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X2 Application Protocol (X2AP)
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Foreword

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

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

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

1 Scope

The present document specifies the radio 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); Tunneling 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".
- [41] 3GPP TS 23.285: " Technical Specification Group Services and System Aspects; Architecture enhancements for V2X services".
- [42] 3GPP TS 38.211: "NR; Physical channels and modulation".
- [43] 3GPP TS 38.213: "NR; Physical layer procedures for control".

- [44] 3GPP TS 38.473: "NG-RAN; F1 application protocol (F1AP)".
- [45] 3GPP TS 38.314: "NR; Layer 2 Measurements".
- [46] Void
- [47] 3GPP TS 38.300: "NR; Overall description; Stage-2".
- [48] 3GPP TS 38.472: "NG-RAN; F1 signalling transport"
- [49] 3GPP TS 38.423: "NG-RAN; Xn Application Protocol (XnAP)".
- [50] 3GPP TS 33.501: "Security architecture and procedures for 5G System".

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].

E-UTRAN node: either an eNB or an en-gNB.

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].

Conditional Handover: As defined in TS 36.300 [15].

DAPS HO: As defined in TS 36.300 [15].

Conditional PSCell Change: As defined in TS 37.340 [32].

Immediate Handover: Used in the context of Conditional Handover, to refer to a handover that is executed immediately after the UE receives the Handover Command.

IAB-node: as defined in TS 38.300 [47].

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
ARPI	Additional RRM Policy Index
ACL	Access Control List
BBF	Broadband Forum
BL	Bandwidth reduced Low complexity
CCO	Cell Change Order
CE	Coverage Enhancement
CHO	Conditional Handover
CoMP	Coordinated Multi Point
DAPS	Dual Active Protocol Stacks
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
IAB	Integrated Access and Backhaul
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
PDCCP	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 <i>Information Element Name</i> 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. <i>E-RAB ID</i> 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.
- EN-DC Load Management. This function is used by MeNB/en-gNB to indicate resource status, overload and traffic load to each other.
- UE Radio Capability ID Mapping.

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 e) Handover Success f) Conditional 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 p) EN-DC Resource Status Reporting Initiation q) EN-DC Resource Status Reporting r) F1-C Traffic Transfer
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
UE Radio Capability ID Mapping	UE Radio Capability ID Mapping

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
EN-DC Resource Status Reporting Initiation	EN-DC RESOURCE STATUS REQUEST	EN-DC RESOURCE STATUS RESPONSE	EN-DC RESOURCE STATUS FAILURE
UE Radio Capability ID Mapping	UE RADIO CAPABILITY ID MAPPING REQUEST	UE RADIO CAPABILITY ID MAPPING RESPONSE	

Table 8.1-2: Class 2 Elementary Procedures

Elementary Procedure	Initiating Message
Load Indication	LOAD INFORMATION
Handover Cancel	HANDOVER CANCEL
SN Status Transfer	SN STATUS TRANSFER
UE Context Release	UE CONTEXT RELEASE
Resource Status Reporting	RESOURCE STATUS UPDATE
Error Indication	ERROR INDICATION
Radio Link Failure Indication	RLF INDICATION
Handover Report	HANDOVER REPORT
X2 Release	X2 RELEASE
X2AP Message Transfer	X2AP MESSAGE TRANSFER
SeNB Reconfiguration Completion	SENB RECONFIGURATION COMPLETE
MeNB initiated SeNB Release	SENB RELEASE REQUEST
SeNB Counter Check	SENB COUNTER CHECK REQUEST
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
Handover Success	HANDOVER SUCCESS
Conditional Handover Cancel	CONDITIONAL HANDOVER CANCEL
Early Status Transfer	EARLY STATUS TRANSFER
EN-DC Resource Status Reporting	EN-DC RESOURCE STATUS UPDATE
Cell Traffic Trace	CELL TRAFFIC TRACE
F1-C Traffic Transfer	F1-C TRAFFIC TRANSFER

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. If the procedure concerns a conditional handover, parallel transactions are allowed. Possible parallel requests are identified by the target cell ID when the source UE AP IDs are the same.

The procedure uses UE-associated signalling.

