                                    PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                            CRITICALITY reject  TYPE SgNB-UE-X2AP-ID                               PRESENCE mandatory}|
    { ID id-E-RABs-Admitted-ToBeAdded-SgNBAddReqAckList CRITICALITY ignore  TYPE E-RABs-Admitted-ToBeAdded-SgNBAddReqAckList  PRESENCE mandatory}|
    { ID id-E-RABs-NotAdmitted-List                    CRITICALITY ignore  TYPE E-RAB-List                                    PRESENCE optional}|
    { ID id-SgNBtoMeNBContainer                        CRITICALITY reject  TYPE SgNBtoMeNBContainer                           PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics                     CRITICALITY ignore  TYPE CriticalityDiagnostics                        PRESENCE optional}|
    { ID id-MeNB-UE-X2AP-ID-Extension                  CRITICALITY reject  TYPE UE-X2AP-ID-Extension                          PRESENCE optional}|
    { ID id-AdmittedSplitSRBs                          CRITICALITY reject  TYPE SplitSRBs                                     PRESENCE optional}|
    { ID id-SgNBResourceCoordinationInformation        CRITICALITY ignore  TYPE SgNBResourceCoordinationInformation           PRESENCE optional}|
```

```
    { ID id-RRCConfigIndication                     CRITICALITY reject  TYPE RRC-Config-Ind                                 PRESENCE optional}|
    { ID id-LocationInformationSgNB                 CRITICALITY ignore  TYPE LocationInformationSgNB                        PRESENCE optional},
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBAddReqAckList ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-Admitted-ToBeAdded-
SgNBAddReqAck-ItemIEs} }

E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item    CRITICALITY ignore  TYPE E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item    PRESENCE
mandatory}
}

E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    en-DC-ResourceConfiguration     EN-DC-ResourceConfiguration,
    resource-configuration          CHOICE {
        sgNBPDCPpresent                 E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDCPpresent,
        sgNBPDCPnotpresent              E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDCPnotpresent,
        ...
    },
    iE-Extensions               ProtocolExtensionContainer { {E-RABs-ToBeAdded-SgNBAddReqAck-ItemExtIEs} }   OPTIONAL,
    ...
}

E-RABs-ToBeAdded-SgNBAddReqAck-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDCPpresent ::= SEQUENCE {
    s1-DL-GTPtunnelEndpoint             GTPtunnelEndpoint,
    sgNB-UL-GTP-TEIDatPDCP              GTPtunnelEndpoint                                                                   OPTIONAL,
-- This IE shall be present if MCG resource IE in the EN-DC Resource Configuration IE is set to “present” --
    rlc-Mode                            RLCMode                                                                             OPTIONAL,
-- This IE shall be present if MCG resource IE in the EN-DC Resource Configuration IE is set to “present” --
    dL-Forwarding-GTPtunnelEndpoint     GTPtunnelEndpoint                                                                   OPTIONAL,
    uL-Forwarding-GTPtunnelEndpoint     GTPtunnelEndpoint                                                                   OPTIONAL,
    mCG-E-RAB-Level-QoS-Parameters      E-RAB-Level-QoS-Parameters                                                          OPTIONAL,
-- This IE shall be present if MCG resource and SCG resource IEs in the EN-DC Resource Configuration IE are set to “present” and the GBR QoS
Information IE is present in the Requested MCG E-RAB Level QoS Parameters IE --
    uL-Configuration                        ULConfiguration                                                                 OPTIONAL,
-- This IE shall be present if MCG resource and SCG resources IEs in the EN-DC Resource Configuration IE are set to “present” --
    iE-Extensions                       ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDCPpresentExtIEs} }
        OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDCPpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-uLpDCPSnLength                      CRITICALITY ignore  EXTENSION PDCPSnLength          PRESENCE optional}|
    { ID id-dLPDCPSnLength                      CRITICALITY ignore  EXTENSION PDCPSnLength          PRESENCE optional},
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDCPnotpresent ::= SEQUENCE {
```

```
    sgNB-DL-GTP-TEIDatSCG               GTPtunnelEndpoint,
    secondary-sgNB-DL-GTP-TEIDatSCG     GTPtunnelEndpoint       OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDCPnotpresentExtIEs} }
    OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDCPnotpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-lCID                CRITICALITY ignore  EXTENSION LCID          PRESENCE optional},
    ...
}



-- **************************************************************
--
-- SGNB ADDITION REQUEST REJECT
--
-- **************************************************************

SgNBAdditionRequestReject ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SgNBAdditionRequestReject-IEs}},
    ...
}

SgNBAdditionRequestReject-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                 CRITICALITY reject  TYPE UE-X2AP-ID                 PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                 CRITICALITY reject  TYPE SgNB-UE-X2AP-ID            PRESENCE optional}|
    { ID id-Cause                           CRITICALITY ignore  TYPE Cause                      PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE optional}|
    { ID id-MeNB-UE-X2AP-ID-Extension       CRITICALITY reject  TYPE UE-X2AP-ID-Extension       PRESENCE optional},
    ...
}


-- **************************************************************
--
-- SGNB RECONFIGURATION COMPLETE
--
-- **************************************************************

SgNBReconfigurationComplete ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SgNBReconfigurationComplete-IEs}},
    ...
}

SgNBReconfigurationComplete-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                     CRITICALITY reject  TYPE UE-X2AP-ID                             PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                     CRITICALITY reject  TYPE SgNB-UE-X2AP-ID                        PRESENCE mandatory}|
    { ID id-ResponseInformationSgNBReconfComp   CRITICALITY ignore  TYPE ResponseInformationSgNBReconfComp     PRESENCE mandatory}|
    { ID id-MeNB-UE-X2AP-ID-Extension           CRITICALITY reject  TYPE UE-X2AP-ID-Extension                   PRESENCE optional},
    ...
}
```

```
ResponseInformationSgNBReconfComp ::= CHOICE {
    success-SgNBReconfComp              ResponseInformationSgNBReconfComp-SuccessItem,
    reject-by-MeNB-SgNBReconfComp       ResponseInformationSgNBReconfComp-RejectByMeNBItem,
    ...
}

ResponseInformationSgNBReconfComp-SuccessItem ::= SEQUENCE {
    meNBtoSgNBContainer             MeNBtoSgNBContainer                 OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {ResponseInformationSgNBReconfComp-SuccessItemExtIEs} } OPTIONAL,
    ...
}

ResponseInformationSgNBReconfComp-SuccessItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

ResponseInformationSgNBReconfComp-RejectByMeNBItem ::= SEQUENCE {
    cause                           Cause,
    iE-Extensions                   ProtocolExtensionContainer { {ResponseInformationSgNBReconfComp-RejectByMeNBItemExtIEs} }     OPTIONAL,
    ...
}

ResponseInformationSgNBReconfComp-RejectByMeNBItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}


-- **************************************************************
--
-- SGNB MODIFICATION REQUEST
--
-- **************************************************************

SgNBModificationRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ SgNBModificationRequest-IEs}},
    ...
}

SgNBModificationRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                     CRITICALITY reject  TYPE UE-X2AP-ID                         PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                     CRITICALITY reject  TYPE SgNB-UE-X2AP-ID                    PRESENCE mandatory}|
    { ID id-Cause                               CRITICALITY ignore  TYPE Cause                              PRESENCE mandatory}|
    { ID id-SelectedPLMN                        CRITICALITY ignore  TYPE PLMN-Identity                      PRESENCE optional}|
    { ID id-HandoverRestrictionList             CRITICALITY ignore  TYPE HandoverRestrictionList            PRESENCE optional}|
    { ID    id-SCGConfigurationQuery            CRITICALITY ignore  TYPE SCGConfigurationQuery              PRESENCE optional}|
    { ID id-UE-ContextInformation-SgNBModReq    CRITICALITY reject  TYPE UE-ContextInformation-SgNBModReq    PRESENCE optional}|
    { ID id-MeNBtoSgNBContainer                 CRITICALITY reject  TYPE MeNBtoSgNBContainer                PRESENCE optional}|
    { ID id-MeNB-UE-X2AP-ID-Extension           CRITICALITY reject  TYPE UE-X2AP-ID-Extension               PRESENCE optional}|
    { ID id-MeNBResourceCoordinationInformation CRITICALITY ignore  TYPE MeNBResourceCoordinationInformation PRESENCE optional}|
    { ID id-RequestedSplitSRBs                  CRITICALITY ignore  TYPE SplitSRBs                          PRESENCE optional}|
    { ID id-RequestedSplitSRBsrelease           CRITICALITY ignore  TYPE SplitSRBs                          PRESENCE optional}|
    { ID id-DesiredActNotificationLevel         CRITICALITY ignore  TYPE DesiredActNotificationLevel        PRESENCE optional}|
    { ID id-LocationInformationSgNBReporting    CRITICALITY ignore  TYPE LocationInformationSgNBReporting   PRESENCE optional}|
    { ID id-MeNBCell-ID                         CRITICALITY ignore  TYPE ECGI                               PRESENCE optional},
```

```
    ...
}

UE-ContextInformation-SgNBModReq ::= SEQUENCE {
    nRUE-SecurityCapabilities       NRUESecurityCapabilities                                                    OPTIONAL,
    sgNB-SecurityKey                SgNBSecurityKey                                                             OPTIONAL,
    sgNBUEAggregateMaximumBitRate   UEAggregateMaximumBitRate                                                   OPTIONAL,
    e-RABs-ToBeAdded                E-RABs-ToBeAdded-SgNBModReq-List                                            OPTIONAL,
    e-RABs-ToBeModified             E-RABs-ToBeModified-SgNBModReq-List                                         OPTIONAL,
    e-RABs-ToBeReleased             E-RABs-ToBeReleased-SgNBModReq-List                                         OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {UE-ContextInformationSgNBModReqExtIEs} }      OPTIONAL,
    ...
}

UE-ContextInformationSgNBModReqExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    {   ID id-SubscriberProfileIDforRFP                CRITICALITY ignore  EXTENSION SubscriberProfileIDforRFP                          PRESENCE
optional},
    ...
}

E-RABs-ToBeAdded-SgNBModReq-List ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeAdded-SgNBModReq-ItemIEs} }

E-RABs-ToBeAdded-SgNBModReq-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeAdded-SgNBModReq-Item        CRITICALITY ignore  TYPE E-RABs-ToBeAdded-SgNBModReq-Item    PRESENCE mandatory},
    ...
}

E-RABs-ToBeAdded-SgNBModReq-Item ::= SEQUENCE {
    e-RAB-ID                            E-RAB-ID,
    drb-ID                              DRB-ID,
    en-DC-ResourceConfiguration         EN-DC-ResourceConfiguration,
    resource-configuration              CHOICE {
        sgNBPDCPpresent                 E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDCPpresent,
        sgNBPDCPnotpresent              E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDCPnotpresent,
        ...
    },
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeAdded-SgNBModReq-ItemExtIEs} }   OPTIONAL,
    ...
}

E-RABs-ToBeAdded-SgNBModReq-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDCPpresent ::= SEQUENCE {
    full-E-RAB-Level-QoS-Parameters         E-RAB-Level-QoS-Parameters,
    max-MN-admit-E-RAB-Level-QoS-Parameters GBR-QosInformation                                                  OPTIONAL,
-- This IE shall be present if MCG resource and SCG resources IEs in the EN-DC Resource Configuration IE are set to “present” and GBR QoS
Information IE is present in Full E-RAB Level QoS Parameters IE --
    dL-Forwarding                           DL-Forwarding                                                           OPTIONAL,
    meNB-DL-GTP-TEIDatMCG                   GTPtunnelEndpoint                                                       OPTIONAL,
-- This IE shall be present if MCG resource IE in the EN-DC Resource Configuration IE is set to “present” --
    s1-UL-GTPtunnelEndpoint                 GTPtunnelEndpoint,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDCPpresentExtIEs} }    OPTIONAL,
```

```
    ...
}

E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDCPpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-RLCMode-transferred                CRITICALITY ignore  EXTENSION RLCMode               PRESENCE optional},
    ...
}

E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDCPnotpresent ::= SEQUENCE {
    requested-SCG-E-RAB-Level-QoS-Parameters        E-RAB-Level-QoS-Parameters,
    meNB-UL-GTP-TEIDatPDCP                          GTPtunnelEndpoint,
    secondary-meNB-UL-GTP-TEIDatPDCP                GTPtunnelEndpoint       OPTIONAL,
    rlc-Mode                                        RLCMode,
    uL-Configuration                                ULConfiguration                                                 OPTIONAL,
-- This IE shall be present if MCG resource and SCG resources IEs in the EN-DC Resource Configuration IE are set to “present” --
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDCPnotpresentExtIEs} }    OPTIONAL,
    ...
}

E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDCPnotpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-uLpDCPSnLength                          CRITICALITY ignore  EXTENSION PDCPSnLength            PRESENCE optional}|
    { ID id-dLPDCPSnLength                          CRITICALITY ignore  EXTENSION PDCPSnLength            PRESENCE optional}|
    { ID id-duplicationActivation                   CRITICALITY ignore  EXTENSION DuplicationActivation   PRESENCE optional},
    ...
}


E-RABs-ToBeModified-SgNBModReq-List ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeModified-SgNBModReq-
ItemIEs} }

E-RABs-ToBeModified-SgNBModReq-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeModified-SgNBModReq-Item CRITICALITY ignore  TYPE E-RABs-ToBeModified-SgNBModReq-Item    PRESENCE mandatory},
    ...
}


E-RABs-ToBeModified-SgNBModReq-Item ::= SEQUENCE {
    e-RAB-ID                                E-RAB-ID,
    en-DC-ResourceConfiguration         EN-DC-ResourceConfiguration,
    resource-configuration              CHOICE {
        sgNBPDCPpresent                     E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDCPpresent,
        sgNBPDCPnotpresent                  E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDCPnotpresent,
        ...
    },
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeModified-SgNBModReq-ItemExtIEs} }   OPTIONAL,
    ...
}

E-RABs-ToBeModified-SgNBModReq-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDCPpresent ::= SEQUENCE {
    full-E-RAB-Level-QoS-Parameters         E-RAB-Level-QoS-Parameters                                                  OPTIONAL,
```

```
    max-MN-admit-E-RAB-Level-QoS-Parameters GBR-QosInformation                                                  OPTIONAL,
    meNB-DL-GTP-TEIDatMCG                   GTPtunnelEndpoint                                                   OPTIONAL,
    s1-UL-GTPtunnelEndpoint                 GTPtunnelEndpoint                                                   OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDCPpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDCPpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-RLC-Status          CRITICALITY ignore          EXTENSION RLC-Status               PRESENCE optional },
    ...
}

E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDCPnotpresent ::= SEQUENCE {
    requested-SCG-E-RAB-Level-QoS-Parameters        E-RAB-Level-QoS-Parameters                                  OPTIONAL,
    meNB-UL-GTP-TEIDatPDCP                       GTPtunnelEndpoint                                           OPTIONAL,
    uL-Configuration                                ULConfiguration                                             OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDCPnotpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDCPnotpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-uLpDCPSnLength                          CRITICALITY ignore  EXTENSION PDCPSnLength            PRESENCE optional}|
    { ID id-dLPDCPSnLength                          CRITICALITY ignore  EXTENSION PDCPSnLength            PRESENCE optional}|
    { ID id-secondarymeNBULGTPTEIDatPDCP            CRITICALITY ignore  EXTENSION GTPtunnelEndpoint       PRESENCE optional},
    ...
}

E-RABs-ToBeReleased-SgNBModReq-List ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeReleased-SgNBModReq-
ItemIEs} }

E-RABs-ToBeReleased-SgNBModReq-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeReleased-SgNBModReq-Item CRITICALITY ignore  TYPE E-RABs-ToBeReleased-SgNBModReq-Item    PRESENCE mandatory},
    ...
}

E-RABs-ToBeReleased-SgNBModReq-Item ::= SEQUENCE {
    e-RAB-ID                                E-RAB-ID,
    en-DC-ResourceConfiguration         EN-DC-ResourceConfiguration,
    resource-configuration              CHOICE {
        sgNBPDCPpresent                     E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCPpresent,
        sgNBPDCPnotpresent                  E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCPnotpresent,
        ...
    },
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBModReq-ItemExtIEs} }   OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBModReq-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCPpresent ::= SEQUENCE {
    dL-GTPtunnelEndpoint            GTPtunnelEndpoint                                                       OPTIONAL,
    uL-GTPtunnelEndpoint            GTPtunnelEndpoint                                                       OPTIONAL,
```

```
    iE-Extensions               ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCPpresentExtIEs} }   OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCPpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCPnotpresent ::= SEQUENCE {
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCPnotpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCPnotpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}



-- **************************************************************
--
-- SGNB MODIFICATION REQUEST ACKNOWLEDGE
--
-- **************************************************************

SgNBModificationRequestAcknowledge ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SgNBModificationRequestAcknowledge-IEs}},
    ...
}

SgNBModificationRequestAcknowledge-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                             CRITICALITY ignore  TYPE UE-X2AP-ID                                     PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                             CRITICALITY ignore  TYPE SgNB-UE-X2AP-ID                                    PRESENCE
mandatory}|
    { ID id-E-RABs-Admitted-ToBeAdded-SgNBModAckList        CRITICALITY ignore  TYPE E-RABs-Admitted-ToBeAdded-SgNBModAckList        PRESENCE
optional}|
    { ID id-E-RABs-Admitted-ToBeModified-SgNBModAckList CRITICALITY ignore  TYPE E-RABs-Admitted-ToBeModified-SgNBModAckList   PRESENCE optional}|
    { ID id-E-RABs-Admitted-ToBeReleased-SgNBModAckList CRITICALITY ignore  TYPE E-RABs-Admitted-ToBeReleased-SgNBModAckList   PRESENCE optional}|
    { ID id-E-RABs-NotAdmitted-List                     CRITICALITY ignore  TYPE E-RAB-List                                     PRESENCE optional}|
    { ID id-SgNBtoMeNBContainer                         CRITICALITY ignore  TYPE SgNBtoMeNBContainer                            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-SgNBResourceCoordinationInformation         CRITICALITY ignore  TYPE SgNBResourceCoordinationInformation           PRESENCE optional}|
    { ID id-AdmittedSplitSRBs                           CRITICALITY ignore  TYPE SplitSRBs                                      PRESENCE optional}|
    { ID id-AdmittedSplitSRBsrelease                        CRITICALITY ignore  TYPE SplitSRBs                                  PRESENCE
optional}|
    { ID id-RRCConfigIndication                         CRITICALITY reject  TYPE RRC-Config-Ind                                 PRESENCE optional}|
    { ID id-LocationInformationSgNB                     CRITICALITY ignore  TYPE LocationInformationSgNB                        PRESENCE optional},
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBModAckList ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-Admitted-ToBeAdded-
SgNBModAck-ItemIEs} }
```

```
E-RABs-Admitted-ToBeAdded-SgNBModAck-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-Admitted-ToBeAdded-SgNBModAck-Item   CRITICALITY ignore  TYPE E-RABs-Admitted-ToBeAdded-SgNBModAck-Item     PRESENCE mandatory}
}

E-RABs-Admitted-ToBeAdded-SgNBModAck-Item ::= SEQUENCE {
    e-RAB-ID                                E-RAB-ID,
    en-DC-ResourceConfiguration         EN-DC-ResourceConfiguration,
    resource-configuration              CHOICE {
        sgNBPDCPpresent                     E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCPpresent,
        sgNBPDCPnotpresent                  E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCPnotpresent,
        ...
    },
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-SgNBModAck-ItemExtIEs} }  OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBModAck-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCPpresent ::= SEQUENCE {
    s1-DL-GTPtunnelEndpoint                 GTPtunnelEndpoint,
    sgNB-UL-GTP-TEIDatPDCP                  GTPtunnelEndpoint                                                                   OPTIONAL,
-- This IE shall be present if MCG resource IE in the EN-DC Resource Configuration IE are set to “present” --
    rlc-Mode                                    RLCMode                                                                             OPTIONAL,
-- This IE shall be present if MCG resource IE in the EN-DC Resource Configuration IE are set to “present” --
    dL-Forwarding-GTPtunnelEndpoint         GTPtunnelEndpoint                                                                   OPTIONAL,
    uL-Forwarding-GTPtunnelEndpoint         GTPtunnelEndpoint                                                                   OPTIONAL,
    mCG-E-RAB-Level-QoS-Parameters          E-RAB-Level-QoS-Parameters                                                          OPTIONAL,
-- This IE shall be present if MCG resource and SCG resource IEs in the EN-DC Resource Configuration IE are set to “present” and the GBR QoS
Information IE is present in the Requested MCG E-RAB Level QoS Parameters IE --
    uL-Configuration                        ULConfiguration                                                                     OPTIONAL,
-- This IE shall be present if MCG resource and SCG resources IEs in the EN-DC Resource Configuration IE are set to “present” --
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCPpresentExtIEs} }    OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCPpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-uLpDCPSnLength                          CRITICALITY ignore  EXTENSION PDCPSnLength            PRESENCE optional}|
    { ID id-dLPDCPSnLength                          CRITICALITY ignore  EXTENSION PDCPSnLength            PRESENCE optional},
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCPnotpresent ::= SEQUENCE {
    sgNB-DL-GTP-TEIDatSCG                   GTPtunnelEndpoint,
    secondary-sgNB-DL-GTP-TEIDatSCG         GTPtunnelEndpoint           OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCPnotpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCPnotpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    {ID id-lCID             CRITICALITY ignore  EXTENSION LCID      PRESENCE optional},
    ...
}
```

```
E-RABs-Admitted-ToBeModified-SgNBModAckList ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-Admitted-ToBeModified-
SgNBModAck-ItemIEs} }

E-RABs-Admitted-ToBeModified-SgNBModAck-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-Admitted-ToBeModified-SgNBModAck-Item        CRITICALITY ignore  TYPE E-RABs-Admitted-ToBeModified-SgNBModAck-Item   PRESENCE
mandatory}
}

E-RABs-Admitted-ToBeModified-SgNBModAck-Item ::= SEQUENCE {
    e-RAB-ID                                E-RAB-ID,
    en-DC-ResourceConfiguration         EN-DC-ResourceConfiguration,
    resource-configuration              CHOICE {
        sgNBPDCPpresent                     E-RABs-Admitted-ToBeModified-SgNBModAck-Item-SgNBPDCPpresent,
        sgNBPDCPnotpresent                  E-RABs-Admitted-ToBeModified-SgNBModAck-Item-SgNBPDCPnotpresent,
        ...
    },
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeAdded-SgNBModAck-ItemExtIEs} }   OPTIONAL,
    ...
}