8.2.1.2 Successful Operation

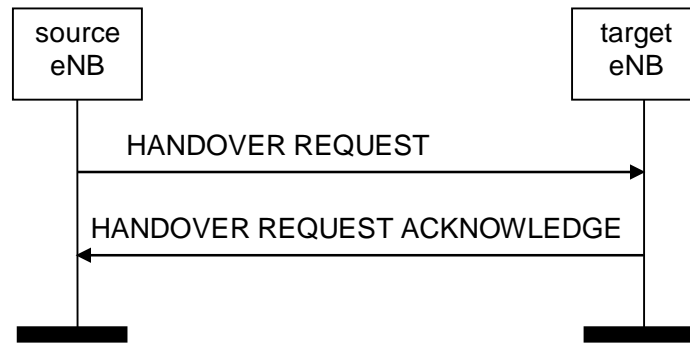


Figure 8.2.1.2-1: Handover Preparation, successful operation

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

If the *Conditional Handover Information Request* IE is contained in the HANOVER REQUEST message, the target eNB shall consider that the request concerns a conditional handover and shall include the *Conditional Handover Information Acknowledge* IE in the HANOVER REQUEST ACKNOWLEDGE message.

If the *New eNB UE X2AP ID* IE is contained in the *Conditional Handover Information Request* IE included in the HANOVER REQUEST message, then the target eNB shall remove the existing prepared conditional HO identified by the *New eNB UE X2AP ID* IE and the *Target Cell ID* IE. It is up to the implementation of the target eNB when to remove the HO information.

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 HANOVER 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 HANOVER 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 HANOVER REQUEST message. The source eNB shall include the *DL Forwarding* IE if it requests a DAPS handover for that E-RAB. 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 HANOVER 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 HANOVER REQUEST ACKNOWLEDGE message the source eNB shall stop the timer $T_{\text{RELOCprep}}$ and terminate the Handover Preparation procedure. If the procedure was initiated for an immediate handover, the source eNB shall start the timer TX2RELOCoverall . 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 HANOVER 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 *Trace Activation* IE includes the *MDT Configuration NR* IE, store and forward the *MDT Configuration NR* IE to the SgNB, if the target eNB has configured EN-DC for the UE.

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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER REQUEST message, the target eNB shall store this information and the target eNB should use the information as defined in TS 36.300 [15].

If the *Additional RRM Policy Index* IE is contained in the HANOVER REQUEST message, the target eNB shall, if supported, 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER REQUEST message.

If the *Expected UE Behaviour* IE is provided in the HANOVER 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER REQUEST ACKNOWLEDGE message, which shall use this information as specified in TS 37.340 [32].

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

If the *Ethernet Type* IE is included in the HANOVER REQUEST message and is set to "True", then the target eNB shall, if supported, take this into account to perform header compression appropriately for the concerned E-RAB.

If the *UE Sidelink Aggregate Maximum Bit Rate* IE is contained in the HANOVER 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 HANOVER 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 HANOVER 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 HANOVER REQUEST message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [12].

If the *DAPS Request Information* IE is included for an E-RAB to be setup in the HANOVER REQUEST message, the target eNB shall consider that the request concerns a DAPS handover for that E-RAB, as described in TS 36.300 [15]. Accordingly, the target eNB shall include the *DAPS Response Information* IE in the HANOVER REQUEST ACKNOWLEDGE message.

If the *Maximum Number of CHO Preparations* IE is included in *Conditional Handover Information Acknowledge* IE contained in the the HANOVER REQUEST ACKNOWLEDGE message, then the source eNB should not prepare more candidate target cells for a CHO for the same UE towards the target eNB than the number indicated in the *Maximum Number of CHO Preparations* IE.

If the *Estimated Arrival Probability* IE is contained in the *Conditional Handover Information Request* IE included in the HANOVER REQUEST message, then the target eNB may use the information to allocate necessary resources for the incoming CHO.

If the *EPC Handover Restriction List Container* IE is included in the HANOVER REQUEST message, the target eNB shall, if supported, store this information in the UE context and shall use it as specified in TS 36.300 [15].

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

If the *PC5 QoS Parameters* IE is contained in the HANOVER REQUEST message, the target eNB shall, if supported, use it for the concerned UE's NR sidelink communication as specified in TS 23.285 [41].

If the *UE Radio Capability ID* IE is contained in the HANOVER REQUEST message, the target eNB shall, if supported, store this information in the UE context and use it as specified in TS 23.401 [12].

If the *IAB Node Indication* IE is contained in the HANOVER REQUEST message, the target eNB shall, if supported, consider that the request is for an IAB node.

If the *IMS Voice EPS Fallback from 5G* IE is contained in the HANOVER REQUEST message, the target eNB shall, if supported, store this information in the UE context and consider that the UE was previously handed over from NG-RAN to E-UTRAN due to an IMS voice fallback.

If the target eNB receives a HANOVER REQUEST message containing the *Source DL Forwarding IP Address* IE as part of the *E-RABs To Be Setup Item* IE, the target eNB shall, if supported, store this information and use it as part of its ACL functionality configuration actions, if such ACL functionality is deployed.

Interaction with SN Status Transfer procedure:

If the *UE Context Kept Indicator* IE set to "True" and the *E-RABs transferred to MeNB* IE are included in the HANOVER REQUEST ACKNOWLEDGE message, then the source eNB shall, if supported, include the uplink/downlink PDCP SN and HFN status received from the SgNB in the SN Status Transfer procedure towards the target eNB, as specified in TS 37.340 [32].

8.2.1.3 Unsuccessful Operation

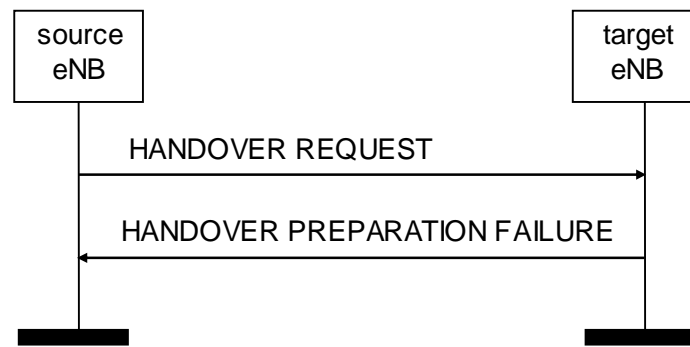


Figure 8.2.1.3-1: Handover Preparation, unsuccessful operation

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 HANOVER PREPARATION FAILURE message to the source eNB. The message shall contain the *Cause* IE with an appropriate value.

If the target eNB receives a HANOVER 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 HANOVER PREPARATION FAILURE message to the source eNB.

If the *Conditional Handover Information Request* IE is contained in the HANOVER REQUEST message and the target eNB rejects the handover or a failure occurs during the Handover Preparation, the target eNB shall include the *Requested Target Cell ID* IE in the HANOVER PREPARATION FAILURE message.

Interactions with Handover Cancel procedure:

If there is no response from the target eNB to the HANOVER REQUEST message before timer $T_{\text{RELOC}_{\text{prep}}}$ expires in the source eNB, the source eNB should cancel the Handover Preparation procedure towards the target eNB by initiating the Handover Cancel procedure with the appropriate value for the *Cause* IE. The source eNB shall ignore any HANOVER REQUEST ACKNOWLEDGE or HANOVER 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 HANOVER 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 HANOVER 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 HANOVER 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 HANOVER PREPARATION FAILURE message.

If the target eNB receives a HANOVER 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 HANOVER 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.

If the *CHO trigger* IE is set to "CHO-replace" in the HANDOVER REQUEST message, but there is no CHO prepared for the included *New eNB UE X2AP ID* IE, or the candidate cell in the *Target Cell ID* IE was not prepared using the same UE-associated signaling connection, 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.

In case that the X2 handover is a DAPS handover, the SN Status Transfer procedure may also be used to transfer the uplink PDCP SN and HFN receiver status, or the downlink PDCP SN and HFN transmitter status for an E-RAB associated with RLC-UM and configured with DAPS as described in TS 36.300 [15].

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 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 to which data is forwarded, is specified by the behaviour of the "target eNB".
- in case of EN-DC, the behaviour of the node from which the E-RAB context is transferred, i.e., either the en-gNB or the MeNB from which data is forwarded, is specified by the behaviour of the "source eNB",
- in case of EN-DC, the behaviour of the node to which the E-RAB context is transferred, i.e., either the en-gNB or the MeNB to which data is forwarded, is specified by the behaviour of the "target eNB".

The procedure uses UE-associated signalling.