E-RABs-ToBeAdded-SgNBModAck-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-Admitted-ToBeModified-SgNBModAck-Item-SgNBPDCPpresent ::= SEQUENCE {
    s1-DL-GTPtunnelEndpoint                 GTPtunnelEndpoint                                                                           OPTIONAL,
    sgNB-UL-GTP-TEIDatPDCP                  GTPtunnelEndpoint                                                                           OPTIONAL,
    mCG-E-RAB-Level-QoS-Parameters          E-RAB-Level-QoS-Parameters                                                                  OPTIONAL,
    uL-Configuration                            ULConfiguration                                                                             OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-Admitted-ToBeModified-SgNBModAck-Item-SgNBPDCPpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeModified-SgNBModAck-Item-SgNBPDCPpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-uLpDCPSnLength                          CRITICALITY ignore  EXTENSION PDCPSnLength          PRESENCE optional}|
    { ID id-dLPDCPSnLength                          CRITICALITY ignore  EXTENSION PDCPSnLength          PRESENCE optional},
    ...
}

E-RABs-Admitted-ToBeModified-SgNBModAck-Item-SgNBPDCPnotpresent ::= SEQUENCE {
    sgNB-DL-GTP-TEIDatSCG                   GTPtunnelEndpoint
    OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-Admitted-ToBeModified-SgNBModAck-Item-SgNBPDCPnotpresentExtIEs} }
    OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeModified-SgNBModAck-Item-SgNBPDCPnotpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-secondarysgNBDLGTPTEIDatPDCP            CRITICALITY ignore  EXTENSION GTPtunnelEndpoint          PRESENCE optional}|
    { ID id-RLC-Status                              CRITICALITY ignore          EXTENSION RLC-Status         PRESENCE optional },
    ...
}
```

```
E-RABs-Admitted-ToBeReleased-SgNBModAckList ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-Admitted-ToBeReleased-
SgNBModAck-ItemIEs} }

E-RABs-Admitted-ToBeReleased-SgNBModAck-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-Admitted-ToBeReleased-SgNBModAck-Item        CRITICALITY ignore  TYPE E-RABs-Admitted-ToReleased-SgNBModAck-Item     PRESENCE
mandatory}
}

E-RABs-Admitted-ToReleased-SgNBModAck-Item ::= SEQUENCE {
    e-RAB-ID                            E-RAB-ID,
    en-DC-ResourceConfiguration         EN-DC-ResourceConfiguration,
    resource-configuration              CHOICE {
        sgNBPDCPpresent                     E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCPpresent,
        sgNBPDCPnotpresent                  E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCPnotpresent,
        ...
    },
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBModAck-ItemExtIEs} }   OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBModAck-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCPpresent ::= SEQUENCE {
    iE-Extensions               ProtocolExtensionContainer { {E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCPpresentExtIEs} }     OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCPpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCPnotpresent ::= SEQUENCE {
    iE-Extensions               ProtocolExtensionContainer { {E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCPnotpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCPnotpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}


-- **************************************************************
--
-- SGNB MODIFICATION REQUEST REJECT
--
-- **************************************************************

SgNBModificationRequestReject ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SgNBModificationRequestReject-IEs}},
    ...
}
```

```
SgNBModificationRequestReject-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                    CRITICALITY ignore  TYPE UE-X2AP-ID              PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                    CRITICALITY ignore  TYPE SgNB-UE-X2AP-ID           PRESENCE mandatory}|
    { ID id-Cause                              CRITICALITY ignore  TYPE Cause                   PRESENCE mandatory}|
    { 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},
    ...
}


-- **************************************************************
--
-- SGNB MODIFICATION REQUIRED
--
-- **************************************************************

SgNBModificationRequired ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{SgNBModificationRequired-IEs}},
    ...
}

SgNBModificationRequired-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                        CRITICALITY reject  TYPE UE-X2AP-ID                            PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                        CRITICALITY reject  TYPE SgNB-UE-X2AP-ID                        PRESENCE mandatory}|
    { ID id-Cause                                  CRITICALITY ignore  TYPE Cause                                  PRESENCE mandatory}|
    { ID id-PDCPChangeIndication                       CRITICALITY ignore  TYPE PDCPChangeIndication                     PRESENCE optional}|
    { ID id-E-RABs-ToBeReleased-SgNBModReqdList    CRITICALITY ignore  TYPE E-RABs-ToBeReleased-SgNBModReqdList    PRESENCE optional}|
    { ID id-SgNBtoMeNBContainer                    CRITICALITY ignore  TYPE SgNBtoMeNBContainer                    PRESENCE optional}|
    { ID id-MeNB-UE-X2AP-ID-Extension              CRITICALITY reject  TYPE UE-X2AP-ID-Extension                   PRESENCE optional}|
    { ID id-E-RABs-ToBeModified-SgNBModReqdList    CRITICALITY ignore  TYPE E-RABs-ToBeModified-SgNBModReqdList    PRESENCE optional}|
    { ID id-SgNBResourceCoordinationInformation    CRITICALITY ignore  TYPE SgNBResourceCoordinationInformation    PRESENCE optional}|
    { ID id-RRCConfigIndication                    CRITICALITY reject  TYPE RRC-Config-Ind                         PRESENCE optional}|
    { ID id-LocationInformationSgNB                CRITICALITY ignore  TYPE LocationInformationSgNB                PRESENCE optional},
    ...
}


E-RABs-ToBeReleased-SgNBModReqdList ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeReleased-SgNBModReqd-
ItemIEs} }

E-RABs-ToBeReleased-SgNBModReqd-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeReleased-SgNBModReqd-Item     CRITICALITY ignore     TYPE E-RABs-ToBeReleased-SgNBModReqd-Item    PRESENCE mandatory },
    ...
}

E-RABs-ToBeReleased-SgNBModReqd-Item ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    cause                       Cause,
    iE-Extensions               ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBModReqd-ItemExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBModReqd-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-RLCMode-transferred                CRITICALITY ignore  EXTENSION RLCMode              PRESENCE optional},
```

```
    ...
}

E-RABs-ToBeModified-SgNBModReqdList ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeModified-SgNBModReqd-
ItemIEs} }

E-RABs-ToBeModified-SgNBModReqd-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeModified-SgNBModReqd-Item     CRITICALITY ignore     TYPE E-RABs-ToBeModified-SgNBModReqd-Item    PRESENCE mandatory },
    ...
}

E-RABs-ToBeModified-SgNBModReqd-Item ::= SEQUENCE {
    e-RAB-ID                                E-RAB-ID,
    en-DC-ResourceConfiguration         EN-DC-ResourceConfiguration,
    resource-configuration              CHOICE {
        sgNBPDCPpresent                     E-RABs-ToBeModified-SgNBModReqd-Item-SgNBPDCPpresent,
        sgNBPDCPnotpresent                  E-RABs-ToBeModified-SgNBModReqd-Item-SgNBPDCPnotpresent,
        ...
    },
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeModified-SgNBModReqd-ItemExtIEs} }  OPTIONAL,
    ...
}

E-RABs-ToBeModified-SgNBModReqd-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeModified-SgNBModReqd-Item-SgNBPDCPpresent ::= SEQUENCE {
    requested-MCG-E-RAB-Level-QoS-Parameters        E-RAB-Level-QoS-Parameters                                          OPTIONAL,
    uL-Configuration                                ULConfiguration                                                     OPTIONAL,
    sgNB-UL-GTP-TEIDatPDCP                       GTPtunnelEndpoint                                                   OPTIONAL,
    s1-DL-GTP-TEIDatSgNB                            GTPtunnelEndpoint                                                   OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { {E-RABs-ToBeModified-SgNBModReqd-Item-SgNBPDCPpresentExtIEs} }    OPTIONAL,
    ...
}

E-RABs-ToBeModified-SgNBModReqd-Item-SgNBPDCPpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-uLpDCPSnLength                          CRITICALITY ignore  EXTENSION PDCPSnLength            PRESENCE optional}|
    { ID id-dLPDCPSnLength                          CRITICALITY ignore  EXTENSION PDCPSnLength            PRESENCE optional}|
    { ID id-new-drb-ID-req                          CRITICALITY ignore  EXTENSION NewDRBIDrequest         PRESENCE optional},
    ...
}

E-RABs-ToBeModified-SgNBModReqd-Item-SgNBPDCPnotpresent ::= SEQUENCE {
    sgNB-DL-GTP-TEIDatSCG               GTPtunnelEndpoint               OPTIONAL,
    secondary-sgNB-DL-GTP-TEIDatSCG     GTPtunnelEndpoint               OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { {E-RABs-ToBeModified-SgNBModReqd-Item-SgNBPDCPnotpresentExtIEs} }    OPTIONAL,
    ...
}

E-RABs-ToBeModified-SgNBModReqd-Item-SgNBPDCPnotpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-RLC-Status          CRITICALITY ignore          EXTENSION RLC-Status                PRESENCE optional}|
    { ID id-lCID                CRITICALITY ignore          EXTENSION LCID                      PRESENCE optional},
    ...
```

```
}


-- **************************************************************
--
-- SGNB MODIFICATION CONFIRM
--
-- **************************************************************

SgNBModificationConfirm ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SgNBModificationConfirm-IEs}},
    ...
}

SgNBModificationConfirm-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                             CRITICALITY ignore  TYPE UE-X2AP-ID                                  PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                             CRITICALITY ignore  TYPE SgNB-UE-X2AP-ID                                  PRESENCE
mandatory}|
    { ID id-E-RABs-AdmittedToBeModified-SgNBModConfList CRITICALITY ignore  TYPE E-RABs-AdmittedToBeModified-SgNBModConfList   PRESENCE optional}|
    { ID id-MeNBtoSgNBContainer                         CRITICALITY ignore  TYPE MeNBtoSgNBContainer                          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-MeNBResourceCoordinationInformation         CRITICALITY ignore  TYPE MeNBResourceCoordinationInformation          PRESENCE optional},
    ...
}

E-RABs-AdmittedToBeModified-SgNBModConfList ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container
    { {E-RABs-AdmittedToBeModified-SgNBModConf-ItemIEs} }

E-RABs-AdmittedToBeModified-SgNBModConf-ItemIEs X2AP-PROTOCOL-IES ::= {
{ ID id-E-RABs-AdmittedToBeModified-SgNBModConf-Item     CRITICALITY ignore TYPE E-RABs-AdmittedToBeModified-SgNBModConf-Item   PRESENCE
mandatory },
    ...
}

E-RABs-AdmittedToBeModified-SgNBModConf-Item ::= SEQUENCE {
    e-RAB-ID                                E-RAB-ID,
    en-DC-ResourceConfiguration         EN-DC-ResourceConfiguration,
    resource-configuration              CHOICE {
        sgNBPDCPpresent                     E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCPpresent,
        sgNBPDCPnotpresent                  E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCPnotpresent,
        ...
    },
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-AdmittedToBeModified-SgNBModConf-ItemExtIEs} }  OPTIONAL,
    ...
}

E-RABs-AdmittedToBeModified-SgNBModConf-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCPpresent ::= SEQUENCE {
    iE-Extensions               ProtocolExtensionContainer { {E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCPpresentExtIEs} }     OPTIONAL,
    ...
```

```
}

E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCPpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCPnotpresent ::= SEQUENCE {
    secondary-meNB-UL-GTP-TEIDatPDCP                GTPtunnelEndpoint               OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { {E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCPnotpresentExtIEs} }
    OPTIONAL,
    ...
}

E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCPnotpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-uLpDCPSnLength                          CRITICALITY ignore  EXTENSION PDCPSnLength            PRESENCE optional}|
    { ID id-dLPDCPSnLength                          CRITICALITY ignore  EXTENSION PDCPSnLength            PRESENCE optional},
    ...
}

-- **************************************************************
--
-- SGNB MODIFICATION REFUSE
--
-- **************************************************************

SgNBModificationRefuse ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{SgNBModificationRefuse-IEs}},
    ...
}

SgNBModificationRefuse-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                     CRITICALITY ignore  TYPE UE-X2AP-ID             PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                     CRITICALITY ignore  TYPE SgNB-UE-X2AP-ID           PRESENCE mandatory}|
    { ID id-Cause                               CRITICALITY ignore  TYPE Cause                   PRESENCE mandatory}|
    { ID id-MeNBtoSgNBContainer                 CRITICALITY ignore  TYPE MeNBtoSgNBContainer       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},
    ...
}

-- **************************************************************
--
-- SGNB RELEASE REQUEST
--
-- **************************************************************

SgNBReleaseRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{SgNBReleaseRequest-IEs}},
    ...
}

SgNBReleaseRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                         CRITICALITY reject  TYPE UE-X2AP-ID                         PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                         CRITICALITY reject  TYPE SgNB-UE-X2AP-ID                      PRESENCE optional}|
```

```
    { ID id-Cause                                   CRITICALITY ignore  TYPE Cause                                  PRESENCE mandatory}|
    { ID id-E-RABs-ToBeReleased-SgNBRelReqList      CRITICALITY ignore  TYPE E-RABs-ToBeReleased-SgNBRelReqList    PRESENCE optional}|
    { ID id-UE-ContextKeptIndicator                 CRITICALITY ignore  TYPE UE-ContextKeptIndicator               PRESENCE optional}|
    { ID id-MeNB-UE-X2AP-ID-Extension               CRITICALITY reject  TYPE UE-X2AP-ID-Extension                  PRESENCE optional}|
    { ID id-MeNBtoSgNBContainer                     CRITICALITY reject  TYPE MeNBtoSgNBContainer                      PRESENCE optional},
    ...
}

E-RABs-ToBeReleased-SgNBRelReqList ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeReleased-SgNBRelReq-
ItemIEs} }

E-RABs-ToBeReleased-SgNBRelReq-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeReleased-SgNBRelReq-Item     CRITICALITY ignore  TYPE E-RABs-ToBeReleased-SgNBRelReq-Item   PRESENCE mandatory},
    ...
}

E-RABs-ToBeReleased-SgNBRelReq-Item ::= SEQUENCE {
    e-RAB-ID                            E-RAB-ID,
    en-DC-ResourceConfiguration         EN-DC-ResourceConfiguration,
    resource-configuration              CHOICE {
        sgNBPDCPpresent                     E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCPpresent,
        sgNBPDCPnotpresent                  E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCPnotpresent,
        ...
    },
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBRelReq-ItemExtIEs} }   OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBRelReq-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}


E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCPpresent ::= SEQUENCE {
    uL-GTPtunnelEndpoint            GTPtunnelEndpoint                                                   OPTIONAL,
    dL-GTPtunnelEndpoint            GTPtunnelEndpoint                                                       OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCPpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCPpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCPnotpresent ::= SEQUENCE {
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCPnotpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCPnotpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
```

```
--
-- SGNB RELEASE REQUEST ACKNOWLEDGE
--
-- **************************************************************

SgNBReleaseRequestAcknowledge ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{SgNBReleaseRequestAcknowledge-IEs}},
    ...
}

SgNBReleaseRequestAcknowledge-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                                 CRITICALITY ignore  TYPE UE-X2AP-ID                                PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                                 CRITICALITY ignore  TYPE SgNB-UE-X2AP-ID                            PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics                          CRITICALITY ignore  TYPE CriticalityDiagnostics                     PRESENCE optional }|
    { ID id-MeNB-UE-X2AP-ID-Extension                       CRITICALITY reject  TYPE UE-X2AP-ID-Extension                       PRESENCE optional }|
    { ID id-E-RABs-Admitted-ToBeReleased-SgNBRelReqAckList  CRITICALITY ignore  TYPE E-RABs-Admitted-ToBeReleased-SgNBRelReqAckList  PRESENCE
optional },
    ...
}

E-RABs-Admitted-ToBeReleased-SgNBRelReqAckList ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF
                                    ProtocolIE-Single-Container { {E-RABs-Admitted-ToBeReleased-SgNBRelReqAck-ItemIEs} }

E-RABs-Admitted-ToBeReleased-SgNBRelReqAck-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-Admitted-ToBeReleased-SgNBRelReqAck-Item CRITICALITY ignore  TYPE E-RABs-Admitted-ToBeReleased-SgNBRelReqAck-Item    PRESENCE
mandatory},
    ...
}

E-RABs-Admitted-ToBeReleased-SgNBRelReqAck-Item ::= SEQUENCE {
    e-RAB-ID                            E-RAB-ID,
    rlc-Mode-transferred            RLCMode,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-Admitted-ToBeReleased-SgNBRelReqAck-ItemExtIEs} }  OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeReleased-SgNBRelReqAck-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- SGNB RELEASE REQUEST REJECT
--
-- **************************************************************

SgNBReleaseRequestReject ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{SgNBReleaseRequestReject-IEs}},
    ...
}

SgNBReleaseRequestReject-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                         CRITICALITY ignore  TYPE UE-X2AP-ID                         PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                         CRITICALITY ignore  TYPE SgNB-UE-X2AP-ID                        PRESENCE mandatory}|
```

```
    { ID id-Cause                                 CRITICALITY ignore  TYPE Cause                                PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics                CRITICALITY ignore  TYPE CriticalityDiagnostics               PRESENCE optional}|
    { ID id-MeNB-UE-X2AP-ID-Extension             CRITICALITY reject  TYPE UE-X2AP-ID-Extension                 PRESENCE optional},
    ...
}

-- **************************************************************
--
-- SGNB RELEASE REQUIRED
--
-- **************************************************************

SgNBReleaseRequired ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SgNBReleaseRequired-IEs}},
    ...
}

SgNBReleaseRequired-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                       CRITICALITY reject  TYPE UE-X2AP-ID                           PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                       CRITICALITY reject  TYPE SgNB-UE-X2AP-ID                         PRESENCE mandatory}|
    { ID id-Cause                                 CRITICALITY ignore  TYPE Cause                                PRESENCE mandatory}|
    { ID id-MeNB-UE-X2AP-ID-Extension             CRITICALITY reject  TYPE UE-X2AP-ID-Extension                 PRESENCE optional }|
    { ID id-E-RABs-ToBeReleased-SgNBRelReqdList   CRITICALITY ignore  TYPE E-RABs-ToBeReleased-SgNBRelReqdList    PRESENCE optional },
    ...
}

E-RABs-ToBeReleased-SgNBRelReqdList ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeReleased-SgNBRelReqd-
ItemIEs} }

E-RABs-ToBeReleased-SgNBRelReqd-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeReleased-SgNBRelReqd-Item      CRITICALITY ignore  TYPE E-RABs-ToBeReleased-SgNBRelReqd-Item    PRESENCE mandatory},
    ...
}

E-RABs-ToBeReleased-SgNBRelReqd-Item ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    rlc-Mode-transferred            RLCMode,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBRelReqd-ItemExtIEs} }  OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBRelReqd-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- SGNB RELEASE CONFIRM
--
-- **************************************************************

SgNBReleaseConfirm ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SgNBReleaseConfirm-IEs}},
    ...
```

```
}

SgNBReleaseConfirm-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                         CRITICALITY ignore  TYPE UE-X2AP-ID                          PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                         CRITICALITY ignore  TYPE SgNB-UE-X2AP-ID                        PRESENCE mandatory}|
    { ID id-E-RABs-ToBeReleased-SgNBRelConfList     CRITICALITY ignore  TYPE E-RABs-ToBeReleased-SgNBRelConfList   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},
    ...
}

E-RABs-ToBeReleased-SgNBRelConfList ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeReleased-SgNBRelConf-
ItemIEs} }

E-RABs-ToBeReleased-SgNBRelConf-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeReleased-SgNBRelConf-Item        CRITICALITY ignore      TYPE E-RABs-ToBeReleased-SgNBRelConf-Item   PRESENCE mandatory},
    ...
}

E-RABs-ToBeReleased-SgNBRelConf-Item ::= SEQUENCE {
    e-RAB-ID                            E-RAB-ID,
    en-DC-ResourceConfiguration         EN-DC-ResourceConfiguration,
    resource-configuration              CHOICE {
        sgNBPDCPpresent                     E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCPpresent,
        sgNBPDCPnotpresent                  E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCPnotpresent,
        ...
    },
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBRelConf-ItemExtIEs} }  OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBRelConf-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCPpresent ::= SEQUENCE {
    uL-GTPtunnelEndpoint            GTPtunnelEndpoint                                                                   OPTIONAL,
    dL-GTPtunnelEndpoint            GTPtunnelEndpoint                                                                   OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCPpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCPpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCPnotpresent ::= SEQUENCE {
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCPnotpresentExtIEs} }   OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCPnotpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
-- ********************************************************
--
-- SGNB COUNTER CHECK REQUEST
--
-- ********************************************************

SgNBCounterCheckRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SgNBCounterCheckRequest-IEs}},
    ...
}

SgNBCounterCheckRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                             CRITICALITY reject  TYPE UE-X2AP-ID                              PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                             CRITICALITY reject  TYPE SgNB-UE-X2AP-ID                            PRESENCE mandatory}|
    { ID id-E-RABs-SubjectToSgNBCounterCheck-List       CRITICALITY ignore  TYPE E-RABs-SubjectToSgNBCounterCheck-List   PRESENCE mandatory}|
    { ID id-MeNB-UE-X2AP-ID-Extension                   CRITICALITY ignore  TYPE UE-X2AP-ID-Extension                     PRESENCE optional},
    ...
}
E-RABs-SubjectToSgNBCounterCheck-List ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-SubjectToSgNBCounterCheck-
ItemIEs} }

E-RABs-SubjectToSgNBCounterCheck-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-SubjectToSgNBCounterCheck-Item       CRITICALITY ignore  TYPE E-RABs-SubjectToSgNBCounterCheck-Item   PRESENCE mandatory},
    ...
}

E-RABs-SubjectToSgNBCounterCheck-Item ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    uL-Count                        INTEGER (0..4294967295),
    dL-Count                        INTEGER (0..4294967295),
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-SubjectToSgNBCounterCheck-ItemExtIEs} } OPTIONAL,
    ...
}

E-RABs-SubjectToSgNBCounterCheck-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- ********************************************************
--
-- SGNB CHANGE REQUIRED
--
-- ********************************************************

SgNBChangeRequired ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{SgNBChangeRequired-IEs}},
    ...
}

SgNBChangeRequired-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                     CRITICALITY reject  TYPE UE-X2AP-ID             PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                     CRITICALITY reject  TYPE SgNB-UE-X2AP-ID           PRESENCE mandatory}|
```

```
    { ID id-Target-SgNB-ID                      CRITICALITY reject  TYPE GlobalGNB-ID           PRESENCE mandatory}|
    { ID id-Cause                               CRITICALITY ignore  TYPE Cause                  PRESENCE mandatory}|
    { ID id-SgNBtoMeNBContainer                 CRITICALITY reject  TYPE SgNBtoMeNBContainer       PRESENCE optional}|
    { ID id-MeNB-UE-X2AP-ID-Extension           CRITICALITY reject  TYPE UE-X2AP-ID-Extension    PRESENCE optional},
    ...
}

-- **************************************************************
--
-- SGNB CHANGE CONFIRM
--
-- **************************************************************

SgNBChangeConfirm ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{SgNBChangeConfirm-IEs}},
    ...
}

SgNBChangeConfirm-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                         CRITICALITY ignore  TYPE UE-X2AP-ID                          PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                         CRITICALITY ignore  TYPE SgNB-UE-X2AP-ID                         PRESENCE mandatory}|
    { ID id-E-RABs-ToBeReleased-SgNBChaConfList     CRITICALITY ignore  TYPE E-RABs-ToBeReleased-SgNBChaConfList   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},
    ...
}

E-RABs-ToBeReleased-SgNBChaConfList ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeReleased-SgNBChaConf-
ItemIEs} }

E-RABs-ToBeReleased-SgNBChaConf-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeReleased-SgNBChaConf-Item        CRITICALITY ignore      TYPE E-RABs-ToBeReleased-SgNBChaConf-Item   PRESENCE mandatory},
    ...
}

E-RABs-ToBeReleased-SgNBChaConf-Item ::= SEQUENCE {
    e-RAB-ID                            E-RAB-ID,
    en-DC-ResourceConfiguration         EN-DC-ResourceConfiguration,
    resource-configuration              CHOICE {
        sgNBPDCPpresent                     E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCPpresent,
        sgNBPDCPnotpresent                  E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCPnotpresent,
        ...
    },
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBChaConf-ItemExtIEs} }  OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBChaConf-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCPpresent ::= SEQUENCE {
    uL-GTPtunnelEndpoint            GTPtunnelEndpoint                                                   OPTIONAL,
    dL-GTPtunnelEndpoint            GTPtunnelEndpoint                                                   OPTIONAL,
```

```
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCPpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCPpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCPnotpresent ::= SEQUENCE {
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCPnotpresentExtIEs} }   OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCPnotpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- RRC TRANSFER
--
-- **************************************************************

RRCTransfer ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{RRCTransfer-IEs}},
    ...
}

RRCTransfer-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                     CRITICALITY reject  TYPE UE-X2AP-ID             PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                     CRITICALITY reject  TYPE SgNB-UE-X2AP-ID           PRESENCE mandatory}|
    { ID id-SplitSRB                                CRITICALITY reject  TYPE SplitSRB              PRESENCE optional}|
    { ID id-NRUeReport                          CRITICALITY reject  TYPE NRUeReport             PRESENCE optional}|
    { ID id-MeNB-UE-X2AP-ID-Extension           CRITICALITY reject  TYPE UE-X2AP-ID-Extension   PRESENCE optional},
    ...
}

-- **************************************************************
--
-- SGNB CHANGE REFUSE
--
-- **************************************************************

SgNBChangeRefuse ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{SgNBChangeRefuse-IEs}},
    ...
}

SgNBChangeRefuse-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                     CRITICALITY ignore  TYPE UE-X2AP-ID             PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                     CRITICALITY ignore  TYPE SgNB-UE-X2AP-ID           PRESENCE mandatory}|
    { ID id-Cause                               CRITICALITY ignore  TYPE Cause                  PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics              CRITICALITY ignore  TYPE CriticalityDiagnostics PRESENCE optional}|
    { ID id-MeNB-UE-X2AP-ID-Extension           CRITICALITY reject  TYPE UE-X2AP-ID-Extension   PRESENCE optional},
```

```
    ...
}

-- **************************************************************
--
-- EN-DC X2 SETUP REQUEST
--
-- **************************************************************

ENDCX2SetupRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCX2SetupRequest-IEs}},
    ...
}

ENDCX2SetupRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-InitiatingNodeType-EndcX2Setup          CRITICALITY reject  TYPE InitiatingNodeType-EndcX2Setup     PRESENCE mandatory},
    ...
}

InitiatingNodeType-EndcX2Setup ::= CHOICE {
    init-eNB                ProtocolIE-Container    {{ENB-ENDCX2SetupReqIEs}},
    init-en-gNB         ProtocolIE-Container    {{En-gNB-ENDCX2SetupReqIEs}},
    ...
}

ENB-ENDCX2SetupReqIEs X2AP-PROTOCOL-IES ::= {
    { ID id-GlobalENB-ID                            CRITICALITY reject  TYPE GlobalENB-ID                           PRESENCE mandatory}|
    { ID id-ServedEUTRAcellsENDCX2ManagementList        CRITICALITY reject  TYPE ServedEUTRAcellsENDCX2ManagementList    PRESENCE mandatory}|
    { ID id-InterfaceInstanceIndication             CRITICALITY reject  TYPE InterfaceInstanceIndication             PRESENCE optional},
    ...
}

ServedEUTRAcellsENDCX2ManagementList ::= SEQUENCE (SIZE (1.. maxCellineNB)) OF SEQUENCE {
    servedEUTRACellInfo                 ServedCell-Information,
    nrNeighbourInfo                     NRNeighbour-Information     OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { {ServedEUTRAcellsENDCX2Management-ExtIEs} } OPTIONAL,
    ...
}

ServedEUTRAcellsENDCX2Management-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

En-gNB-ENDCX2SetupReqIEs X2AP-PROTOCOL-IES ::= {
    { ID id-Globalen-gNB-ID                         CRITICALITY reject  TYPE GlobalGNB-ID                           PRESENCE mandatory}|
    { ID id-ServedNRcellsENDCX2ManagementList       CRITICALITY reject  TYPE ServedNRcellsENDCX2ManagementList      PRESENCE mandatory},
    ...
}

ServedNRcellsENDCX2ManagementList ::= SEQUENCE (SIZE (1.. maxCellinengNB)) OF SEQUENCE {
    servedNRCellInfo                        ServedNRCell-Information,
    nRNeighbourInfo                     NRNeighbour-Information OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { {En-gNBServedCells-ExtIEs} } OPTIONAL,
    ...
```

```
}

En-gNBServedCells-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

ServedNRCell-Information ::= SEQUENCE {
    nrpCI               NRPCI,
    nrCellID            NRCGI,
    fiveGS-TAC          FiveGS-TAC  OPTIONAL,
    configured-TAC      TAC         OPTIONAL,
    broadcastPLMNs      BroadcastPLMNs-Item,
    nrModeInfo          CHOICE {
        fdd     FDD-InfoServedNRCell-Information,
        tdd     TDD-InfoServedNRCell-Information,
        ...
    },
    measurementTimingConfiguration  OCTET STRING,
    iE-Extensions                       ProtocolExtensionContainer { {ServedNRCell-Information-ExtIEs} } OPTIONAL,
    ...
}

ServedNRCell-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    {ID id-additionalPLMNs-Item         CRITICALITY ignore  EXTENSION AdditionalPLMNs-Item       PRESENCE optional}|
    { ID id-BPLMN-ID-Info-NR                CRITICALITY ignore  EXTENSION BPLMN-ID-Info-NR          PRESENCE optional},
    ...
}

FDD-InfoServedNRCell-Information ::= SEQUENCE {
    ul-NRFreqInfo               NRFreqInfo,
    dl-NRFreqInfo               NRFreqInfo,
    ul-NR-TxBW              NR-TxBW,
    dl-NR-TxBW              NR-TxBW,
    iE-Extensions           ProtocolExtensionContainer { {FDD-InfoServedNRCell-Information-ExtIEs} }    OPTIONAL,
    ...
}

FDD-InfoServedNRCell-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

TDD-InfoServedNRCell-Information ::= SEQUENCE {
    nRFreqInfo              NRFreqInfo,
    nR-TxBW                 NR-TxBW,
    iE-Extensions           ProtocolExtensionContainer { {TDD-InfoServedNRCell-Information-ExtIEs} }    OPTIONAL,
    ...
}

TDD-InfoServedNRCell-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CellAssistanceInformation ::= CHOICE {
    limited-list                Limited-list,
```

```
    full-list               ENUMERATED {allServedNRcells, ...},
    ...
}


Limited-list    ::= SEQUENCE (SIZE (1..maxCellinengNB)) OF SEQUENCE {
    nrCellID            NRCGI,
        iE-Extensions                       ProtocolExtensionContainer { {Limited-list-ExtIEs} } OPTIONAL,
    ...
}

Limited-list-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- EN-DC X2 SETUP RESPONSE
--
-- **************************************************************

ENDCX2SetupResponse ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCX2SetupResponse-IEs}},
    ...
}

ENDCX2SetupResponse-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-RespondingNodeType-EndcX2Setup      CRITICALITY reject  TYPE RespondingNodeType-EndcX2Setup    PRESENCE mandatory},
    ...
}

RespondingNodeType-EndcX2Setup ::= CHOICE {
    respond-eNB         ProtocolIE-Container    {{ENB-ENDCX2SetupReqAckIEs}},
    respond-en-gNB      ProtocolIE-Container    {{En-gNB-ENDCX2SetupReqAckIEs}},
    ...
}

ENB-ENDCX2SetupReqAckIEs X2AP-PROTOCOL-IES ::= {
    { ID id-GlobalENB-ID                                CRITICALITY reject  TYPE GlobalENB-ID                          PRESENCE mandatory}|
    { ID id-ServedEUTRAcellsENDCX2ManagementList        CRITICALITY reject  TYPE ServedEUTRAcellsENDCX2ManagementList    PRESENCE mandatory}|
    { ID id-InterfaceInstanceIndication             CRITICALITY reject  TYPE InterfaceInstanceIndication             PRESENCE optional },
    ...
}


En-gNB-ENDCX2SetupReqAckIEs X2AP-PROTOCOL-IES ::= {
    { ID id-Globalen-gNB-ID                         CRITICALITY reject  TYPE GlobalGNB-ID                           PRESENCE mandatory}|
    { ID id-ServedNRcellsENDCX2ManagementList       CRITICALITY reject  TYPE ServedNRcellsENDCX2ManagementList       PRESENCE mandatory},
    ...
}

-- **************************************************************
--
-- EN-DC X2 SETUP FAILURE
```

```
--
-- **************************************************************

ENDCX2SetupFailure ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCX2SetupFailure-IEs}},
    ...
}

ENDCX2SetupFailure-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-Cause                           CRITICALITY ignore      TYPE Cause                          PRESENCE mandatory} |
    { ID id-CriticalityDiagnostics          CRITICALITY ignore      TYPE CriticalityDiagnostics         PRESENCE optional } |
    { ID id-TimeToWait                      CRITICALITY ignore      TYPE TimeToWait                     PRESENCE optional } |
    { ID id-InterfaceInstanceIndication     CRITICALITY reject      TYPE InterfaceInstanceIndication    PRESENCE optional },
    ...
}

-- **************************************************************
--
-- EN-DC CONFIGURATION UPDATE
--
-- **************************************************************

ENDCConfigurationUpdate ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCConfigurationUpdate-IEs}},
    ...
}

ENDCConfigurationUpdate-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-InitiatingNodeType-EndcConfigUpdate         CRITICALITY reject  TYPE InitiatingNodeType-EndcConfigUpdate        PRESENCE mandatory}|
    { ID id-InterfaceInstanceIndication                 CRITICALITY reject  TYPE InterfaceInstanceIndication                PRESENCE optional},
    ...
}

InitiatingNodeType-EndcConfigUpdate::= CHOICE {
    init-eNB            ProtocolIE-Container    {{ENB-ENDCConfigUpdateIEs}},
    init-en-gNB         ProtocolIE-Container    {{En-gNB-ENDCConfigUpdateIEs}},
    ...
}

ENB-ENDCConfigUpdateIEs X2AP-PROTOCOL-IES ::= {
    { ID id-CellAssistanceInformation               CRITICALITY reject  TYPE CellAssistanceInformation                  PRESENCE optional }|
    { ID id-ServedEUTRAcellsENDCX2ManagementList        CRITICALITY reject  TYPE ServedEUTRAcellsENDCX2ManagementList       PRESENCE optional }|
    { ID id-ServedEUTRAcellsToModifyListENDCConfUpd CRITICALITY reject  TYPE ServedEUTRAcellsToModifyListENDCConfUpd     PRESENCE optional }|
    { ID id-ServedEUTRAcellsToDeleteListENDCConfUpd CRITICALITY reject  TYPE ServedEUTRAcellsToDeleteListENDCConfUpd     PRESENCE optional },
    ...
}

ServedEUTRAcellsToModifyListENDCConfUpd ::= SEQUENCE (SIZE (1.. maxCellineNB)) OF SEQUENCE {
    old-ECGI                                ECGI,
    servedEUTRACellInfo                 ServedCell-Information,
    nrNeighbourInfo                     NRNeighbour-Information     OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { {ServedEUTRAcellsToModifyListENDCConfUpd-ExtIEs} } OPTIONAL,
    ...
}
```

```
ServedEUTRAcellsToModifyListENDCConfUpd-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

ServedEUTRAcellsToDeleteListENDCConfUpd ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ECGI


En-gNB-ENDCConfigUpdateIEs X2AP-PROTOCOL-IES ::= {
    { ID id-ServedNRcellsENDCX2ManagementList       CRITICALITY reject  TYPE ServedNRcellsENDCX2ManagementList        PRESENCE optional }|
    { ID id-ServedNRcellsToModifyListENDCConfUpd        CRITICALITY reject  TYPE ServedNRcellsToModifyENDCConfUpdList    PRESENCE optional }|
    { ID id-ServedNRcellsToDeleteListENDCConfUpd        CRITICALITY reject  TYPE ServedNRcellsToDeleteENDCConfUpdList    PRESENCE optional },
    ...
}

ServedNRcellsToModifyENDCConfUpdList ::= SEQUENCE (SIZE (1..maxCellinengNB)) OF ServedNRCellsToModify-Item

ServedNRCellsToModify-Item::= SEQUENCE {
    old-nrcgi                       NRCGI,
    servedNRCellInformation         ServedNRCell-Information,
    nrNeighbourInformation          NRNeighbour-Information         OPTIONAL,
    nrDeactivationIndication            DeactivationIndication          OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {ServedNRCellsToModify-Item-ExtIEs} } OPTIONAL,
    ...
}

ServedNRCellsToModify-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

ServedNRcellsToDeleteENDCConfUpdList ::= SEQUENCE (SIZE (1..maxCellinengNB)) OF NRCGI

-- **************************************************************
--
-- EN-DC CONFIGURATION UPDATE ACKNOWLEDGE
--
-- **************************************************************

ENDCConfigurationUpdateAcknowledge ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCConfigurationUpdateAcknowledge-IEs}},
    ...
}

ENDCConfigurationUpdateAcknowledge-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-RespondingNodeType-EndcConfigUpdate         CRITICALITY reject  TYPE RespondingNodeType-EndcConfigUpdate        PRESENCE mandatory}|
    { ID id-InterfaceInstanceIndication                 CRITICALITY reject  TYPE InterfaceInstanceIndication                PRESENCE optional },
    ...
}


RespondingNodeType-EndcConfigUpdate::= CHOICE {
    respond-eNB         ProtocolIE-Container    {{ENB-ENDCConfigUpdateAckIEs}},
    respond-en-gNB      ProtocolIE-Container    {{En-gNB-ENDCConfigUpdateAckIEs}},
    ...
```

```
}


ENB-ENDCConfigUpdateAckIEs X2AP-PROTOCOL-IES ::= {
    ...
}

En-gNB-ENDCConfigUpdateAckIEs X2AP-PROTOCOL-IES ::= {
    { ID id-ServedNRcellsENDCX2ManagementList       CRITICALITY reject  TYPE ServedNRcellsENDCX2ManagementList     PRESENCE optional},
    ...
}


-- **************************************************************
--
-- EN-DC CONFIGURATION UPDATE FAILURE
--
-- **************************************************************

ENDCConfigurationUpdateFailure ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCConfigurationUpdateFailure-IEs}},
    ...
}

ENDCConfigurationUpdateFailure-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-Cause                           CRITICALITY ignore  TYPE Cause                          PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics       PRESENCE optional }|
    { ID id-TimeToWait                      CRITICALITY ignore  TYPE TimeToWait                   PRESENCE optional }|
    { ID id-InterfaceInstanceIndication     CRITICALITY reject  TYPE InterfaceInstanceIndication    PRESENCE optional },
    ...
}


-- **************************************************************
--
-- EN-DC CELL ACTIVATION REQUEST
--
-- **************************************************************

ENDCCellActivationRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCCellActivationRequest-IEs}},
    ...
}

ENDCCellActivationRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-ServedNRCellsToActivate         CRITICALITY reject  TYPE ServedNRCellsToActivate          PRESENCE mandatory}|
    { ID id-ActivationID                    CRITICALITY reject  TYPE ActivationID                   PRESENCE mandatory}|
    { ID id-InterfaceInstanceIndication CRITICALITY reject  TYPE InterfaceInstanceIndication        PRESENCE optional },
    ...
}

ServedNRCellsToActivate::= SEQUENCE (SIZE (1.. maxCellinengNB)) OF ServedNRCellsToActivate-Item

ServedNRCellsToActivate-Item::= SEQUENCE {
```

```
    nrCellID                        NRCGI,
    iE-Extensions                   ProtocolExtensionContainer { {ServedNRCellsToActivate-Item-ExtIEs} } OPTIONAL,
    ...
}

ServedNRCellsToActivate-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- EN-DC CELL ACTIVATION RESPONSE
--
-- **************************************************************

ENDCCellActivationResponse ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCCellActivationResponse-IEs}},
    ...
}

ENDCCellActivationResponse-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-ActivatedNRCellList         CRITICALITY ignore  TYPE ActivatedNRCellList             PRESENCE mandatory}|
    { ID id-ActivationID                    CRITICALITY reject  TYPE ActivationID                   PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics         PRESENCE optional }|
    { ID id-InterfaceInstanceIndication CRITICALITY reject  TYPE InterfaceInstanceIndication     PRESENCE optional },
    ...
}

ActivatedNRCellList ::= SEQUENCE (SIZE (1.. maxCellinengNB)) OF ActivatedNRCellList-Item

ActivatedNRCellList-Item::= SEQUENCE {
    nrCellID                        NRCGI,
    iE-Extensions                       ProtocolExtensionContainer { {ActivatedNRCellList-Item-ExtIEs} } OPTIONAL,
    ...
}

ActivatedNRCellList-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

--**************************************************************
--
-- EN-DC CELL ACTIVATION FAILURE
--
-- **************************************************************

ENDCCellActivationFailure ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCCellActivationFailure-IEs}},
    ...
}

ENDCCellActivationFailure-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-ActivationID                        CRITICALITY reject  TYPE ActivationID               PRESENCE mandatory }|
    { ID id-Cause                           CRITICALITY ignore  TYPE Cause                      PRESENCE mandatory }|
```

```
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics      PRESENCE optional }|
    { ID id-InterfaceInstanceIndication     CRITICALITY reject  TYPE InterfaceInstanceIndication    PRESENCE optional },
    ...
}

-- **************************************************************
--
-- SECONDARY RAT DATA USAGE REPORT
--
-- **************************************************************

SecondaryRATDataUsageReport ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{SecondaryRATDataUsageReport-IEs}},
    ...
}

SecondaryRATDataUsageReport-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                     CRITICALITY reject  TYPE UE-X2AP-ID                     PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                     CRITICALITY reject  TYPE SgNB-UE-X2AP-ID                   PRESENCE mandatory}|
    { ID id-SecondaryRATUsageReportList         CRITICALITY reject  TYPE SecondaryRATUsageReportList      PRESENCE mandatory}|
    { ID id-MeNB-UE-X2AP-ID-Extension           CRITICALITY reject  TYPE UE-X2AP-ID-Extension            PRESENCE optional},
    ...
}

-- **************************************************************
--
-- SGNB ACTIVITY NOTIFICATION
--
-- **************************************************************

SgNBActivityNotification ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{SgNBActivityNotification-IEs}},
    ...
}

SgNBActivityNotification-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID                     CRITICALITY reject  TYPE UE-X2AP-ID                     PRESENCE mandatory}|
    { ID id-SgNB-UE-X2AP-ID                     CRITICALITY reject  TYPE SgNB-UE-X2AP-ID                   PRESENCE mandatory}|
    { ID id-UEContextLevelUserPlaneActivity     CRITICALITY ignore  TYPE UserPlaneTrafficActivityReport   PRESENCE optional}|
    { ID id-ERABActivityNotifyItemList          CRITICALITY ignore  TYPE ERABActivityNotifyItemList       PRESENCE optional}|
    { ID id-MeNB-UE-X2AP-ID-Extension           CRITICALITY reject  TYPE UE-X2AP-ID-Extension            PRESENCE optional},
    ...
}

-- **************************************************************
--
-- EN-DC PARTIAL RESET REQUIRED
--
-- **************************************************************

ENDCPartialResetRequired ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCPartialResetRequired-IEs}},
    ...
}
```

```
ENDCPartialResetRequired-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-UEs-ToBeReset               CRITICALITY reject  TYPE UEsToBeResetList                PRESENCE mandatory}|
    { ID id-Cause                       CRITICALITY ignore  TYPE Cause                          PRESENCE mandatory}|
    { ID id-InterfaceInstanceIndication CRITICALITY reject  TYPE InterfaceInstanceIndication       PRESENCE optional},
    ...
}

-- **************************************************************
--
-- EN-DC PARTIAL RESET CONFIRM
--
-- **************************************************************

ENDCPartialResetConfirm ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCPartialResetConfirm-IEs}},
    ...
}

ENDCPartialResetConfirm-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-UEs-Admitted-ToBeReset              CRITICALITY reject  TYPE UEsToBeResetList              PRESENCE mandatory}|
    { ID id-InterfaceInstanceIndication         CRITICALITY reject  TYPE InterfaceInstanceIndication   PRESENCE optional},
    ...
}

-- **************************************************************
--
-- E-UTRA - NR CELL RESOURCE COORDINATION REQUEST
--
-- **************************************************************

EUTRANRCellResourceCoordinationRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{EUTRANRCellResourceCoordinationRequest-IEs}},
    ...
}

EUTRANRCellResourceCoordinationRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-InitiatingNodeType-EutranrCellResourceCoordination  CRITICALITY reject  TYPE InitiatingNodeType-EutranrCellResourceCoordination
    PRESENCE mandatory}|
    { ID id-InterfaceInstanceIndication                         CRITICALITY reject  TYPE InterfaceInstanceIndication
    PRESENCE optional },
    ...
}

InitiatingNodeType-EutranrCellResourceCoordination ::= CHOICE {
    initiate-eNB            ProtocolIE-Container    {{ENB-EUTRA-NRCellResourceCoordinationReqIEs}},
    initiate-en-gNB         ProtocolIE-Container    {{En-gNB-EUTRA-NRCellResourceCoordinationReqIEs}},
    ...
}


ENB-EUTRA-NRCellResourceCoordinationReqIEs X2AP-PROTOCOL-IES ::= {
    { ID id-DataTrafficResourceIndication           CRITICALITY reject  TYPE DataTrafficResourceIndication            PRESENCE mandatory}|
    { ID id-SpectrumSharingGroupID                  CRITICALITY reject  TYPE SpectrumSharingGroupID                   PRESENCE mandatory}|
```

```
    { ID id-ListofEUTRACellsinEUTRACoordinationReq  CRITICALITY reject  TYPE ListofEUTRACellsinEUTRACoordinationReq   PRESENCE mandatory},
    ...
}


En-gNB-EUTRA-NRCellResourceCoordinationReqIEs X2AP-PROTOCOL-IES ::= {
    { ID id-DataTrafficResourceIndication           CRITICALITY reject  TYPE DataTrafficResourceIndication         PRESENCE mandatory}|
    { ID id-ListofEUTRACellsinNRCoordinationReq     CRITICALITY reject  TYPE ListofEUTRACellsinNRCoordinationReq   PRESENCE mandatory }|
    { ID id-SpectrumSharingGroupID                  CRITICALITY reject  TYPE SpectrumSharingGroupID                PRESENCE mandatory}|
    { ID id-ListofNRCellsinNRCoordinationReq        CRITICALITY reject  TYPE ListofNRCellsinNRCoordinationReq      PRESENCE mandatory},
    ...
}


ListofEUTRACellsinEUTRACoordinationReq ::= SEQUENCE (SIZE (0..maxCellineNB)) OF ECGI
ListofEUTRACellsinNRCoordinationReq ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ECGI
ListofNRCellsinNRCoordinationReq ::= SEQUENCE (SIZE (0..maxnoNRcellsSpectrumSharingWithE-UTRA)) OF NRCGI

-- ************************************************************
--
-- E-UTRA - NR CELL RESOURCE COORDINATION RESPONSE
--
-- ************************************************************

EUTRANRCellResourceCoordinationResponse ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        {{EUTRANRCellResourceCoordinationResponse-IEs}},
    ...
}

EUTRANRCellResourceCoordinationResponse-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-RespondingNodeType-EutranrCellResourceCoordination      CRITICALITY reject  TYPE RespondingNodeType-EutranrCellResourceCoordination
        PRESENCE mandatory}|
    { ID id-InterfaceInstanceIndication CRITICALITY reject  TYPE InterfaceInstanceIndication    PRESENCE optional },
    ...
}

RespondingNodeType-EutranrCellResourceCoordination ::= CHOICE {
    respond-eNB         ProtocolIE-Container    {{ENB-EUTRA-NRCellResourceCoordinationReqAckIEs}},
    respond-en-gNB      ProtocolIE-Container    {{En-gNB-EUTRA-NRCellResourceCoordinationReqAckIEs}},
    ...
}


ENB-EUTRA-NRCellResourceCoordinationReqAckIEs X2AP-PROTOCOL-IES ::= {
    { ID id-DataTrafficResourceIndication               CRITICALITY reject  TYPE DataTrafficResourceIndication           PRESENCE mandatory}|
    { ID id-SpectrumSharingGroupID                      CRITICALITY reject  TYPE SpectrumSharingGroupID                  PRESENCE mandatory}|
    { ID id-ListofEUTRACellsinEUTRACoordinationResp     CRITICALITY reject  TYPE ListofEUTRACellsinEUTRACoordinationResp PRESENCE mandatory},
    ...
}


En-gNB-EUTRA-NRCellResourceCoordinationReqAckIEs X2AP-PROTOCOL-IES ::= {
    { ID id-DataTrafficResourceIndication       CRITICALITY reject  TYPE DataTrafficResourceIndication       PRESENCE mandatory}|
    { ID id-SpectrumSharingGroupID              CRITICALITY reject  TYPE SpectrumSharingGroupID              PRESENCE mandatory}|
```

```
    { ID id-ListofNRCellsinNRCoordinationResp   CRITICALITY reject  TYPE ListofNRCellsinNRCoordinationResp    PRESENCE mandatory},


    ...
}

ListofEUTRACellsinEUTRACoordinationResp ::= SEQUENCE (SIZE (0..maxCellineNB)) OF ECGI
ListofNRCellsinNRCoordinationResp ::= SEQUENCE (SIZE (0..maxnoNRcellsSpectrumSharingWithE-UTRA)) OF NRCGI

-- **************************************************************
--
-- EN-DC X2 REMOVAL REQUEST
--
-- **************************************************************

ENDCX2RemovalRequest ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCX2RemovalRequest-IEs}},
    ...
}

ENDCX2RemovalRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-InitiatingNodeType-EndcX2Removal            CRITICALITY reject  TYPE InitiatingNodeType-EndcX2Removal     PRESENCE mandatory}|
    { ID id-InterfaceInstanceIndication                 CRITICALITY reject  TYPE InterfaceInstanceIndication          PRESENCE optional },
    ...
}

InitiatingNodeType-EndcX2Removal ::= CHOICE {
    init-eNB                ProtocolIE-Container    {{ENB-ENDCX2RemovalReqIEs}},
    init-en-gNB         ProtocolIE-Container    {{En-gNB-ENDCX2RemovalReqIEs}},
    ...
}

ENB-ENDCX2RemovalReqIEs X2AP-PROTOCOL-IES ::= {
    { ID id-GlobalENB-ID                                CRITICALITY reject  TYPE GlobalENB-ID                           PRESENCE mandatory},
    ...
}

En-gNB-ENDCX2RemovalReqIEs X2AP-PROTOCOL-IES ::= {
    { ID id-Globalen-gNB-ID                         CRITICALITY reject  TYPE GlobalGNB-ID                           PRESENCE mandatory},
    ...
}

-- **************************************************************
--
-- EN-DC X2 REMOVAL RESPONSE
--
-- **************************************************************

ENDCX2RemovalResponse ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCX2RemovalResponse-IEs}},
    ...
}

ENDCX2RemovalResponse-IEs X2AP-PROTOCOL-IES ::= {
```

```
    { ID id-RespondingNodeType-EndcX2Removal       CRITICALITY reject  TYPE RespondingNodeType-EndcX2Removal   PRESENCE mandatory}|
    { ID id-InterfaceInstanceIndication            CRITICALITY reject  TYPE InterfaceInstanceIndication          PRESENCE optional },
    ...
}

RespondingNodeType-EndcX2Removal ::= CHOICE {
    respond-eNB         ProtocolIE-Container    {{ENB-ENDCX2RemovalReqAckIEs}},
    respond-en-gNB      ProtocolIE-Container    {{En-gNB-ENDCX2RemovalReqAckIEs}},
    ...
}

ENB-ENDCX2RemovalReqAckIEs X2AP-PROTOCOL-IES ::= {
    { ID id-GlobalENB-ID                            CRITICALITY reject  TYPE GlobalENB-ID                        PRESENCE mandatory},
    ...
}

En-gNB-ENDCX2RemovalReqAckIEs X2AP-PROTOCOL-IES ::= {
    { ID id-Globalen-gNB-ID                         CRITICALITY reject  TYPE GlobalGNB-ID                        PRESENCE mandatory},
    ...
}

-- **************************************************************
--
-- EN-DC X2 REMOVAL FAILURE
--
-- **************************************************************

ENDCX2RemovalFailure ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCX2RemovalFailure-IEs}},
    ...
}

ENDCX2RemovalFailure-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-Cause                           CRITICALITY ignore      TYPE Cause                          PRESENCE mandatory} |
    { ID id-CriticalityDiagnostics          CRITICALITY ignore      TYPE CriticalityDiagnostics         PRESENCE optional }|
    { ID id-InterfaceInstanceIndication     CRITICALITY reject      TYPE InterfaceInstanceIndication    PRESENCE optional },
    ...
}

-- **************************************************************
--
-- DATA FORWARDING ADDRESS INDICATION
--
-- **************************************************************

DataForwardingAddressIndication ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{DataForwardingAddressIndication-IEs}},
    ...
}

DataForwardingAddressIndication-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-New-eNB-UE-X2AP-ID-Extension        CRITICALITY ignore  TYPE UE-X2AP-ID-Extension               PRESENCE optional }|
    { 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 }|
```

```
    { ID id-E-RABs-DataForwardingAddress-List   CRITICALITY ignore  TYPE E-RABs-DataForwardingAddress-List    PRESENCE mandatory},
    ...
}

E-RABs-DataForwardingAddress-List ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-DataForwardingAddress-ItemIEs} }

E-RABs-DataForwardingAddress-ItemIEs    X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-DataForwardingAddress-Item   CRITICALITY ignore  TYPE E-RABs-DataForwardingAddress-Item PRESENCE mandatory},
    ...
}

E-RABs-DataForwardingAddress-Item ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    dl-GTPtunnelEndpoint            GTPtunnelEndpoint,
    iE-Extensions                   ProtocolExtensionContainer { {E-RABs-DataForwardingAddress-ItemExtIEs} } OPTIONAL,
    ...
}

E-RABs-DataForwardingAddress-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- GNB STATUS INDICATION
--
-- **************************************************************


GNBStatusIndication ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container    { { GNBStatusIndicationIEs} },
    ...
}

GNBStatusIndicationIEs X2AP-PROTOCOL-IES ::= {
    { ID id-GNBOverloadInformation          CRITICALITY ignore  TYPE GNBOverloadInformation       PRESENCE mandatory}|
    { ID id-InterfaceInstanceIndication     CRITICALITY reject  TYPE InterfaceInstanceIndication     PRESENCE optional },
    ...
}

-- **************************************************************
--
-- EN-DC CONFIGURATION TRANSFER
--
-- **************************************************************

ENDCConfigurationTransfer ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ENDCConfigurationTransfer-IEs}},
    ...
}

ENDCConfigurationTransfer-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-endcSONConfigurationTransfer    CRITICALITY ignore  TYPE EndcSONConfigurationTransfer       PRESENCE optional}|
    { ID id-InterfaceInstanceIndication     CRITICALITY reject  TYPE InterfaceInstanceIndication          PRESENCE optional },
```

```
    ...
}

-- **************************************************************
--
-- TRACE START
--
-- **************************************************************

TraceStart ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        { {TraceStartIEs} },
    ...
}

TraceStartIEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID         CRITICALITY reject  TYPE UE-X2AP-ID                 PRESENCE mandatory  }|
    { ID id-SgNB-UE-X2AP-ID         CRITICALITY reject  TYPE SgNB-UE-X2AP-ID            PRESENCE mandatory  }|
    { ID id-TraceActivation         CRITICALITY ignore  TYPE TraceActivation            PRESENCE mandatory  },
    ...
}

-- **************************************************************
--
-- DEACTIVATE TRACE
--
-- **************************************************************

DeactivateTrace ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        { {DeactivateTraceIEs} },
    ...
}

DeactivateTraceIEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID         CRITICALITY reject  TYPE UE-X2AP-ID                 PRESENCE mandatory  }|
    { ID id-SgNB-UE-X2AP-ID         CRITICALITY reject  TYPE SgNB-UE-X2AP-ID            PRESENCE mandatory  }|
    { ID id-EUTRANTraceID           CRITICALITY ignore  TYPE EUTRANTraceID              PRESENCE mandatory  },
    ...
}

END
-- ASN1STOP
```

9.3.5 Information Element definitions

```
-- ASN1START
-- **************************************************************
--
-- 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-NRrestrictioninEPSasSecondaryRAT,
    id-NRrestrictionin5GS,
    id-AdditionalSpecialSubframe-Info,
    id-UEID,
    id-enhancedRNTP,
    id-ProSeUEtoNetworkRelaying,
    id-M6Configuration,
    id-M7Configuration,
    id-OffsetOfNbiotChannelNumberToDL-EARFCN,
    id-OffsetOfNbiotChannelNumberToUL-EARFCN,
    id-AdditionalSpecialSubframeExtension-Info,
    id-BandwidthReducedSI,
    id-extended-e-RAB-MaximumBitrateDL,
    id-extended-e-RAB-MaximumBitrateUL,
    id-extended-e-RAB-GuaranteedBitrateDL,
    id-extended-e-RAB-GuaranteedBitrateUL,
    id-extended-uEaggregateMaximumBitRateDownlink,
    id-extended-uEaggregateMaximumBitRateUplink,
    id-E-RABUsageReport-Item,
    id-SecondaryRATUsageReport-Item,
    id-UEAppLayerMeasConfig,
    id-DL-scheduling-PDCCH-CCE-usage,
    id-UL-scheduling-PDCCH-CCE-usage,
    id-DownlinkPacketLossRate,
    id-UplinkPacketLossRate,
    id-serviceType,
```

```
    id-ProtectedEUTRAResourceIndication,
    id-NRS-NSSS-PowerOffset,
    id-NSSS-NumOccasionDifferentPrecoder,
    id-CNTypeRestrictions,
    id-BluetoothMeasurementConfiguration,
    id-WLANMeasurementConfiguration,
    id-ECGI,
    id-NRCGI,
    id-MeNBCoordinationAssistanceInformation,
    id-SgNBCoordinationAssistanceInformation,
    id-NRNeighbourInfoToAdd,
    id-LastNG-RANPLMNIdentity,
    id-BPLMN-ID-Info-EUTRA,

    maxnoofBearers,
    maxCellineNB,
    maxEARFCN,
    maxEARFCNPlusOne,
    newmaxEARFCN,
    maxInterfaces,

    maxnoofBands,
    maxnoofBPLMNs,
    maxnoofAdditionalPLMNs,
    maxnoofCells,
    maxnoofEPLMNs,
    maxnoofEPLMNsPlusOne,
    maxnoofForbLACs,
    maxnoofForbTACs,
    maxnoofNeighbours,
    maxnoofPRBs,
    maxNrOfErrors,
    maxPools,
    maxnoofMBSFN,
    maxnoofTAforMDT,
    maxnoofCellIDforMDT,
    maxnoofMBMSServiceAreaIdentities,
    maxnoofMDTPLMNs,
    maxnoofCoMPHypothesisSet,
    maxnoofCoMPCells,
    maxUEReport,
    maxCellReport,
    maxnoofPA,
    maxCSIProcess,
    maxCSIReport,
    maxSubband,
    maxnooftimeperiods,
    maxnoofCellIDforQMC,
    maxnoofTAforQMC,
    maxnoofPLMNforQMC,
    maxUEsinengNBDU,
    maxnoofProtectedResourcePatterns,
    maxnoNRcellsSpectrumSharingWithE-UTRA,
    maxnoofNrCellBands,
```

```
    maxnoofBluetoothName,
    maxnoofWLANName,
    maxofNRNeighbours,
    maxnoofextBPLMNs,
    maxnoofextBPLMNsminus1,
    maxnoofBPLMNsminus1

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, ...},
    measurement-subset                  BIT STRING (SIZE(40)),
    iE-Extensions                       ProtocolExtensionContainer { {ABSInformationFDD-ExtIEs} } OPTIONAL,
    ...
}

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 ::= {
    ...
}

ActivationID ::= INTEGER (0..255)

AdditionalSpecialSubframe-Info ::=      SEQUENCE {
    additionalspecialSubframePatterns       AdditionalSpecialSubframePatterns,
    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,
    ...
}

AdditionalSpecialSubframeExtension-Info ::=     SEQUENCE {
    additionalspecialSubframePatternsExtension  AdditionalSpecialSubframePatternsExtension,
    cyclicPrefixDL                              CyclicPrefixDL,
    cyclicPrefixUL                              CyclicPrefixUL,
    iE-Extensions                               ProtocolExtensionContainer { {AdditionalSpecialSubframeExtension-Info-ExtIEs} } OPTIONAL,
    ...
}

AdditionalSpecialSubframeExtension-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

AdditionalSpecialSubframePatternsExtension ::= ENUMERATED {
    ssp10,
```

```
    ...
}

AerialUEsubscriptionInformation ::= ENUMERATED {
    allowed,
    not-allowed,
    ...
}

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,
    ...,
    tAIBased                    TAIBasedMDT
}

AreaScopeOfQMC ::= CHOICE {
    cellBased                   CellBasedQMC,
    tABased                     TABasedQMC,
    tAIBased                    TAIBasedQMC,
    pLMNAreaBased               PLMNAreaBasedQMC,
    ...
}

AS-SecurityInformation ::= SEQUENCE {
    key-eNodeB-star     Key-eNodeB-Star,
    nextHopChainingCount            NextHopChainingCount,
    iE-Extensions                       ProtocolExtensionContainer { {AS-SecurityInformation-ExtIEs} } OPTIONAL,
    ...
}

AS-SecurityInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

AdditionalPLMNs-Item ::= SEQUENCE (SIZE(1..maxnoofAdditionalPLMNs)) OF PLMN-Identity


-- B

BandwidthReducedSI::= ENUMERATED {
```

```
    scheduled,
    ...
}

BearerType ::= ENUMERATED {
    non-IP,
    ...
}

BenefitMetric ::= INTEGER (-101..100, ...)

BitRate ::= INTEGER (0..10000000000)
BroadcastPLMNs-Item ::= SEQUENCE (SIZE(1..maxnoofBPLMNs)) OF PLMN-Identity

BluetoothMeasurementConfiguration ::= SEQUENCE {
    bluetoothMeasConfig             BluetoothMeasConfig,
    bluetoothMeasConfigNameList     BluetoothMeasConfigNameList         OPTIONAL,
    bt-rssi                         ENUMERATED {true, ...}              OPTIONAL,
    iE-Extensions       ProtocolExtensionContainer { {BluetoothMeasurementConfiguration-ExtIEs} } OPTIONAL,
    ...
}

BluetoothMeasurementConfiguration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

BluetoothMeasConfigNameList ::= SEQUENCE (SIZE(1..maxnoofBluetoothName)) OF BluetoothName

BluetoothMeasConfig::= ENUMERATED {setup,...}

BluetoothName ::= OCTET STRING (SIZE (1..248))

BPLMN-ID-Info-EUTRA ::= SEQUENCE (SIZE(1..maxnoofBPLMNsminus1)) OF BPLMN-ID-Info-EUTRA-Item

BPLMN-ID-Info-EUTRA-Item ::= SEQUENCE {
    broadcastPLMNs                  BroadcastPLMNs-Item,
    tac                             TAC,
    e-utraCI                        EUTRANCellIdentifier,
    iE-Extension                    ProtocolExtensionContainer { {BPLMN-ID-Info-EUTRA-Item-ExtIEs} } OPTIONAL,
    ...
}

BPLMN-ID-Info-EUTRA-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

BPLMN-ID-Info-NR ::= SEQUENCE (SIZE(1..maxnoofextBPLMNsminus1)) OF BPLMN-ID-Info-NR-Item

BPLMN-ID-Info-NR-Item ::= SEQUENCE {
    broadcastPLMNs                  BroadcastextPLMNs,
    fiveGStac                       FiveGS-TAC      OPTIONAL,
    nr-CI                           NRCellIdentifier,
    iE-Extension                    ProtocolExtensionContainer { {BPLMN-ID-Info-NR-Item-ExtIEs} } OPTIONAL,
    ...
```

```
}

BPLMN-ID-Info-NR-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

BroadcastextPLMNs ::= SEQUENCE (SIZE(1..maxnoofextBPLMNs)) 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-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,
    mCG-Mobility,
    sCG-Mobility,
    count-reaches-max-value,
    unknown-old-en-gNB-UE-X2AP-ID,
    pDCP-Overload

}

CauseTransport ::= ENUMERATED {
    transport-resource-unavailable,
    unspecified,
    ...
}

CellBasedMDT::= SEQUENCE {
    cellIdListforMDT    CellIdListforMDT,
    iE-Extensions       ProtocolExtensionContainer { {CellBasedMDT-ExtIEs} } OPTIONAL,
    ...
}
```

```
CellBasedMDT-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CellBasedQMC::= SEQUENCE {
    cellIdListforQMC        CellIdListforQMC,
    iE-Extensions       ProtocolExtensionContainer { {CellBasedQMC-ExtIEs} } OPTIONAL,
    ...
}

CellBasedQMC-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CellCapacityClassValue ::= INTEGER (1..100, ...)

CellDeploymentStatusIndicator ::= ENUMERATED {pre-change-notification, ...}

CellIdListforMDT ::= SEQUENCE (SIZE(1..maxnoofCellIDforMDT)) OF ECGI

CellIdListforQMC ::= SEQUENCE (SIZE(1..maxnoofCellIDforQMC)) 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 ::= {
    ...
}

CNTypeRestrictions ::= SEQUENCE (SIZE(1.. maxnoofEPLMNsPlusOne)) OF CNTypeRestrictionsItem

CNTypeRestrictionsItem ::= SEQUENCE {
    plmn-Id             PLMN-Identity,
    cn-type             ENUMERATED {fiveGC-forbidden, ... , epc-forbidden},
    iE-Extensions       ProtocolExtensionContainer { {CNTypeRestrictionsItem-ExtIEs} } OPTIONAL,
    ...
```

```
}

CNTypeRestrictionsItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CoMPHypothesisSet ::= SEQUENCE (SIZE(1..maxnoofCoMPCells)) OF CoMPHypothesisSetItem

CoMPHypothesisSetItem ::= SEQUENCE {
    coMPCellID                      ECGI,
    coMPHypothesis                  BIT STRING (SIZE(6..4400, ...)),
    iE-Extensions                   ProtocolExtensionContainer { {CoMPHypothesisSetItem-ExtIEs} } OPTIONAL,
    ...
}

CoMPHypothesisSetItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CoMPInformation ::= SEQUENCE {
    coMPInformationItem                 CoMPInformationItem,
    coMPInformationStartTime            CoMPInformationStartTime,
    iE-Extensions                       ProtocolExtensionContainer { {CoMPInformation-ExtIEs} } OPTIONAL,
    ...
}

CoMPInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CoMPInformationItem ::= SEQUENCE (SIZE(1..maxnoofCoMPHypothesisSet)) OF
    SEQUENCE {
        coMPHypothesisSet               CoMPHypothesisSet,
        benefitMetric                   BenefitMetric,
        iE-Extensions                   ProtocolExtensionContainer { {CoMPInformationItem-ExtIEs} } OPTIONAL,
        ...
    }

CoMPInformationItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CoMPInformationStartTime ::= SEQUENCE (SIZE(0..1)) OF
    SEQUENCE {
        startSFN                        INTEGER (0..1023, ...),
        startSubframeNumber             INTEGER (0..9, ...),
        iE-Extensions                   ProtocolExtensionContainer { {CoMPInformationStartTime-ExtIEs} } OPTIONAL,
        ...
    }

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,
    iE-Extensions           ProtocolExtensionContainer { {COUNTvalue-ExtIEs} } OPTIONAL,
    ...
}

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,
    iE-Extensions           ProtocolExtensionContainer { {COUNTvaluePDCP-SNlength18-ExtIEs} } OPTIONAL,
    ...
}

COUNTvaluePDCP-SNlength18-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
```

```
    ...
}

CoverageModificationList ::= SEQUENCE (SIZE (1..maxCellineNB)) OF CoverageModification-Item

CoverageModification-Item ::= SEQUENCE {
    eCGI                          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,
        iE-Extensions          ProtocolExtensionContainer { {CriticalityDiagnostics-IE-List-ExtIEs} } OPTIONAL,
        ...
}

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,
        subbandCQIList                  SubbandCQIList  OPTIONAL,
        iE-Extensions                   ProtocolExtensionContainer { {CSIReportPerCSIProcessItem-ExtIEs} } OPTIONAL,
        ...
    }

CSIReportPerCSIProcessItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CyclicPrefixDL ::= ENUMERATED {
    normal,
    extended,
    ...
}

CyclicPrefixUL ::= ENUMERATED {
    normal,
    extended,
    ...
}


-- D


DataTrafficResources ::= BIT STRING (SIZE(6..17600))

DataTrafficResourceIndication ::= SEQUENCE {
    activationSFN                   INTEGER (0..1023),
```

```
    sharedResourceType              SharedResourceType,
    reservedSubframePattern         ReservedSubframePattern OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {DataTrafficResourceIndication-ExtIEs} } OPTIONAL,
...
}

DataTrafficResourceIndication-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

DeactivationIndication::= ENUMERATED {
    deactivated,
    ...
}

DeliveryStatus ::= SEQUENCE {
    highestSuccessDeliveredPDCPSN       INTEGER (0..4095),
    iE-Extensions       ProtocolExtensionContainer { {DeliveryStatus-ExtIEs} } OPTIONAL,
    ...
}

DeliveryStatus-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

DesiredActNotificationLevel ::= ENUMERATED {none, e-rab, ue-level, ...}

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)

DLResourceBitmapULandDLSharing ::= DataTrafficResources

DLResourcesULandDLSharing ::= CHOICE {
unchanged           NULL,
    changed             DLResourceBitmapULandDLSharing,
    ...
}

DL-scheduling-PDCCH-CCE-usage::= INTEGER (0..100)

DL-Total-PRB-usage::= INTEGER (0..100)

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

DuplicationActivation::= ENUMERATED {active, inactive, ...}
```

```
DynamicDLTransmissionInformation ::= CHOICE {
    naics-active            DynamicNAICSInformation,
    naics-inactive          NULL,
    ...
}

DynamicNAICSInformation ::= SEQUENCE {
    transmissionModes                   BIT STRING (SIZE(8))                                                OPTIONAL,
    pB-information                      INTEGER(0..3)                                                       OPTIONAL,
    pA-list                             SEQUENCE (SIZE(0..maxnoofPA)) OF PA-Values,
    iE-Extensions                       ProtocolExtensionContainer { {DynamicNAICSInformation-ExtIEs} } OPTIONAL,
    ...
}

DynamicNAICSInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- E

EARFCN ::= INTEGER (0..maxEARFCN)

EARFCNExtension ::= INTEGER(maxEARFCNPlusOne..newmaxEARFCN, ...)

ECGI ::= SEQUENCE {
    pLMN-Identity               PLMN-Identity,
    eUTRANcellIdentifier        EUTRANCellIdentifier,
    iE-Extensions               ProtocolExtensionContainer { {ECGI-ExtIEs} } OPTIONAL,
    ...
}

ECGI-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

EndcSONConfigurationTransfer ::= OCTET STRING

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)),
    ... ,
    short-Macro-eNB-ID      BIT STRING (SIZE(18)),
    long-Macro-eNB-ID       BIT STRING (SIZE(21))
}

EncryptionAlgorithms ::= BIT STRING (SIZE (16, ...))

EN-DC-ResourceConfiguration ::= SEQUENCE {
    pDCPatSgNB      ENUMERATED {present, not-present, ...},
    mCGresources    ENUMERATED {present, not-present, ...},
    sCGresources    ENUMERATED {present, not-present, ...},
    iE-Extensions                   ProtocolExtensionContainer { {EN-DC-ResourceConfigurationExtIEs} }  OPTIONAL,
    ...
}

EN-DC-ResourceConfigurationExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}


EPLMNs ::= SEQUENCE (SIZE(1..maxnoofEPLMNs)) OF PLMN-Identity

ERABActivityNotifyItemList ::= SEQUENCE (SIZE (0..maxnoofBearers)) OF ERABActivityNotifyItem

ERABActivityNotifyItem ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    activityReport                  UserPlaneTrafficActivityReport,
    iE-Extensions                   ProtocolExtensionContainer { {ERABActivityNotifyItem-ExtIEs} }   OPTIONAL,
    ...
}

ERABActivityNotifyItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RAB-ID ::= INTEGER (0..15, ...)

E-RAB-Level-QoS-Parameters ::= SEQUENCE {
    qCI                             QCI,
    allocationAndRetentionPriority  AllocationAndRetentionPriority,
    gbrQosInformation               GBR-QosInformation                                          OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {E-RAB-Level-QoS-Parameters-ExtIEs} }  OPTIONAL,
    ...
}
```

```
E-RAB-Level-QoS-Parameters-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
-- Extended for introduction of downlink and uplink packet loss rate for enhanced Voice performance –
    { ID id-DownlinkPacketLossRate          CRITICALITY ignore  EXTENSION Packet-LossRate       PRESENCE optional}|
    { ID id-UplinkPacketLossRate            CRITICALITY ignore  EXTENSION Packet-LossRate       PRESENCE optional},
    ...
}

E-RAB-List ::= SEQUENCE (SIZE(1.. maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RAB-ItemIEs} }

E-RAB-ItemIEs   X2AP-PROTOCOL-IES ::= {
    { ID id-E-RAB-Item   CRITICALITY ignore     TYPE E-RAB-Item     PRESENCE mandatory },
    ...
}

E-RAB-Item ::= SEQUENCE {
    e-RAB-ID                E-RAB-ID,
    cause                       Cause,
    iE-Extensions               ProtocolExtensionContainer { {E-RAB-Item-ExtIEs} } OPTIONAL,
    ...
}

E-RAB-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABUsageReportList ::= SEQUENCE (SIZE(1..maxnooftimeperiods)) OF ProtocolIE-Single-Container { {E-RABUsageReport-ItemIEs} }

E-RABUsageReport-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABUsageReport-Item    CRITICALITY ignore     TYPE E-RABUsageReport-Item  PRESENCE mandatory },
    ...
}

E-RABUsageReport-Item ::= SEQUENCE {
    startTimeStamp              OCTET STRING (SIZE(4)),
    endTimeStamp                    OCTET STRING (SIZE(4)),
    usageCountUL                    INTEGER (0..18446744073709551615),
    usageCountDL                    INTEGER (0..18446744073709551615),
    iE-Extensions               ProtocolExtensionContainer { {E-RABUsageReport-Item-ExtIEs} } OPTIONAL,
...
}

E-RABUsageReport-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

EUTRA-Mode-Info ::= CHOICE {
    fDD     FDD-Info,
    tDD     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,
    iE-Extensions       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 ::= {
    ...
}

ExtendedBitRate ::= INTEGER (10000000001..4000000000000,...)

-- F

FDD-Info ::= SEQUENCE {
```

```
    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 ::= {
    { ID id-UL-EARFCNExtension                      CRITICALITY reject  EXTENSION EARFCNExtension                       PRESENCE optional}|
    { ID id-DL-EARFCNExtension                      CRITICALITY reject  EXTENSION EARFCNExtension                       PRESENCE optional}|
    { ID id-OffsetOfNbiotChannelNumberToDL-EARFCN   CRITICALITY reject  EXTENSION OffsetOfNbiotChannelNumberToEARFCN    PRESENCE optional}|
    { ID id-OffsetOfNbiotChannelNumberToUL-EARFCN   CRITICALITY reject  EXTENSION OffsetOfNbiotChannelNumberToEARFCN    PRESENCE optional}|
    { ID id-NRS-NSSS-PowerOffset                    CRITICALITY ignore  EXTENSION NRS-NSSS-PowerOffset                  PRESENCE optional}|
    { ID id-NSSS-NumOccasionDifferentPrecoder       CRITICALITY ignore  EXTENSION NSSS-NumOccasionDifferentPrecoder     PRESENCE optional},
    ...
}

FDD-InfoNeighbourServedNRCell-Information ::= SEQUENCE {
    ul-NRFreqInfo           NRFreqInfo,
    dl-NRFreqInfo           NRFreqInfo,
    iE-Extensions           ProtocolExtensionContainer { {FDD-InfoNeighbourServedNRCell-Information-ExtIEs} }    OPTIONAL,
    ...
}

FDD-InfoNeighbourServedNRCell-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

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 ::= SEQUENCE (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 ::= SEQUENCE (SIZE(1..maxnoofForbLACs)) OF LAC

Fourframes ::= BIT STRING (SIZE (24))

FreqBandIndicator ::= INTEGER (1..256, ...)

FreqBandIndicatorPriority ::= ENUMERATED {
    not-broadcasted,
    broadcasted,
    ...
}


FreqBandNrItem ::= SEQUENCE {
    freqBandIndicatorNr             INTEGER (1..1024,...),
    supportedSULBandList    SEQUENCE (SIZE(0..maxnoofNrCellBands)) OF SupportedSULFreqBandItem,
    iE-Extensions               ProtocolExtensionContainer { {FreqBandNrItem-ExtIEs} } OPTIONAL,
    ...
}

FreqBandNrItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- G

GBR-QosInformation ::= SEQUENCE {
    e-RAB-MaximumBitrateDL          BitRate,
    e-RAB-MaximumBitrateUL          BitRate,
    e-RAB-GuaranteedBitrateDL       BitRate,
    e-RAB-GuaranteedBitrateUL       BitRate,
    iE-Extensions                   ProtocolExtensionContainer { {GBR-QosInformation-ExtIEs} } OPTIONAL,
    ...
}

GBR-QosInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
-- Extension for maximum bitrate > 10Gbps --
    { ID id-extended-e-RAB-MaximumBitrateDL     CRITICALITY ignore  EXTENSION ExtendedBitRate   PRESENCE optional}|
    { ID id-extended-e-RAB-MaximumBitrateUL     CRITICALITY ignore  EXTENSION ExtendedBitRate   PRESENCE optional}|
    { ID id-extended-e-RAB-GuaranteedBitrateDL  CRITICALITY ignore  EXTENSION ExtendedBitRate   PRESENCE optional}|
```

```
    { ID id-extended-e-RAB-GuaranteedBitrateUL  CRITICALITY ignore  EXTENSION ExtendedBitRate   PRESENCE optional},
    ...
}

GlobalENB-ID ::= SEQUENCE {
    pLMN-Identity           PLMN-Identity,
    eNB-ID                  ENB-ID,
    iE-Extensions           ProtocolExtensionContainer { {GlobalENB-ID-ExtIEs} } OPTIONAL,
    ...
}

GlobalENB-ID-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

GlobalGNB-ID ::= SEQUENCE {
    pLMN-Identity           PLMN-Identity,
    gNB-ID                  GNB-ID,
    iE-Extensions           ProtocolExtensionContainer { {GlobalGNB-ID-ExtIEs} } OPTIONAL,
    ...
}

GlobalGNB-ID-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

GNBOverloadInformation ::= ENUMERATED {overloaded, not-overloaded, ...}

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


GU-Group-ID         ::= SEQUENCE {
    pLMN-Identity       PLMN-Identity,
    mME-Group-ID        MME-Group-ID,
    iE-Extensions       ProtocolExtensionContainer { {GU-Group-ID-ExtIEs} } OPTIONAL,
    ...
}

GU-Group-ID-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
GUMMEI          ::= SEQUENCE {

    gU-Group-ID     GU-Group-ID,
    mME-Code            MME-Code,
    iE-Extensions                   ProtocolExtensionContainer { {GUMMEI-ExtIEs} } OPTIONAL,
    ...
}

GUMMEI-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

GNB-ID ::= CHOICE {
    gNB-ID  BIT STRING (SIZE (22..32)),
    ...
}


-- 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 ::= {
    { ID id-NRrestrictioninEPSasSecondaryRAT            CRITICALITY ignore  EXTENSION NRrestrictioninEPSasSecondaryRAT      PRESENCE optional}|
    { ID id-CNTypeRestrictions                      CRITICALITY ignore  EXTENSION CNTypeRestrictions                    PRESENCE optional}|
    { ID id-NRrestrictionin5GS                      CRITICALITY ignore  EXTENSION NRrestrictionin5GS                    PRESENCE optional}|
    { ID id-LastNG-RANPLMNIdentity                  CRITICALITY ignore  EXTENSION PLMN-Identity                         PRESENCE optional},
    ...
}

HFN ::= INTEGER (0..1048575)

HFNModified ::= INTEGER (0..131071)

HFNforPDCP-SNlength18 ::= INTEGER (0..16383)

HWLoadIndicator ::= SEQUENCE {
```

```
    dLHWLoadIndicator           LoadIndicator,
    uLHWLoadIndicator           LoadIndicator,
    iE-Extensions               ProtocolExtensionContainer { {HWLoadIndicator-ExtIEs} } OPTIONAL,
    ...
}

HWLoadIndicator-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}


-- I

IntegrityProtectionAlgorithms ::= BIT STRING (SIZE (16, ...))

InterfaceInstanceIndication ::= INTEGER (0..255, ...)

InterfacesToTrace ::= BIT STRING (SIZE (8))

InvokeIndication ::= ENUMERATED{
    abs-information,
    ...,
    naics-information-start,
    naics-information-stop
}

-- J
-- K

Key-eNodeB-Star ::= BIT STRING (SIZE(256))

-- L

LAC                ::= OCTET STRING (SIZE (2)) --(EXCEPT ('0000'H|'FFFE'H))

LastVisitedCell-Item ::= CHOICE {
    e-UTRAN-Cell                    LastVisitedEUTRANCellInformation,
    uTRAN-Cell                      LastVisitedUTRANCellInformation,
    gERAN-Cell                      LastVisitedGERANCellInformation,
    ...,
    nG-RAN-Cell                     LastVisitedNGRANCellInformation
}

LastVisitedEUTRANCellInformation ::= SEQUENCE {
    global-Cell-ID                  ECGI,
    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-Time-UE-StayedInCell-EnhancedGranularity    CRITICALITY ignore  EXTENSION Time-UE-StayedInCell-EnhancedGranularity PRESENCE optional}|
```

```
    { ID id-HO-cause                                CRITICALITY ignore  EXTENSION Cause                                 PRESENCE optional},
    ...
}

LastVisitedGERANCellInformation ::= CHOICE {
    undefined                       NULL,
    ...
}

LastVisitedNGRANCellInformation ::= OCTET STRING

LastVisitedUTRANCellInformation ::= OCTET STRING

LCID ::= INTEGER(1..32, ...)

LHN-ID ::= OCTET STRING(SIZE (32..256))

Links-to-log ::= ENUMERATED {uplink, downlink, both-uplink-and-downlink, ...}

LoadIndicator ::= ENUMERATED {
    lowLoad,
    mediumLoad,
    highLoad,
    overLoad,
    ...
}

LocationInformationSgNB ::= SEQUENCE {
    pSCell-id           NRCGI,
    iE-Extensions       ProtocolExtensionContainer { {LocationInformationSgNB-ExtIEs} } OPTIONAL,
    ...
}

LocationInformationSgNB-ExtIEs X2AP-PROTOCOL-EXTENSION ::={
    ...
}

LocationInformationSgNBReporting ::= ENUMERATED {
    pSCell,
    ...
}

LocationReportingInformation ::= SEQUENCE {
    eventType       EventType,
    reportArea      ReportArea,
    iE-Extensions       ProtocolExtensionContainer { {LocationReportingInformation-ExtIEs} } OPTIONAL,
    ...
}

LocationReportingInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::={
    ...
}

-- M
```

```
M1PeriodicReporting ::= SEQUENCE {
    reportInterval              ReportIntervalMDT,
    reportAmount                ReportAmountMDT,
    iE-Extensions               ProtocolExtensionContainer { {M1PeriodicReporting-ExtIEs} } OPTIONAL,
    ...
}

M1PeriodicReporting-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

M1ReportingTrigger::= ENUMERATED{
    periodic,
    a2eventtriggered,
    ...,
    a2eventtriggered-periodic
}

M1ThresholdEventA2 ::= SEQUENCE {
    measurementThreshold        MeasurementThresholdA2,
    iE-Extensions               ProtocolExtensionContainer { {M1ThresholdEventA2-ExtIEs} } OPTIONAL,
    ...
}

M1ThresholdEventA2-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

M3Configuration ::= SEQUENCE {
    m3period            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       ProtocolExtensionContainer { {M4Configuration-ExtIEs} } OPTIONAL,
    ...
}

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,
    iE-Extensions       ProtocolExtensionContainer { {M7Configuration-ExtIEs} } OPTIONAL,
    ...
}

M7Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

M7period ::= INTEGER(1..60, ...)

MakeBeforeBreakIndicator::= ENUMERATED {true, ...}

ManagementBasedMDTallowed ::= ENUMERATED {allowed, ...}

Masked-IMEISV ::= BIT STRING (SIZE (64))

MDT-Activation      ::= ENUMERATED {
    immediate-MDT-only,
    immediate-MDT-and-Trace,
    ...
```

```
}

MDT-Configuration ::= SEQUENCE {
    mdt-Activation              MDT-Activation,
    areaScopeOfMDT              AreaScopeOfMDT,
    measurementsToActivate      MeasurementsToActivate,
    m1reportingTrigger          M1ReportingTrigger,
    m1thresholdeventA2          M1ThresholdEventA2          OPTIONAL,
-- Included in case of event-triggered, or event-triggered periodic reporting for measurement M1
    m1periodicReporting         M1PeriodicReporting         OPTIONAL,
-- Included in case of periodic, or event-triggered periodic reporting for measurement M1
    iE-Extensions               ProtocolExtensionContainer { {MDT-Configuration-ExtIEs} } OPTIONAL,
    ...
}

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}|
    {ID id-M6Configuration                          CRITICALITY ignore  EXTENSION M6Configuration                    PRESENCE conditional}|
    {ID id-M7Configuration                          CRITICALITY ignore  EXTENSION M7Configuration                    PRESENCE conditional}|
    { ID id-BluetoothMeasurementConfiguration       CRITICALITY ignore  EXTENSION BluetoothMeasurementConfiguration  PRESENCE optional}|
    { ID id-WLANMeasurementConfiguration            CRITICALITY ignore  EXTENSION WLANMeasurementConfiguration       PRESENCE optional},
    ...
}

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-RSRQ              Threshold-RSRQ,
    ...
}

MeNBCoordinationAssistanceInformation ::= ENUMERATED{
    coordination-not-required,
    ...
}

MeNBResourceCoordinationInformation ::= SEQUENCE {
    eUTRA-Cell-ID                   ECGI,
    uLCoordinationInformation       BIT STRING (SIZE(6..4400, ...)),
    dLCoordinationInformation       BIT STRING (SIZE(6..4400, ...))     OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {MeNBResourceCoordinationInformationExtIEs} }      OPTIONAL,
    ...
}
```

```
MeNBResourceCoordinationInformationExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-NRCGI                                   CRITICALITY ignore  EXTENSION NRCGI                                   PRESENCE optional}|
    { ID id-MeNBCoordinationAssistanceInformation       CRITICALITY reject  EXTENSION MeNBCoordinationAssistanceInformation PRESENCE optional},
    ...
}

MeNBtoSeNBContainer ::= OCTET STRING

MME-Group-ID    ::= OCTET STRING (SIZE (2))

MME-Code        ::= OCTET STRING (SIZE (1))

MBMS-Service-Area-Identity-List ::= SEQUENCE (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 ::= SEQUENCE {
    radioframeAllocationPeriod      RadioframeAllocationPeriod,
    radioframeAllocationOffset      RadioframeAllocationOffset,
    subframeAllocation              SubframeAllocation,
    iE-Extensions                   ProtocolExtensionContainer { {MBSFN-Subframe-Info-ExtIEs} }   OPTIONAL,
    ...
}

MBSFN-Subframe-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

MobilityParametersModificationRange ::= SEQUENCE {
    handoverTriggerChangeLowerLimit     INTEGER (-20..20),
    handoverTriggerChangeUpperLimit     INTEGER (-20..20),
    ...
}

MobilityParametersInformation ::= SEQUENCE {
    handoverTriggerChange           INTEGER (-20..20),
    ...
}

MultibandInfoList ::= SEQUENCE (SIZE(1..maxnoofBands)) OF BandInfo


BandInfo    ::= SEQUENCE {
    freqBandIndicator       FreqBandIndicator,
    iE-Extensions           ProtocolExtensionContainer { {BandInfo-ExtIEs} }    OPTIONAL,
    ...
}

BandInfo-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
MeNBtoSgNBContainer ::= OCTET STRING

SplitSRBs ::= ENUMERATED {srb1, srb2, srb1and2, ...}

SplitSRB ::= SEQUENCE {
    rrcContainer                RRCContainer            OPTIONAL,
    srbType                     SRBType,
    deliveryStatus              DeliveryStatus          OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { {SplitSRB-ExtIEs} } OPTIONAL,
    ...
}

SplitSRB-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- N

Neighbour-Information ::= SEQUENCE (SIZE (0..maxnoofNeighbours)) OF SEQUENCE {
    eCGI                        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)

NewDRBIDrequest::= ENUMERATED {true, ...}

Number-of-Antennaports ::= ENUMERATED {
        an1,
        an2,
        an4,
        ...
}

NRFreqInfo ::= SEQUENCE{
    nRARFCN         INTEGER (0.. 3279165),
    freqBandListNr  SEQUENCE (SIZE(1..maxnoofNrCellBands)) OF FreqBandNrItem,
    sULInformation  SULInformation      OPTIONAL,
    iE-Extensions   ProtocolExtensionContainer { {NRFreqInfo-ExtIEs} } OPTIONAL,

    ...
}

NRFreqInfo-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
```

```
    ...
}

NRCellIdentifier ::= BIT STRING (SIZE (36))

NRCGI ::= SEQUENCE {
    pLMN-Identity               PLMN-Identity,
    nRcellIdentifier                NRCellIdentifier,
    iE-Extensions               ProtocolExtensionContainer { {NRCGI-ExtIEs} } OPTIONAL,
    ...
}

NRCGI-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

NRNeighbour-Information ::= SEQUENCE (SIZE (1.. maxofNRNeighbours))OF SEQUENCE {
    nrpCI                           NRPCI,
    nrCellID                        NRCGI,
    fiveGS-TAC                      FiveGS-TAC  OPTIONAL,
    configured-TAC                  TAC         OPTIONAL,
    measurementTimingConfiguration  OCTET STRING,
    nRNeighbourModeInfo             CHOICE {
        fdd     FDD-InfoNeighbourServedNRCell-Information,
        tdd     TDD-InfoNeighbourServedNRCell-Information,
        ...
    },
    iE-Extensions                       ProtocolExtensionContainer { {NRNeighbour-Information-ExtIEs} } OPTIONAL,
    ...
}

NRNeighbour-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

NRPCI ::= INTEGER (0..1007)

NRrestrictioninEPSasSecondaryRAT ::= ENUMERATED {
    nRrestrictedinEPSasSecondaryRAT,
    ...
}

NRrestrictionin5GS ::= ENUMERATED {
    nRrestrictedin5GS,
    ...
}

NRencryptionAlgorithms ::= BIT STRING (SIZE (16,...))
NRintegrityProtectionAlgorithms ::= BIT STRING (SIZE (16,...))

NR-TxBW ::= SEQUENCE {
    nRSCS   NRSCS,
    nRNRB   NRNRB,
    iE-Extensions               ProtocolExtensionContainer { {NR-TxBW-ExtIEs} } OPTIONAL,
```

```
    ...
}

NR-TxBW-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

NRNRB ::= ENUMERATED { nrb11, nrb18, nrb24, nrb25, nrb31, nrb32, nrb38, nrb51, nrb52, nrb65, nrb66, nrb78, nrb79, nrb93, nrb106, nrb107, nrb121,
nrb132, nrb133, nrb135, nrb160, nrb162, nrb189, nrb216, nrb217, nrb245, nrb264, nrb270, nrb273, ...}

NRSCS ::= ENUMERATED { scs15, scs30, scs60, scs120, ...}

NRS-NSSS-PowerOffset ::= ENUMERATED { minusThree, zero, three, ...}

FiveGS-TAC ::= OCTET STRING (SIZE (3))

NRUeReport ::= SEQUENCE {
    uENRMeasurements            RRCContainer,
    iE-Extensions           ProtocolExtensionContainer { { NRUeReport-ExtIEs} } OPTIONAL,
    ...
}

NRUeReport-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

NRUESecurityCapabilities ::= SEQUENCE {
    nRencryptionAlgorithms              NRencryptionAlgorithms,
    nRintegrityProtectionAlgorithms     NRintegrityProtectionAlgorithms,
    iE-Extensions                       ProtocolExtensionContainer { {NRUESecurityCapabilities-ExtIEs} }   OPTIONAL,
...
}

NRUESecurityCapabilities-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

NSSS-NumOccasionDifferentPrecoder ::= ENUMERATED { two, four, eight, ...}

-- O

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

Packet-LossRate ::= INTEGER(0..1000)

PA-Values ::= ENUMERATED {
    dB-6,
    dB-4dot77,
    dB-3,
    dB-1dot77,
    dB0,
    dB1,
    dB2,
    dB3,
    ...
}

PDCPChangeIndication ::= ENUMERATED {s-KgNB-update-required, pDCP-data-recovery-required,...}

PDCP-SN ::= INTEGER (0..4095)

PDCP-SNExtended ::= INTEGER (0..32767)

PDCP-SNlength18 ::= INTEGER (0..262143)

PDCPSnLength    ::= ENUMERATED {twelve-bits,eighteen-bits,...}

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-FreqOffset                    INTEGER (0..94),
    prach-ConfigIndex                   INTEGER (0..63)     OPTIONAL, -- present for TDD --
    iE-Extensions                       ProtocolExtensionContainer { {PRACH-Configuration-ExtIEs} } OPTIONAL,
    ...
```

```
}

PLMNAreaBasedQMC ::= SEQUENCE {
    plmnListforQMC      PLMNListforQMC,
    iE-Extensions       ProtocolExtensionContainer { {PLMNAreaBasedQMC-ExtIEs} } OPTIONAL,
    ...
}

PLMNAreaBasedQMC-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

PLMNListforQMC ::= SEQUENCE (SIZE(1..maxnoofPLMNforQMC)) OF PLMN-Identity


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,
    ...
}

ProtectedEUTRAResourceIndication::= SEQUENCE {
    activationSFN                           INTEGER (0..1023),
    protectedResourceList                   ProtectedResourceList,
    mBSFNControlRegionLength                INTEGER (0..3) OPTIONAL,
    pDCCHRegionLength                       INTEGER (1..3) OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { {ProtectedEUTRAResourceIndication-ExtIEs} }  OPTIONAL,
    ...
}

ProtectedEUTRAResourceIndication-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
} -- Rapporteur: missing extension --


ProtectedFootprintTimePattern ::= SEQUENCE {
    protectedFootprintTimePeriodicity               INTEGER (1..320, ...),
    protectedFootprintStartTime                     INTEGER (1..20, ...),
    iE-Extensions                                   ProtocolExtensionContainer { {ProtectedFootprintTimePattern-ExtIEs} }OPTIONAL,
    ...
}

ProtectedFootprintTimePattern-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

ProtectedResourceList ::= SEQUENCE (SIZE(1.. maxnoofProtectedResourcePatterns)) OF ProtectedResourceList-Item

ProtectedResourceList-Item ::= SEQUENCE {
    resourceType                    ResourceType,
    intraPRBProtectedResourceFootprint      BIT STRING (SIZE(84, ...)),
    protectedFootprintFrequencyPattern      BIT STRING (SIZE(6..110, ...)),
    protectedFootprintTimePattern           ProtectedFootprintTimePattern,
    iE-Extensions                           ProtocolExtensionContainer { {ProtectedResourceList-Item-ExtIEs} }   OPTIONAL,
    ...
}

ProtectedResourceList-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- Q

QCI ::= 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 ::= {
    {ID id-DL-scheduling-PDCCH-CCE-usage        CRITICALITY ignore  EXTENSION DL-scheduling-PDCCH-CCE-usage     PRESENCE optional}|
    {ID id-UL-scheduling-PDCCH-CCE-usage        CRITICALITY ignore  EXTENSION UL-scheduling-PDCCH-CCE-usage     PRESENCE optional},
    ...
}

ReceiveStatusofULPDCPSDUs ::= BIT STRING (SIZE(4096))

ReceiveStatusOfULPDCPSDUsExtended ::= BIT STRING (SIZE(1..16384))

ReceiveStatusOfULPDCPSDUsPDCP-SNlength18 ::= BIT STRING (SIZE(1..131072))

Reestablishment-Indication ::= ENUMERATED {
    reestablished,
    ...
}

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, ...},
    p-B                                 INTEGER (0..3,...),
```

```
    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}

ReservedSubframePattern ::= SEQUENCE{
    subframeType                    SubframeType,
    reservedSubframePattern         BIT STRING (SIZE(10..160)),
    mBSFNControlRegionLength        INTEGER (0..3),
    iE-Extensions                   ProtocolExtensionContainer { {ReservedSubframePattern-ExtIEs} }  OPTIONAL,
    ...
}

ReservedSubframePattern-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
```

```
    ...
}

ResourceType ::= ENUMERATED {
    downlinknonCRS,
    cRS,
    uplink,
    ...
}

ResumeID    ::= CHOICE {
    non-truncated   BIT STRING(SIZE(40)),
    truncated       BIT STRING(SIZE(24)),
    ...
}

RLCMode ::= ENUMERATED {
    rlc-am,
    rlc-um-bidirectional,
    rlc-um-unidirectional-ul,
    rlc-um-unidirectional-dl,
    ...
}

RLC-Status ::= SEQUENCE {
    reestablishment-Indication  Reestablishment-Indication,
    iE-Extensions               ProtocolExtensionContainer { {RLC-Status-ExtIEs} } OPTIONAL,
    ...
}

RLC-Status-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

RNTP-Threshold ::= ENUMERATED {
    minusInfinity,
    minusEleven,
    minusTen,
    minusNine,
    minusEight,
    minusSeven,
    minusSix,
    minusFive,
    minusFour,
    minusThree,
    minusTwo,
    minusOne,
    zero,
    one,
    two,
    three,
    ...
}
```

```
RRC-Config-Ind ::= ENUMERATED {
    full-config,
    delta-config,
    ...
}

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,
        iE-Extensions                   ProtocolExtensionContainer { {RSRPMRList-ExtIEs} } OPTIONAL,
        ...
    }

RSRPMRList-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-UEID    CRITICALITY ignore  EXTENSION UEID      PRESENCE optional},
    ...
}

RRCContainer ::= OCTET STRING

-- S

S1TNLLoadIndicator ::= SEQUENCE {
    dLS1TNLLoadIndicator            LoadIndicator,
    uLS1TNLLoadIndicator            LoadIndicator,
    iE-Extensions                   ProtocolExtensionContainer { {S1TNLLoadIndicator-ExtIEs} } OPTIONAL,
    ...
}
```

```
S1TNLLoadIndicator-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

SCGChangeIndication ::= ENUMERATED {pDCPCountWrapAround, pSCellChange, other, ...}

SecondaryRATUsageReportList ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container {{SecondaryRATUsageReport-ItemIEs}}

SecondaryRATUsageReport-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-SecondaryRATUsageReport-Item        CRITICALITY reject  TYPE SecondaryRATUsageReport-Item     PRESENCE mandatory},
    ...
}

SecondaryRATUsageReport-Item ::= SEQUENCE {
    e-RAB-ID                        E-RAB-ID,
    secondaryRATType                ENUMERATED {nr, ...},
    e-RABUsageReportList            E-RABUsageReportList,
    iE-Extensions               ProtocolExtensionContainer { {SecondaryRATUsageReport-Item-ExtIEs} } OPTIONAL,
...
}

SecondaryRATUsageReport-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

SeNBSecurityKey ::= BIT STRING (SIZE(256))

SeNBtoMeNBContainer ::= OCTET STRING


ServedCells ::= SEQUENCE (SIZE (1.. maxCellineNB)) OF SEQUENCE {
    servedCellInfo                  ServedCell-Information,
    neighbour-Info                  Neighbour-Information          OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {ServedCell-ExtIEs} } OPTIONAL,
    ...
}

ServedCell-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-NRNeighbourInfoToAdd            CRITICALITY ignore  EXTENSION NRNeighbour-Information         PRESENCE optional },
    ...
}

ServedCell-Information ::= SEQUENCE {
    pCI                 PCI,
    cellId              ECGI,
    tAC                 TAC,
    broadcastPLMNs      BroadcastPLMNs-Item,
    eUTRA-Mode-Info     EUTRA-Mode-Info,
    iE-Extensions       ProtocolExtensionContainer { {ServedCell-Information-ExtIEs} } OPTIONAL,
    ...
}

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}|
    { ID id-BandwidthReducedSI                CRITICALITY ignore  EXTENSION BandwidthReducedSI                PRESENCE optional}|
    { ID id-ProtectedEUTRAResourceIndication  CRITICALITY ignore  EXTENSION ProtectedEUTRAResourceIndication  PRESENCE optional}|
    { ID id-BPLMN-ID-Info-EUTRA               CRITICALITY ignore  EXTENSION BPLMN-ID-Info-EUTRA               PRESENCE optional},
    ...
}

ServiceType ::= ENUMERATED{
    qMC-for-streaming-service,
    qMC-for-MTSI-service,
    ...
}

SgNBCoordinationAssistanceInformation ::= ENUMERATED{
    coordination-not-required,
    ...
}

SgNBResourceCoordinationInformation ::= SEQUENCE {
    nR-CGI                      NRCGI,
    uLCoordinationInformation   BIT STRING (SIZE(6..4400, ...)),
    dLCoordinationInformation   BIT STRING (SIZE(6..4400, ...)) OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { {SgNBResourceCoordinationInformationExtIEs} }      OPTIONAL,
    ...
}

SgNBResourceCoordinationInformationExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-ECGI                                  CRITICALITY ignore  EXTENSION ECGI                                PRESENCE optional}|
    { ID id-SgNBCoordinationAssistanceInformation CRITICALITY reject  EXTENSION SgNBCoordinationAssistanceInformation PRESENCE optional},
    ...
}

SgNB-UE-X2AP-ID ::= INTEGER (0..4294967295)

SIPTOBearerDeactivationIndication ::= ENUMERATED {
    true,
    ...
}

SharedResourceType ::= CHOICE{
    uLOnlySharing       ULOnlySharing,
    uLandDLSharing      ULandDLSharing,
    ...
}

ShortMAC-I ::= BIT STRING (SIZE(16))


SGNB-Addition-Trigger-Ind    ::= ENUMERATED {
```

```
    sn-change,
    inter-eNB-HO,
    intra-eNB-HO,
    ...
}

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,
    ...
}

SpectrumSharingGroupID ::= INTEGER (1..maxCellineNB)

SubbandCQI ::= SEQUENCE {
    subbandCQICodeword0         SubbandCQICodeword0,
    subbandCQICodeword1         SubbandCQICodeword1     OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { {SubbandCQI-ExtIEs} } OPTIONAL,
    ...
}

Subscription-Based-UE-DifferentiationInfo ::= SEQUENCE {
    periodicCommunicationIndicator  ENUMERATED {periodically, ondemand, ...}        OPTIONAL,
    periodicTime                    INTEGER (1..3600, ...)                          OPTIONAL,
    scheduledCommunicationTime      ScheduledCommunicationTime                      OPTIONAL,
    stationaryIndication            ENUMERATED {stationary, mobile, ...}            OPTIONAL,
    trafficProfile                  ENUMERATED {single-packet, dual-packets, multiple-packets, ...}       OPTIONAL,
    batteryIndication               ENUMERATED {battery-powered, battery-powered-not-rechargeable-or-replaceable, not-battery-powered, ...}
    OPTIONAL,
```

```
    iE-Extensions                   ProtocolExtensionContainer { { Subscription-Based-UE-DifferentiationInfo-ExtIEs} } OPTIONAL,
    ...
}

Subscription-Based-UE-DifferentiationInfo-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

ScheduledCommunicationTime ::= SEQUENCE {
    dayofWeek               BIT STRING (SIZE(7))                                    OPTIONAL,
    timeofDayStart          INTEGER (0..86399, ...)                                 OPTIONAL,
    timeofDayEnd            INTEGER (0..86399, ...)                                 OPTIONAL,
    iE-Extensions           ProtocolExtensionContainer { { ScheduledCommunicationTime-ExtIEs}}  OPTIONAL,
    ...
}

ScheduledCommunicationTime-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

SRVCCOperationPossible ::= ENUMERATED {
    possible,
    ...
}

SubbandCQI-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

SubbandCQICodeword0 ::= CHOICE {
    four-bitCQI                     INTEGER (0..15, ...),
    two-bitSubbandDifferentialCQI   INTEGER (0..3, ...),
    two-bitDifferentialCQI          INTEGER (0..3, ...),
    ...
}
SubbandCQICodeword1 ::= CHOICE {
    four-bitCQI                         INTEGER (0..15, ...),
    three-bitSpatialDifferentialCQI     INTEGER (0..7, ...),
    two-bitSubbandDifferentialCQI       INTEGER (0..3, ...),
    two-bitDifferentialCQI              INTEGER (0..3, ...),
    ...
}

SubbandCQIList ::= SEQUENCE (SIZE(1.. maxSubband)) OF SubbandCQIItem

SubbandCQIItem ::= SEQUENCE {
    subbandCQI          SubbandCQI,
    subbandIndex        INTEGER (0..27,...),
    iE-Extensions       ProtocolExtensionContainer { {SubbandCQIItem-ExtIEs} } OPTIONAL,
    ...
}

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,
    sa1,
    sa2,
    sa3,
    sa4,
    sa5,
    sa6,
    ...
}

SubframeType ::= ENUMERATED{mbsfn,nonmbsfn,...}

SgNBSecurityKey ::= BIT STRING (SIZE(256))

SgNBtoMeNBContainer ::= OCTET STRING

SRBType ::= ENUMERATED {srb1, srb2, ...}
SCGConfigurationQuery ::= ENUMERATED {true,...}

SULInformation ::= SEQUENCE {
    sUL-ARFCN               INTEGER (0.. 3279165),
    sUL-TxBW                NR-TxBW,
    iE-Extensions           ProtocolExtensionContainer { {SULInformation-ExtIEs} }      OPTIONAL,
    ...
}


SupportedSULFreqBandItem ::= SEQUENCE {
    freqBandIndicatorNr             INTEGER (1..1024,...),
    iE-Extensions           ProtocolExtensionContainer { {SupportedSULFreqBandItem-ExtIEs} }     OPTIONAL,
    ...
}

SupportedSULFreqBandItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
```

```
    ...
}

SULInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- 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,
    iE-Extensions           ProtocolExtensionContainer { {TAIBasedMDT-ExtIEs} } OPTIONAL,
    ...
}

TAIBasedMDT-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

TAIListforMDT ::= SEQUENCE (SIZE(1..maxnoofTAforMDT)) OF TAI-Item

TAI-Item ::= SEQUENCE {
    tAC                 TAC,
    pLMN-Identity       PLMN-Identity,
    iE-Extensions       ProtocolExtensionContainer { {TAI-Item-ExtIEs} } OPTIONAL,
    ...
}

TAI-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

TAListforMDT ::= SEQUENCE (SIZE(1..maxnoofTAforMDT)) OF TAC

TABasedQMC ::= SEQUENCE {
    tAListforQMC        TAListforQMC,
    iE-Extensions       ProtocolExtensionContainer { {TABasedQMC-ExtIEs} } OPTIONAL,
    ...
}

TABasedQMC-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
```

```
}

TAListforQMC ::= SEQUENCE (SIZE(1..maxnoofTAforQMC)) OF TAC

TAIBasedQMC ::= SEQUENCE {
    tAIListforQMC       TAIListforQMC,
    iE-Extensions       ProtocolExtensionContainer { {TAIBasedQMC-ExtIEs} } OPTIONAL,
    ...
}

TAIBasedQMC-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

TAIListforQMC ::= SEQUENCE (SIZE(1..maxnoofTAforQMC)) OF TAI-Item

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 ::= SEQUENCE {
    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}|
    { ID id-eARFCNExtension                         CRITICALITY reject  EXTENSION EARFCNExtension                        PRESENCE optional}|
    { ID id-AdditionalSpecialSubframeExtension-Info CRITICALITY ignore  EXTENSION AdditionalSpecialSubframeExtension-Info PRESENCE optional},
    ...
}

TDD-InfoNeighbourServedNRCell-Information ::= SEQUENCE {
    nRFreqInfo              NRFreqInfo,
    iE-Extensions           ProtocolExtensionContainer { {TDD-InfoNeighbourServedNRCell-Information-ExtIEs} }    OPTIONAL,
    ...
}

TDD-InfoNeighbourServedNRCell-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

Threshold-RSRP ::= INTEGER(0..97)

Threshold-RSRQ ::= INTEGER(0..34)

TimeToWait ::= ENUMERATED {
    v1s,
    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,
    iE-Extensions                   ProtocolExtensionContainer { {TraceActivation-ExtIEs} } OPTIONAL,
    ...
}

TraceActivation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-MDTConfiguration            CRITICALITY ignore  EXTENSION MDT-Configuration         PRESENCE optional}|
    { ID id-UEAppLayerMeasConfig        CRITICALITY ignore  EXTENSION UEAppLayerMeasConfig      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,
    ...
}


-- U

UEAggregateMaximumBitRate ::= SEQUENCE {
    uEaggregateMaximumBitRateDownlink   BitRate,
    uEaggregateMaximumBitRateUplink     BitRate,
    iE-Extensions                       ProtocolExtensionContainer { {UEAggregate-MaximumBitrate-ExtIEs} } OPTIONAL,
    ...
}

UEAggregate-MaximumBitrate-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-extended-uEaggregateMaximumBitRateDownlink  CRITICALITY ignore  EXTENSION ExtendedBitRate   PRESENCE optional}|
    { ID id-extended-uEaggregateMaximumBitRateUplink    CRITICALITY ignore  EXTENSION ExtendedBitRate   PRESENCE optional},
    ...
}

UEAppLayerMeasConfig ::= SEQUENCE {
    containerForAppLayerMeasConfig          OCTET STRING (SIZE(1..1000)),
    areaScopeOfQMC      AreaScopeOfQMC,
    iE-Extensions       ProtocolExtensionContainer { {UEAppLayerMeasConfig-ExtIEs} } OPTIONAL,
    ...
}

UEAppLayerMeasConfig-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    {ID id-serviceType  CRITICALITY ignore  EXTENSION ServiceType   PRESENCE optional},
    ...
}

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 ::= {
    ...
}

UESidelinkAggregateMaximumBitRate ::= SEQUENCE {
    uESidelinkAggregateMaximumBitRate       BitRate,
    iE-Extensions                   ProtocolExtensionContainer { {UE-Sidelink-Aggregate-MaximumBitRate-ExtIEs} } OPTIONAL,
    ...
}

UE-Sidelink-Aggregate-MaximumBitRate-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

UEsToBeResetList ::= SEQUENCE (SIZE (1.. maxUEsinengNBDU)) OF UEsToBeResetList-Item

UEsToBeResetList-Item::= SEQUENCE {
    meNB-ID                 UE-X2AP-ID,                                                         OPTIONAL,
    meNB-ID-ext             UE-X2AP-ID-Extension                                                OPTIONAL,
    sgNB-ID                 SgNB-UE-X2AP-ID                                                     OPTIONAL,
    iE-Extensions           ProtocolExtensionContainer { {UEsToBeResetList-Item-ExtIEs} }       OPTIONAL,
    ...
}

UEsToBeResetList-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

ULandDLSharing ::= SEQUENCE{
    uLResourcesULandDLSharing               ULResourcesULandDLSharing,
    dLResourcesULandDLSharing               DLResourcesULandDLSharing,
    iE-Extensions           ProtocolExtensionContainer { {ULandDLSharing-ExtIEs} }          OPTIONAL,
```

```
    ...
}

ULandDLSharing-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

ULConfiguration::= SEQUENCE {
    uL-PDCP         UL-UE-Configuration,
    iE-Extensions                   ProtocolExtensionContainer { {ULConfiguration-ExtIEs} } OPTIONAL,
    ...
}

ULConfiguration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

UL-UE-Configuration::= ENUMERATED { no-data, shared, only, ... }

UL-GBR-PRB-usage::= INTEGER (0..100)

UL-HighInterferenceIndicationInfo ::= SEQUENCE (SIZE(1..maxCellineNB)) OF UL-HighInterferenceIndicationInfo-Item

UL-HighInterferenceIndicationInfo-Item ::= SEQUENCE {
    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 ::= SEQUENCE (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)

ULOnlySharing ::= SEQUENCE{
    uLResourceBitmapULOnlySharing   DataTrafficResources,
    iE-Extensions                   ProtocolExtensionContainer { {ULOnlySharing-ExtIEs} }           OPTIONAL,
    ...
}

ULOnlySharing-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
```

```
    ...
}

ULResourceBitmapULandDLSharing ::= DataTrafficResources


ULResourcesULandDLSharing ::= CHOICE {
    unchanged           NULL,
    changed             ULResourceBitmapULandDLSharing,
    ...
}

UL-scheduling-PDCCH-CCE-usage::= INTEGER (0..100)

UL-Total-PRB-usage::= INTEGER (0..100)

UsableABSInformation ::= CHOICE {
    fdd                 UsableABSInformationFDD,
    tdd                 UsableABSInformationTDD,
    ...
}

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, ...)),
    iE-Extensions                       ProtocolExtensionContainer { {UsableABSInformationTDD-ExtIEs} } OPTIONAL,
    ...
}

UsableABSInformationTDD-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}


UserPlaneTrafficActivityReport ::= ENUMERATED {inactive, re-activated, ...}

-- V

V2XServicesAuthorized ::= SEQUENCE {
    vehicleUE           VehicleUE                                                   OPTIONAL,
pedestrianUE            PedestrianUE                                                OPTIONAL,
    iE-Extensions       ProtocolExtensionContainer { {V2XServicesAuthorized-ExtIEs} }   OPTIONAL,
    ...
}
```

```
V2XServicesAuthorized-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

VehicleUE ::= ENUMERATED {
    authorized,
    not-authorized,
    ...
}

PedestrianUE ::= ENUMERATED {
    authorized,
    not-authorized,
    ...
}

-- W

WidebandCQI ::= SEQUENCE {
    widebandCQICodeword0        INTEGER (0..15, ...),
    widebandCQICodeword1        WidebandCQICodeword1        OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { {WidebandCQI-ExtIEs} } OPTIONAL,
    ...
}

WidebandCQI-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

WidebandCQICodeword1::= CHOICE {
    four-bitCQI                         INTEGER (0..15, ...),
    three-bitSpatialDifferentialCQI     INTEGER (0..7, ...),
    ...
}

WLANMeasurementConfiguration ::= SEQUENCE {
    wlanMeasConfig              WLANMeasConfig,
    wlanMeasConfigNameList      WLANMeasConfigNameList              OPTIONAL,
    wlan-rssi                   ENUMERATED {true, ...}              OPTIONAL,
    wlan-rtt                    ENUMERATED {true, ...}              OPTIONAL,
    iE-Extensions       ProtocolExtensionContainer { {WLANMeasurementConfiguration-ExtIEs} } OPTIONAL,
    ...
}

WLANMeasurementConfiguration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

WLANMeasConfigNameList ::= SEQUENCE (SIZE(1..maxnoofWLANName)) OF WLANName

WLANMeasConfig::= ENUMERATED {setup,...}

WLANName ::= OCTET STRING (SIZE (1..32))
```

```
WTID ::= CHOICE {
    wTID-Type1          WTID-Type1,
    wTID-Type2          WTID-Long-Type2,
    ...
}

WTID-Type1 ::= SEQUENCE {
    pLMN-Identity                   PLMN-Identity,
    shortWTID                       BIT STRING (SIZE(24)),
    ...
}

WTID-Long-Type2 ::= BIT STRING (SIZE(48))

WT-UE-XwAP-ID ::= OCTET STRING (SIZE (3))

-- X

X2BenefitValue ::= INTEGER (1..8, ...)

-- Y
-- Z

END
-- ASN1STOP
```

9.3.6 Common definitions

```
-- ASN1START
-- **************************************************************
--
-- 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
--
-- **************************************************************

Criticality     ::= ENUMERATED { reject, ignore, notify }

Presence        ::= ENUMERATED { optional, conditional, mandatory }

PrivateIE-ID    ::= CHOICE {
    local               INTEGER (0.. maxPrivateIEs),
    global              OBJECT IDENTIFIER
}

ProcedureCode       ::= INTEGER (0..255)


ProtocolIE-ID       ::= INTEGER (0..maxProtocolIEs)


TriggeringMessage   ::= ENUMERATED { initiating-message, successful-outcome, unsuccessful-outcome}

END
-- ASN1STOP
```

9.3.7 Constant definitions

```
-- ASN1START
-- **************************************************************
--
-- 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

IMPORTS
    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
id-reset                                                ProcedureCode ::= 7
id-eNBConfigurationUpdate                               ProcedureCode ::= 8
id-resourceStatusReportingInitiation                    ProcedureCode ::= 9
id-resourceStatusReporting                              ProcedureCode ::= 10
id-privateMessage                                       ProcedureCode ::= 11
id-mobilitySettingsChange                               ProcedureCode ::= 12
id-rLFIndication                                        ProcedureCode ::= 13
id-handoverReport                                       ProcedureCode ::= 14
id-cellActivation                                       ProcedureCode ::= 15
id-x2Release                                            ProcedureCode ::= 16
id-x2APMessageTransfer                                  ProcedureCode ::= 17
id-x2Removal                                            ProcedureCode ::= 18
id-seNBAdditionPreparation                              ProcedureCode ::= 19
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
id-sgNBAdditionPreparation                              ProcedureCode ::= 27
id-sgNBReconfigurationCompletion                            ProcedureCode ::= 28
id-meNBinitiatedSgNBModificationPreparation             ProcedureCode ::= 29
id-sgNBinitiatedSgNBModification                            ProcedureCode ::= 30
id-meNBinitiatedSgNBRelease                             ProcedureCode ::= 31
id-sgNBinitiatedSgNBRelease                             ProcedureCode ::= 32
id-sgNBCounterCheck                                     ProcedureCode ::= 33
id-sgNBChange                                           ProcedureCode ::= 34
id-rRCTransfer                                          ProcedureCode ::= 35
id-endcX2Setup                                          ProcedureCode ::= 36
id-endcConfigurationUpdate                              ProcedureCode ::= 37
id-secondaryRATDataUsageReport                          ProcedureCode ::= 38
id-endcCellActivation                                   ProcedureCode ::= 39
id-endcPartialReset                                     ProcedureCode ::= 40
id-eUTRANRCellResourceCoordination                      ProcedureCode ::= 41
id-SgNBActivityNotification                             ProcedureCode ::= 42
id-endcX2Removal                                        ProcedureCode ::= 43
id-dataForwardingAddressIndication                      ProcedureCode ::= 44
id-gNBStatusIndication                                  ProcedureCode ::= 45
id-deactivateTrace                                      ProcedureCode ::= 46
id-traceStart                                           ProcedureCode ::= 47
id-endcConfigurationTransfer                                ProcedureCode ::= 48
-- ************************************************************
--
-- Lists
--
```

```
-- **************************************************************

maxEARFCN                                INTEGER ::= 65535
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
maxnoofEPLMNs                            INTEGER ::= 15
maxnoofEPLMNsPlusOne                     INTEGER ::= 16
maxnoofForbLACs                          INTEGER ::= 4096
maxnoofForbTACs                          INTEGER ::= 4096
maxnoofBPLMNs                            INTEGER ::= 6
maxnoofAdditionalPLMNs                   INTEGER ::= 6
maxnoofNeighbours                        INTEGER ::= 512
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
maxofNRNeighbours                        INTEGER ::= 1024
maxCellinengNB                           INTEGER ::= 16384
--  maxnoofNRCarriers                    INTEGER ::= 32
maxnooftimeperiods                       INTEGER ::= 2
maxnoofCellIDforQMC                      INTEGER ::= 32
maxnoofTAforQMC                          INTEGER ::= 8
maxnoofPLMNforQMC                        INTEGER ::= 16
maxUEsinengNBDU                          INTEGER ::= 8192
maxnoofProtectedResourcePatterns         INTEGER ::= 16
maxnoNRcellsSpectrumSharingWithE-UTRA    INTEGER ::= 64
maxnoofNrCellBands                       INTEGER ::= 32
maxnoofBluetoothName                     INTEGER ::= 4
maxnoofWLANName                          INTEGER ::= 4
maxnoofextBPLMNs                         INTEGER ::= 12
maxnoofextBPLMNsminus1                   INTEGER ::= 11
maxnoofBPLMNsminus1                      INTEGER ::= 11

-- **************************************************************
--
```

```
-- 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 ::= 36
id-Measurement-ID                                          ProtocolIE-ID ::= 37
id-ReportCharacteristics                                   ProtocolIE-ID ::= 38
id-ENB1-Measurement-ID                                     ProtocolIE-ID ::= 39
id-ENB2-Measurement-ID                                     ProtocolIE-ID ::= 40
id-Number-of-Antennaports                                  ProtocolIE-ID ::= 41
id-CompositeAvailableCapacityGroup                         ProtocolIE-ID ::= 42
id-ENB1-Cell-ID                                            ProtocolIE-ID ::= 43
id-ENB2-Cell-ID                                            ProtocolIE-ID ::= 44
id-ENB2-Proposed-Mobility-Parameters                       ProtocolIE-ID ::= 45
id-ENB1-Mobility-Parameters                                ProtocolIE-ID ::= 46
id-ENB2-Mobility-Parameters-Modification-Range             ProtocolIE-ID ::= 47
id-FailureCellPCI                                          ProtocolIE-ID ::= 48
id-Re-establishmentCellECGI                                ProtocolIE-ID ::= 49
id-FailureCellCRNTI                                        ProtocolIE-ID ::= 50
```

```
id-ShortMAC-I                                   ProtocolIE-ID ::= 51
id-SourceCellECGI                               ProtocolIE-ID ::= 52
id-FailureCellECGI                              ProtocolIE-ID ::= 53
id-HandoverReportType                           ProtocolIE-ID ::= 54
id-PRACH-Configuration                          ProtocolIE-ID ::= 55
id-MBSFN-Subframe-Info                          ProtocolIE-ID ::= 56
id-ServedCellsToActivate                        ProtocolIE-ID ::= 57
id-ActivatedCellList                            ProtocolIE-ID ::= 58
id-DeactivationIndication                       ProtocolIE-ID ::= 59
id-UE-RLF-Report-Container                      ProtocolIE-ID ::= 60
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
```

```
id-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-RelReq                     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 ::= 155
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 ::= 158
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-BearerType                                       ProtocolIE-ID ::= 171
id-resumeID                                         ProtocolIE-ID ::= 172
id-UE-ContextInformationRetrieve                    ProtocolIE-ID ::= 173
id-E-RABs-ToBeSetupRetrieve-Item                    ProtocolIE-ID ::= 174
id-NewEUTRANCellIdentifier                          ProtocolIE-ID ::= 175
id-V2XServicesAuthorized                            ProtocolIE-ID ::= 176
id-OffsetOfNbiotChannelNumberToDL-EARFCN            ProtocolIE-ID ::= 177
id-OffsetOfNbiotChannelNumberToUL-EARFCN            ProtocolIE-ID ::= 178
id-AdditionalSpecialSubframeExtension-Info          ProtocolIE-ID ::= 179
id-BandwidthReducedSI                               ProtocolIE-ID ::= 180
id-MakeBeforeBreakIndicator                         ProtocolIE-ID ::= 181
id-UE-ContextReferenceAtWT                          ProtocolIE-ID ::= 182
id-WT-UE-ContextKeptIndicator                       ProtocolIE-ID ::= 183
id-UESidelinkAggregateMaximumBitRate                ProtocolIE-ID ::= 184
id-uL-GTPtunnelEndpoint                             ProtocolIE-ID ::= 185
id-DL-scheduling-PDCCH-CCE-usage                    ProtocolIE-ID ::= 193
id-UL-scheduling-PDCCH-CCE-usage                    ProtocolIE-ID ::= 194
id-UEAppLayerMeasConfig                             ProtocolIE-ID ::= 195
id-extended-e-RAB-MaximumBitrateDL                  ProtocolIE-ID ::= 196
id-extended-e-RAB-MaximumBitrateUL                  ProtocolIE-ID ::= 197
id-extended-e-RAB-GuaranteedBitrateDL               ProtocolIE-ID ::= 198
id-extended-e-RAB-GuaranteedBitrateUL               ProtocolIE-ID ::= 199
id-extended-uEaggregateMaximumBitRateDownlink       ProtocolIE-ID ::= 200
id-extended-uEaggregateMaximumBitRateUplink         ProtocolIE-ID ::= 201
id-NRrestrictioninEPSasSecondaryRAT                 ProtocolIE-ID ::= 202
id-SgNBSecurityKey                                  ProtocolIE-ID ::= 203
id-SgNBUEAggregateMaximumBitRate                        ProtocolIE-ID ::= 204
id-E-RABs-ToBeAdded-SgNBAddReqList                  ProtocolIE-ID ::= 205
id-MeNBtoSgNBContainer                              ProtocolIE-ID ::= 206
id-SgNB-UE-X2AP-ID                                  ProtocolIE-ID ::= 207
id-RequestedSplitSRBs                               ProtocolIE-ID ::= 208
id-E-RABs-ToBeAdded-SgNBAddReq-Item                 ProtocolIE-ID ::= 209
id-E-RABs-Admitted-ToBeAdded-SgNBAddReqAckList      ProtocolIE-ID ::= 210
id-SgNBtoMeNBContainer                              ProtocolIE-ID ::= 211
id-AdmittedSplitSRBs                                    ProtocolIE-ID ::= 212
id-E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item     ProtocolIE-ID ::= 213
id-ResponseInformationSgNBReconfComp                    ProtocolIE-ID ::= 214
id-UE-ContextInformation-SgNBModReq                 ProtocolIE-ID ::= 215
id-E-RABs-ToBeAdded-SgNBModReq-Item                 ProtocolIE-ID ::= 216
id-E-RABs-ToBeModified-SgNBModReq-Item              ProtocolIE-ID ::= 217
id-E-RABs-ToBeReleased-SgNBModReq-Item              ProtocolIE-ID ::= 218
id-E-RABs-Admitted-ToBeAdded-SgNBModAckList         ProtocolIE-ID ::= 219
id-E-RABs-Admitted-ToBeModified-SgNBModAckList      ProtocolIE-ID ::= 220
id-E-RABs-Admitted-ToBeReleased-SgNBModAckList      ProtocolIE-ID ::= 221
```

```
id-E-RABs-Admitted-ToBeAdded-SgNBModAck-Item                ProtocolIE-ID ::= 222
id-E-RABs-Admitted-ToBeModified-SgNBModAck-Item           ProtocolIE-ID ::= 223
id-E-RABs-Admitted-ToBeReleased-SgNBModAck-Item           ProtocolIE-ID ::= 224
id-E-RABs-ToBeReleased-SgNBModReqdList                    ProtocolIE-ID ::= 225
id-E-RABs-ToBeModified-SgNBModReqdList                    ProtocolIE-ID ::= 226
id-E-RABs-ToBeReleased-SgNBModReqd-Item                   ProtocolIE-ID ::= 227
id-E-RABs-ToBeModified-SgNBModReqd-Item                   ProtocolIE-ID ::= 228
id-E-RABs-ToBeReleased-SgNBChaConfList                    ProtocolIE-ID ::= 229
id-E-RABs-ToBeReleased-SgNBChaConf-Item                   ProtocolIE-ID ::= 230
id-E-RABs-ToBeReleased-SgNBRelReqList                     ProtocolIE-ID ::= 231
id-E-RABs-ToBeReleased-SgNBRelReq-Item                    ProtocolIE-ID ::= 232
id-E-RABs-ToBeReleased-SgNBRelConfList                    ProtocolIE-ID ::= 233
id-E-RABs-ToBeReleased-SgNBRelConf-Item                   ProtocolIE-ID ::= 234
id-E-RABs-SubjectToSgNBCounterCheck-List                    ProtocolIE-ID ::= 235
id-E-RABs-SubjectToSgNBCounterCheck-Item                    ProtocolIE-ID ::= 236
id-RRCContainer                                           ProtocolIE-ID ::= 237
id-SRBType                                                ProtocolIE-ID ::= 238
id-Target-SgNB-ID                                         ProtocolIE-ID ::= 239
id-HandoverRestrictionList                                ProtocolIE-ID ::= 240
id-SCGConfigurationQuery                                    ProtocolIE-ID ::= 241
id-SplitSRB                                               ProtocolIE-ID ::= 242
id-NRUeReport                                             ProtocolIE-ID ::= 243
id-InitiatingNodeType-EndcX2Setup                         ProtocolIE-ID ::= 244
id-InitiatingNodeType-EndcConfigUpdate                    ProtocolIE-ID ::= 245
id-RespondingNodeType-EndcX2Setup                         ProtocolIE-ID ::= 246
id-RespondingNodeType-EndcConfigUpdate                    ProtocolIE-ID ::= 247
id-NRUESecurityCapabilities                               ProtocolIE-ID ::= 248
id-PDCPChangeIndication                                   ProtocolIE-ID ::= 249
id-ServedEUTRAcellsENDCX2ManagementList                   ProtocolIE-ID ::= 250
id-CellAssistanceInformation                                ProtocolIE-ID ::= 251
id-Globalen-gNB-ID                                        ProtocolIE-ID ::= 252
id-ServedNRcellsENDCX2ManagementList                        ProtocolIE-ID ::= 253
id-UE-ContextReferenceAtSgNB                                ProtocolIE-ID ::= 254
id-SecondaryRATUsageReport                                ProtocolIE-ID ::= 255
id-ActivationID                                           ProtocolIE-ID ::= 256
id-MeNBResourceCoordinationInformation                    ProtocolIE-ID ::= 257
id-SgNBResourceCoordinationInformation                    ProtocolIE-ID ::= 258
id-ServedEUTRAcellsToModifyListENDCConfUpd                ProtocolIE-ID ::= 259
id-ServedEUTRAcellsToDeleteListENDCConfUpd                ProtocolIE-ID ::= 260
id-ServedNRcellsToModifyListENDCConfUpd                   ProtocolIE-ID ::= 261
id-ServedNRcellsToDeleteListENDCConfUpd                   ProtocolIE-ID ::= 262
id-E-RABUsageReport-Item                                    ProtocolIE-ID ::= 263
id-Old-SgNB-UE-X2AP-ID                                    ProtocolIE-ID ::= 264
id-SecondaryRATUsageReportList                            ProtocolIE-ID ::= 265
id-SecondaryRATUsageReport-Item                           ProtocolIE-ID ::= 266
id-ServedNRCellsToActivate                                ProtocolIE-ID ::= 267
id-ActivatedNRCellList                                    ProtocolIE-ID ::= 268
id-SelectedPLMN                                           ProtocolIE-ID ::= 269
id-UEs-ToBeReset                                          ProtocolIE-ID ::= 270
id-UEs-Admitted-ToBeReset                                 ProtocolIE-ID ::= 271
id-RRCConfigIndication                                    ProtocolIE-ID ::= 272
id-DownlinkPacketLossRate                                 ProtocolIE-ID ::= 273
id-UplinkPacketLossRate                                   ProtocolIE-ID ::= 274
id-SubscriberProfileIDforRFP                              ProtocolIE-ID ::= 275
```

```
id-serviceType                                                  ProtocolIE-ID ::= 276
id-AerialUEsubscriptionInformation                              ProtocolIE-ID ::= 277
id-SGNB-Addition-Trigger-Ind                                    ProtocolIE-ID ::= 278
id-MeNBCell-ID                                                  ProtocolIE-ID ::= 279
id-RequestedSplitSRBsrelease                                    ProtocolIE-ID ::= 280
id-AdmittedSplitSRBsrelease                                     ProtocolIE-ID ::= 281
id-NRS-NSSS-PowerOffset                                         ProtocolIE-ID ::= 282
id-NSSS-NumOccasionDifferentPrecoder                            ProtocolIE-ID ::= 283
id-ProtectedEUTRAResourceIndication                             ProtocolIE-ID ::= 284
id-InitiatingNodeType-EutranrCellResourceCoordination           ProtocolIE-ID ::= 285
id-RespondingNodeType-EutranrCellResourceCoordination           ProtocolIE-ID ::= 286
id-DataTrafficResourceIndication                                ProtocolIE-ID ::= 287
id-SpectrumSharingGroupID                                       ProtocolIE-ID ::= 288
id-ListofEUTRACellsinEUTRACoordinationReq                       ProtocolIE-ID ::= 289
id-ListofEUTRACellsinEUTRACoordinationResp                      ProtocolIE-ID ::= 290
id-ListofEUTRACellsinNRCoordinationReq                          ProtocolIE-ID ::= 291
id-ListofNRCellsinNRCoordinationReq                             ProtocolIE-ID ::= 292
id-ListofNRCellsinNRCoordinationResp                            ProtocolIE-ID ::= 293
id-E-RABs-AdmittedToBeModified-SgNBModConfList                  ProtocolIE-ID ::= 294
id-E-RABs-AdmittedToBeModified-SgNBModConf-Item                 ProtocolIE-ID ::= 295
id-UEContextLevelUserPlaneActivity                              ProtocolIE-ID ::= 296
id-ERABActivityNotifyItemList                                   ProtocolIE-ID ::= 297
id-InitiatingNodeType-EndcX2Removal                             ProtocolIE-ID ::= 298
id-RespondingNodeType-EndcX2Removal                             ProtocolIE-ID ::= 299
id-RLC-Status                                                   ProtocolIE-ID ::= 300
id-CNTypeRestrictions                                           ProtocolIE-ID ::= 301
id-uLpDCPSnLength                                               ProtocolIE-ID ::= 302
id-BluetoothMeasurementConfiguration                            ProtocolIE-ID ::= 303
id-WLANMeasurementConfiguration                                 ProtocolIE-ID ::= 304
id-NRrestrictionin5GS                                           ProtocolIE-ID ::= 305
id-dL-Forwarding                                                ProtocolIE-ID ::= 306
id-E-RABs-DataForwardingAddress-List                            ProtocolIE-ID ::= 307
id-E-RABs-DataForwardingAddress-Item                            ProtocolIE-ID ::= 308
id-Subscription-Based-UE-DifferentiationInfo                    ProtocolIE-ID ::= 309
id-GNBOverloadInformation                                       ProtocolIE-ID ::= 310
id-dLPDCPSnLength                                               ProtocolIE-ID ::= 311
id-secondarysgNBDLGTPTEIDatPDCP                                 ProtocolIE-ID ::= 312
id-secondarymeNBULGTPTEIDatPDCP                                 ProtocolIE-ID ::= 313
id-lCID                                                         ProtocolIE-ID ::= 314
id-duplicationActivation                                        ProtocolIE-ID ::= 315
id-ECGI                                                         ProtocolIE-ID ::= 316
id-RLCMode-transferred                                          ProtocolIE-ID ::= 317
id-E-RABs-Admitted-ToBeReleased-SgNBRelReqAckList               ProtocolIE-ID ::= 318
id-E-RABs-Admitted-ToBeReleased-SgNBRelReqAck-Item              ProtocolIE-ID ::= 319
id-E-RABs-ToBeReleased-SgNBRelReqdList                          ProtocolIE-ID ::= 320
id-E-RABs-ToBeReleased-SgNBRelReqd-Item                         ProtocolIE-ID ::= 321
id-NRCGI                                                        ProtocolIE-ID ::= 322
id-MeNBCoordinationAssistanceInformation                        ProtocolIE-ID ::= 323
id-SgNBCoordinationAssistanceInformation                        ProtocolIE-ID ::= 324
id-new-drb-ID-req                                               ProtocolIE-ID ::= 325
id-endcSONConfigurationTransfer                                 ProtocolIE-ID ::= 326
id-NRNeighbourInfoToAdd                                         ProtocolIE-ID ::= 327
id-NRNeighbourInfoToModify                                      ProtocolIE-ID ::= 328
id-DesiredActNotificationLevel                                  ProtocolIE-ID ::= 329
```

```
id-LocationInformationSgNBReporting                 ProtocolIE-ID ::= 330
id-LocationInformationSgNB                          ProtocolIE-ID ::= 331
id-LastNG-RANPLMNIdentity                           ProtocolIE-ID ::= 332
id-EUTRANTraceID                                    ProtocolIE-ID ::= 333
id-additionalPLMNs-Item                             ProtocolIE-ID ::= 334
id-InterfaceInstanceIndication                      ProtocolIE-ID ::= 335
id-BPLMN-ID-Info-EUTRA                              ProtocolIE-ID ::= 336
id-BPLMN-ID-Info-NR                                 ProtocolIE-ID ::= 337

END
-- ASN1STOP
```

9.3.8 Container definitions

```
-- ASN1START
-- **************************************************************
--
-- 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 {
    &id             ProtocolIE-ID           UNIQUE,
```

```
    &criticality    Criticality,
    &Value,
    &presence       Presence
}
WITH SYNTAX {
    ID              &id
    CRITICALITY     &criticality
    TYPE            &Value
    PRESENCE        &presence
}

-- **************************************************************
--
-- Class Definition for Protocol IEs
--
-- **************************************************************

X2AP-PROTOCOL-IES-PAIR ::= CLASS {
    &id                     ProtocolIE-ID       UNIQUE,
    &firstCriticality       Criticality,
    &FirstValue,
    &secondCriticality      Criticality,
    &SecondValue,
    &presence               Presence
}
WITH SYNTAX {
    ID                      &id
    FIRST CRITICALITY       &firstCriticality
    FIRST TYPE              &FirstValue
    SECOND CRITICALITY      &secondCriticality
    SECOND TYPE             &SecondValue
    PRESENCE                &presence
}

-- **************************************************************
--
-- Class Definition for Protocol Extensions
--
-- **************************************************************

X2AP-PROTOCOL-EXTENSION ::= CLASS {
    &id                 ProtocolIE-ID       UNIQUE,
    &criticality        Criticality,
    &Extension,
    &presence           Presence
}
WITH SYNTAX {
    ID                  &id
    CRITICALITY         &criticality
    EXTENSION           &Extension
    PRESENCE            &presence
}

-- **************************************************************
```

```
--
-- Class Definition for Private IEs
--
-- ************************************************************

X2AP-PRIVATE-IES ::= CLASS {
    &id                 PrivateIE-ID,
    &criticality        Criticality,
    &Value,
    &presence           Presence
}
WITH SYNTAX {
    ID                  &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} ::= SEQUENCE {
    id              X2AP-PROTOCOL-IES.&id                   ({IEsSetParam}),
    criticality     X2AP-PROTOCOL-IES.&criticality          ({IEsSetParam}{@id}),
    value           X2AP-PROTOCOL-IES.&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 {
    id                  X2AP-PROTOCOL-IES-PAIR.&id                  ({IEsSetParam}),
    firstCriticality    X2AP-PROTOCOL-IES-PAIR.&firstCriticality    ({IEsSetParam}{@id}),
    firstValue          X2AP-PROTOCOL-IES-PAIR.&FirstValue          ({IEsSetParam}{@id}),
    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 {
    id                  X2AP-PROTOCOL-EXTENSION.&id             ({ExtensionSetParam}),
    criticality         X2AP-PROTOCOL-EXTENSION.&criticality    ({ExtensionSetParam}{@id}),
    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 {
    id              X2AP-PRIVATE-IES.&id            ({IEsSetParam}),
    criticality     X2AP-PRIVATE-IES.&criticality   ({IEsSetParam}{@id}),
    value           X2AP-PRIVATE-IES.&Value         ({IEsSetParam}{@id})
}

END
-- ASN1STOP
```

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, MeNB initiated SeNB Modification Preparation, SgNB Addition Preparation, or MeNB initiated SgNB 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. Or specifies the maximum time in the SgNB for either the SgNB initiated SgNB Modification procedure or the protection of the E-UTRAN actions necessary to configure UE resources at SgNB Addition or MeNB initiated SgNB Modification.

10 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 relative units	9.1.0
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 relative units	9.1.0
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 network sharing scenarios.	9.3.0
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 Configuration Update messages	9.4.0
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 procedure including detailed reporting of failure cause	10.0.0
50	RP-101279	0407	4	X2 handover support	10.0.0
SP-49	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 message	10.1.0
51	RP-110230	0413	2	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	1	Clarification on Radio Resource Status	10.2.0
52	RP-110700	0443	4	X2 support of RLF Report extension for SON MRO defined in R10	10.2.0
52	RP-110695	0447	3	Support for MDT user consent	10.2.0
52	RP-110686	0451	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 Reporting	10.2.0
52	RP-110695	0453	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	RP-111194	0476	2	Updates of reported quantities for eICIC	10.3.0
53	RP-111195	0478	1	Definition of value of bit in Measurements to Activate	10.3.0
53	RP-111197	0479		Clarification on PLMN Identity	10.3.0
54	RP-111648	0480	2	Correction on ABS Information	10.4.0
55	RP-120234	0491	1	Correct of reset	10.5.0
03/2012				Rel-11 version created based in v. 10.5.0	11.0.0

55	RP-120236	0487	1	Addition of TAC to the neighbour information of a served cell for X2 setup 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	3	Adding RRC re-establishment cause to RLF indication	11.1.0
56	RP-120752	0513	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 and addition of HO cause value to the UE history information	11.2.0
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	3	Introduction of new MDT measurements	11.3.0
58	RP-121732	0550	1	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	2	X2AP Rapporteur Update	11.3.0
59	RP-130208	0572	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	2	Extending maxEARFCN	11.4.0
59	RP-130237	0584	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		Clarification on Signalling Based MDT PLMN List	11.4.0
59	RP-130210	0587	1	X2AP modification for PDCP SN extension	11.4.0
60	RP-130643	0588		Correction on the Definition of Direct Neighbours	11.5.0
60	RP-130641	0589	1	Correction for the MDT Location Information IE	11.5.0
60	RP-130640	0590	5	Correction on RLF INDICATION procedure	11.5.0
60	RP-130643	0592	1	Security key generation in case of MFBI	11.5.0
60	RP-130643	0593	2	Correction on the Multiple Frequency Band Indicators	11.5.0
61	RP-131181	0598	1	Correction on Handover Report procedure	11.6.0
61	RP-131179	0602	2	Correction on ABS Information	11.6.0
61	RP-131183	0606	1	Correction of terminology concerning the mobility restriction function	11.6.0
62	RP-131902	0609	3	Correction of Handover Restriction List	11.7.0
62	RP-131902	0611	1	Correction for Load Balancing Related cause value CR for 36423	11.7.0
62	RP-131902	0623	2	Correction for Load Balancing Related IE	12.0.0
62	RP-131909	0607	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	4	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	3	Introduction of the UE history reported from the UE	12.3.0
65	RP-141518	0690	2	Introduction of an indication of the expected UE behaviour	12.3.0
66	RP-142089	0691	8	Introduction of Dual Connectivity	12.4.0
66	RP-142090	0692	10	Introduction of inter-eNB CoMP signalling	12.4.0
66	RP-142092	0748	5	X2 support for Network Assisted Interference Cancellation	12,4.0
66	RP-142094	0754	2	X2AP Rapporteur Update	12.4.0
66	RP-142094	0759	2	Correction on RLF Report Container	12.4.0
66	RP-142094	0776	2	Setting of Re-establishment Cell ID in RLF Indication message	12.4.0
66	RP-142094	0777	3	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	5	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-150356	0797	1	Correction on DC stage3	12.5.0
67	RP-150348	0801	1	Correction of the Usage of the MultibandInfoList IE	12.5.0
67	RP-150351	0802	1	Introduction of Cause values for Dual Connectivity	12.5.0
67	RP-150356	0803	1	ASN.1 Corrections for X2AP	12.5.0
67	RP-150351	0804	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	0808	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	0912	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	0924	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 information	13.2.0
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 handover without SeNB change	13.3.0
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	3	Correction on Old/New eNB UE X2AP ID	13.3.0
72	RP-161042	0965	7	Introduction of the inter-eNB UE Context Resume function	13.4.0
72	RP-161043	0968	1	Correction on the DC function description	13.4.0
72	RP-161043	0969	3	Correction on eNB UE X2AP ID Extension	13.4.0
72	RP-161043	0972	2	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 on NB-IoT inter node RRC container	13.5.0
73	RP-161550	0998	2	Correction on Security Related Information in UE Context Retrieval Request	13.5.0
09/2016				Rel-14 version created based in v. 13.5.0	14.0.0
73	RP-161552	0975	5	Vehicular Authorization Signaling over X2	14.0.0
74	RP-162337	1007		Clarification on V2X Services Authorized IE	14.1.0
74	RP-162340	1008	3	Target cell selection for low complexity UEs and UEs in enhanced coverage	14.1.0
74	RP-162340	1011	-	Correction to Served Cell Information for NB-IoT	14.1.0

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
03/2017	RP-75	RP-170535	1023		B	X2AP Support for Inter-eNB Mobility without WT Change	14.2.0
03/2017	RP-75	RP-170537	1005	3	B	Introduction of a new special subframe configuration	14.2.0
03/2017	RP-75	RP-170538	1025		B	Support of V2X over X2	14.2.0
03/2017	RP-75	RP-170542	1026		B	Introduction of New types of eNB ID	14.2.0
03/2017	RP-75	RP-170536	1024	1	B	Introduction of eMOB Stage3	14.2.0
06/2017	RP-75	RP-171329	1033	1	A	Introduction of UL TNL address in CIoT UP Solution	14.3.0
09/2017	RP-77	RP-171974	1035	1	F	Correction on NB-IoT UP mobility	14.4.0
09/2017	RP-77	RP-171974	1037	1	F	Correction of SeNB Release Confirm	14.4.0
12/2017	RP-78	RP-172673	1044	2	F	Introduction of new IEs in X2 for high performing load balance	14.5.0
12/2017	RP-78	RP-172715	1046	-	F	Correction of mismatched tabular and ASN.1	14.5.0
12/2017	RP-78	RP-172672	1041	6	B	Baseline CR to TS 36.423 covering agreements of RAN3 #98	15.0.0
12/2017	RP-78	RP-172674	1045	1	B	Introduction of QoE Measurement Collection for LTE	15.0.0
03/2018	RP-79	RP-180468	1050	-	B	X2AP corrections for agreed EN-DC BL CR	15.1.0
03/2018	RP-79	RP-180468	1051	1	F	Essential corrections for EN-DC	15.1.0
03/2018	RP-79	RP-180468	1052	1	F	Clarification on HRL for EN-DC	15.1.0
03/2018	RP-79	RP-180468	1053	-	F	Correction of counter Check procedure for EN-DC	15.1.0
03/2018	RP-79	RP-180468	1054	-	B	Support for supplementary UL carrier	15.1.0
03/2018	RP-79	RP-180468	1056	-	F	Correction on SgNB initiated SgNB Modification procedure	15.1.0
03/2018	RP-79	RP-180468	1061	1	F	Correction of mandatory/optional/Conditional IEs in 36.423	15.1.0
03/2018	RP-79	RP-180468	1067	2		Support for S-RLF	15.1.0
03/2018	RP-79	RP-180468	1071	2	F	Update of EN-DC X2 Setup and EN-DC Configuration Update	15.1.0
03/2018	RP-79	RP-180468	1073	-	F	Removal of wrong abnormal behaviour that does not exist in EN-DC	15.1.0
03/2018	RP-79	RP-180468	1078	1		CR for addition of cause	15.1.0
03/2018	RP-79	RP-180468	1079	2	F	Clarification and correction on X2 for EN-DC	15.1.0
03/2018	RP-79	RP-180468	1081	1	F	Corrections for EN-DC	15.1.0
03/2018	RP-79	RP-180468	1082	1	F	Resolve the remaining issues over X2 for EN-DC	15.1.0
03/2018	RP-79	RP-180468	1083	1	F	Introduction of DRB ID for EN-DC	15.1.0
03/2018	RP-79	RP-180314	1087	1	F	Removing data forwarding from the corresponding node for EN-DC	15.1.0
03/2018	RP-79	RP-180472	1092	1	F	Rapporteur correction of 36.423 before NSA ASN.1 freeze	15.1.0
03/2018	RP-79	RP-180473	1093	-	A	Correction on Offset of NB-IoT Channel Number to EARFCN	15.1.0
03/2018	RP-79	RP-180468	1094	-	F	Correction of TAC for NG-RAN cells before NSA ASN.1 freeze	15.1.0
03/2018	RP-79	RP-180468	1095	-	F	Remove PDCP change indication in SN modification request message	15.1.0
03/2018	RP-79	RP-180468	1096	-	F	Change the presence of container in SgNB reconfiguration complete procedure	15.1.0
03/2018	RP-79	RP-180468	1097	-	F	Addition of Measurement Timing Configuration information	15.1.0
06/2018	RP-80	RP-181241	1047	6	B	Support of Enhanced VoLTE Performance	15.2.0
06/2018	RP-80	RP-181239	1065	4	F	X2 partial reset for EN-DC	15.2.0
06/2018	RP-80	RP-181238	1068	1	F	Clarification of the interactions with the UE Context Release	15.2.0
06/2018	RP-80	RP-181241	1086	3	C	Introduction of QMC for MTSI in EUTRAN	15.2.0
06/2018	RP-80	RP-181237	1090	9	B	Baseline CR for E-UTRA - NR Cell Resource Coordination for TS 36.423 covering agreements of RAN3#100	15.2.0
06/2018	RP-80	RP-181238	1104	-	F	Correction of UL link configuration in TS36.423	15.2.0
06/2018	RP-80	RP-181410	1107	4	F	Addition of the full config indicator	15.2.0
06/2018	RP-80	RP-181239	1116	1	F	Correction of the SeNB Reconfiguration Completion procedure	15.2.0
06/2018	RP-80	RP-181239	1117	2	F	Correction of abnormal conditions for EN-DC security algorithm selection	15.2.0
06/2018	RP-80	RP-181238	1121	1	F	Correction of reference in RRC Container	15.2.0
06/2018	RP-80	RP-181238	1122	-	F	Correction of condition presence of E-RAB Level QoS Parameters related	15.2.0
06/2018	RP-80	RP-181238	1123	1	F	Support of TEID change at SN	15.2.0
06/2018	RP-80	RP-181237	1125	4	B	X2AP CR for support of NR Multiple frequency band in EN-DC	15.2.0
06/2018	RP-80	RP-181238	1130	-	F	Correction of max NR ARFCN value	15.2.0
06/2018	RP-80	RP-181243	1132	3	B	Baseline CR: Introduction of the Aerial Usage Indication	15.2.0
06/2018	RP-80	RP-181238	1133	1	F	Use of SPID for EN-DC	15.2.0
06/2018	RP-80	RP-181238	1134	1	F	Correction of references to RRC containers for EN-DC	15.2.0
06/2018	RP-80	RP-181238	1135	-	F	Corrections on Tabular indentation and ASN.1 criticality	15.2.0
06/2018	RP-80	RP-181239	1138	-	F	Adding missing relation for the TEID	15.2.0
06/2018	RP-80	RP-181241	1142	3	B	Retrieve UE Context at UE Re-establishment	15.2.0
06/2018	RP-80	RP-181241	1143	-	D	Rapporteur's corrections on the specification	15.2.0
06/2018	RP-80	RP-181239	1145	-	F	Correction on the same terminology of "Split SRB" in TS36.423	15.2.0
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06/2018	RP-80	RP-181239	1149	3	F	CR for Clarification on resource coordination	15.2.0
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06/2018	RP-80	RP-181239	1153	-	F	Coordination of Inactivity for EN-DC	15.2.0
06/2018	RP-80	RP-181239	1155	-	C	Introduction of CN type restriction	15.2.0
06/2018	RP-80	RP-181239	1158	-	F	User Inactivity handling over X2 EN-DC	15.2.0
06/2018	RP-80	RP-181239	1160	1	F	Addition of Cause Value	15.2.0
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06/2018	RP-80	RP-181239	1164	-	F	Corrections on misalignment between tabular and ASN.1	15.2.0
06/2018	RP-80	RP-181239	1165	1	F	Introduction of EN-DC X2 removal procedure	15.2.0
06/2018	RP-80	RP-181239	1167	-	F	Support of DL TEID change over S1 at SN	15.2.0
06/2018	RP-80	RP-181242	1174	2	B	Support of NB-IoT measurement enhancement and TDD Config	15.2.0
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06/2018	RP-80	RP-181239	1176	1	F	Introduction of a Configured TAC into the NR Neighbour Information IE and the Served NR Cell Information IE	15.2.0
06/2018	RP-80	RP-181239	1178	-	F	Correction of the Limited List IE encoding to enable extensibility	15.2.0
09/2018	RP-81	RP-181920	1115	4	F	Indication of the RLC re-establishment at the assisting node	15.3.0
09/2018	RP-81	RP-181920	1190	-	F	Addition of RRC config indication to SGNB MODIFICATION REQUIRED and SGNB MODIFICATION REQUEST ACKNOWLEDGE	15.3.0
09/2018	RP-81	RP-181920	1191	2	F	Clarification on secondary RAT data volume reporting	15.3.0
09/2018	RP-81	RP-181920	1192	1	F	Essential corrections for EN-DC	15.3.0
09/2018	RP-81	RP-181920	1193	1	F	Corrections on EN-DC Resource Configuration	15.3.0
09/2018	RP-81	RP-181921	1196	3	F	Notification of PDCP SN length change	15.3.0
09/2018	RP-81	RP-181920	1198	1	F	Corrections on E-UTRA – NR Cell Resource Coordination	15.3.0
09/2018	RP-81	RP-181921	1201	2	F	RLC Mode Indication over X2 – for 36.423	15.3.0
09/2018	RP-81	RP-181922	1202	4	F	Baseline CR for TS 36.423 covering agreements of RAN3#AH1807 and RAN3#101	15.3.0
09/2018	RP-81	RP-181921	1203	2	F	Correction of "Maximum MCG admittable E-RAB Level QoS Parameters"	15.3.0
09/2018	RP-81	RP-181921	1206	-	F	X2 Corrections for EN-DC	15.3.0
09/2018	RP-81	RP-181921	1211	1	F	Access Restriction Data for NR in EPC	15.3.0
09/2018	RP-81	RP-181921	1214	2	C	Extension of Data Traffic Resources IE for E-UTRA-NR Cell Resource Coordination	15.3.0
09/2018	RP-81	RP-181921	1217	-	F	Correction of 5GS TAC	15.3.0
09/2018	RP-81	RP-181921	1221	1	F	CR on clarification of successfully delivered for NR-U	15.3.0
09/2018	RP-81	RP-181923	1226	3	F	Data forwarding for Retrieve UE Context in case of RRC connection re-establishment	15.3.0
09/2018	RP-81	RP-181924	1231	1	F	CR to X2AP to introduce Bluetooth and WLAN measurement in MDT	15.3.0
09/2018	RP-81	RP-182127	1233	4	B	Introduction of Subscription based UE differentiation	15.3.0
09/2018	RP-81	RP-181921	1235	-	F	Correction of SgNB Activity Notification Procedure	15.3.0
12/2018	RP-82	RP-182447	1237	4	F	Addition of the RLC Mode information for PDCP transfer	15.4.0
12/2018	RP-82	RP-182446	1243	3	F	Correction on PDCP SN length	15.4.0
12/2018	RP-82	RP-182447	1244	2	F	Support of CA based PDCP duplication on X2	15.4.0
12/2018	RP-82	RP-182446	1245	1	F	CR on Introduction of overload indication over X2	15.4.0
12/2018	RP-82	RP-182447	1246	1	F	CR on alingment of terminology for eNB or MeNB	15.4.0
12/2018	RP-82	RP-182446	1247	1	F	Correction of SgNB Initiated SN Modification procedure for Measurement Gap	15.4.0
12/2018	RP-82	RP-182446	1248	-	F	ASN.1 corrections on NRNeighbour-Information IE and NRFreqInfo IE	15.4.0
12/2018	RP-82	RP-182446	1250	-	F	Correction on E-UTRA - NR resource coordination	15.4.0
12/2018	RP-82	RP-182447	1253	3	F	Corrections of MeNB/SgNB resource coordination	15.4.0
12/2018	RP-82	RP-182446	1256	1	F	Correction on SGNB ACTIVITY NOTIFICATION IE's	15.4.0
12/2018	RP-82	RP-182447	1259	1	F	Correction of PDCP SN Length Indication	15.4.0
12/2018	RP-82	RP-182447	1264	2	F	RLC reestablishment indication for TS36.423	15.4.0
12/2018	RP-82	RP-182504	1267	1	F	Update on Retrieve UE Context Request message for TS36.423	15.4.0
12/2018	RP-82	RP-182447	1272	1	F	Handling of RLC failure	15.4.0
12/2018	RP-82	RP-182447	1273	-	F	Add missing description on non-operational X2 interface for EN-DC	15.4.0
12/2018	RP-82	RP-182447	1275	2	F	Further corrections of MeNB/SgNB resource coordination	15.4.0
12/2018	RP-82	RP-182447	1279	1	F	Criticality Correction for X2AP UE-ID	15.4.0
12/2018	RP-82	RP-182437	1280	2	F	Allowing SgNB to request new DRB ID from MeNB in EN-DC for an already established SN terminated bearer	15.4.0
03/2019	RP-83	RP-190555	1282	3	F	Correction to RRC transfer	15.5.0
03/2019	RP-83	RP-190555	1283	2	F	Transfer of the PSCell information for LI purposes	15.5.0
03/2019	RP-83	RP-190555	1285	-	F	Enabling using Dual Connectivity cause values in EN-DC	15.5.0
03/2019	RP-83	RP-190555	1287	1	F	Desired Activity Notification Level	15.5.0
03/2019	RP-83	RP-190555	1291	-	F	Introduction of IMEISV to Addition Request over X2	15.5.0
03/2019	RP-83	RP-190555	1292	1	F	Clarification on the usage of coordination assistance information	15.5.0
03/2019	RP-83	RP-190556	1297	1	F	Introducing NR Neighbour information in X2 Setup	15.5.0
03/2019	RP-83	RP-190555	1298	-	F	Rapporteur updates on version 15.4.0	15.5.0
03/2019	RP-83	RP-190523	1300	3	F	Adding Trace Messages in X2AP	15.5.0
03/2019	RP-83	RP-190556	1301	1	F	Correction of EPC interworking	15.5.0
03/2019	RP-83	RP-190555	1302	-	F	Straighten-up SgNB's request to release and add the same SN-terminated bearer with different DRB ID	15.5.0
03/2019	RP-83	RP-190561	1304	1	F	Introduction of TNL Address discovery for EN-DC (using new container)	15.5.0
2019-07	RP-84	RP-191395	1299	2	F	Correction of MaxnoofBPLMNs for NR	15.6.0
2019-07	RP-84	RP-191395	1307	1	F	RRC config indication behaviour	15.6.0
2019-07	RP-84	RP-191395	1308	-	F	Transferring of NR RRC message in MeNB	15.6.0

2019-07	RP-84	RP-191396	1313	1	F	PDCP SN length related clean-up over To Be Mofidified structure in SN initiated SN Modifcation procedure	15.6.0
2019-07	RP-84	RP-191429	1314	5	F	RAN sharing with multiple Cell ID broadcast	15.6.0
2019-07	RP-84	RP-191395	1315	-	F	SN Status Transfer applicability for Re-establishment	15.6.0
2019-07	RP-84	RP-191395	1316	2	F	Rapporteur's corrections to version 15.5.0	15.6.0
2019-07	RP-84	RP-191397	1317	1	F	Correction of Core Network Type Restriction	15.6.0
2019-07	RP-84	RP-191395	1318	-	F	CR36423 for Addition of MN (MeNB) cell ID to solve the PCI confusion in SN(SgNB) modification Request message	15.6.0
2019-07	RP-84	RP-191395	1321	1	F	Updates on TS 36.423 for EN-DC TNL Address discovery	15.6.0
2019-07	RP-84	RP-191394	1330	1	F	PDCP SN length related clean-up over To Be Modified structure in MN initiated SN Modification procedure	15.6.0

History

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