8.2.2.2 Successful Operation

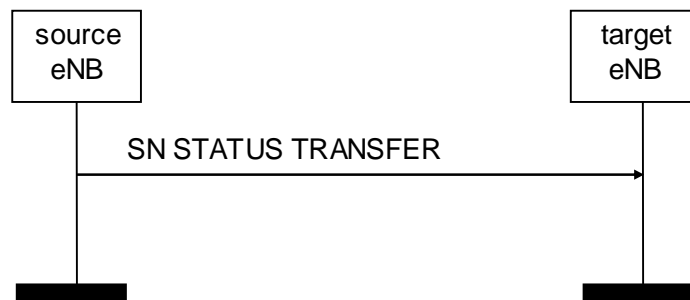


Figure 8.2.2.2-1: SN Status Transfer, successful operation

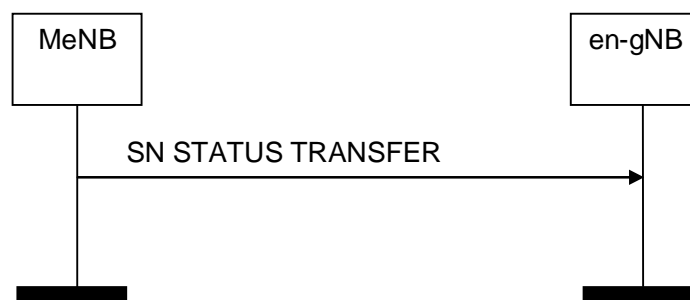


Figure 8.2.2.2-2: MeNB initiated SN Status Transfer for EN-DC, successful operation

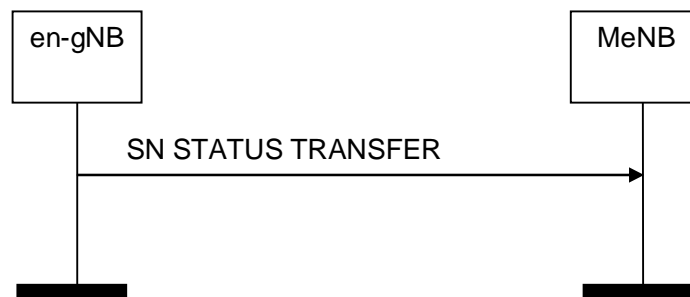


Figure 8.2.2.2-3: en-gNB initiated SN Status Transfer for EN-DC, successful operation

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] or for the EN-DC operations as per TS 37.340 [32] shall ignore the information received in this message. In case of EN-DC, if the target eNB performs PDCP version change or PDCP SN length change or RLC mode change for an E-RAB as specified in TS 37.340 [32], it shall ignore the information received for that E-RAB in this message.

In case that the X2 handover is a DAPS handover, the source eNB may continue assigning PDCP SNs to downlink SDUs and delivering uplink SDUs toward the EPC when initiating this procedure for E-RABs not configured with DAPS as in TS 36.300 [15].

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. In case that the X2 handover is a DAPS handover, this IE may contain the E-RAB ID(s) corresponding to the E-RAB(s) associated with RLC-UM.

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 HANOVER 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 HANOVER 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.

If the *Candidate Cells To Be Cancelled List* IE is included in the HANOVER CANCEL message, the target eNB shall consider that the source eNB is cancelling only the handover associated to the candidate cells identified by the included ECGI and associated to the UE-associated signaling connection identified by the *Old eNB UE X2AP ID* IE (or the *Old*

eNB UE X2AP ID Extension IE if included) and, if included, also by the *New eNB UE X2AP ID IE* (or the *New eNB UE X2AP ID Extension IE* if included).

8.2.4.3 Unsuccessful Operation

Not applicable.

8.2.4.4 Abnormal Conditions

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

If the *Candidate Cells To Be Cancelled List IE* is included in the HANOVER CANCEL message and the handover is not associated to a conditional handover, the target eNB shall ignore the *Candidate Cells To Be Cancelled List IE*.

If one or more candidate cells in the *Candidate Cells To Be Cancelled List IE* included in the HANOVER CANCEL message were not prepared using the same UE-associated signalling connection, the target eNB shall ignore those non-associated candidate cells.

8.2.5 Handover Success

8.2.5.1 General

The Handover Success procedure is used during a conditional handover or a DAPS handover to enable a target eNB to inform the source eNB that the UE has successfully accessed the target eNB.

The procedure uses UE-associated signalling.

8.2.5.2 Successful Operation

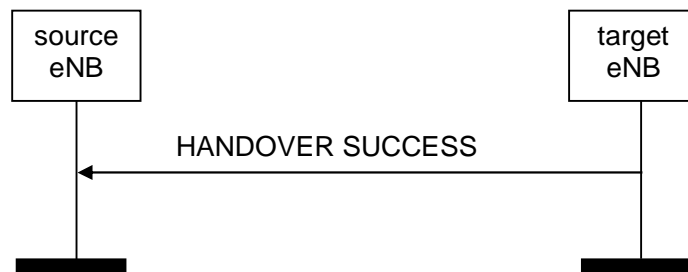


Figure 8.2.5.2-1: Handover Success, successful operation

The target eNB initiates the procedure by sending the HANOVER SUCCESS message to the source eNB.

If late data forwarding was configured for this UE, the source eNB shall start data forwarding using the tunnel information related to the global target cell ID provided in the HANOVER SUCCESS message.

When the source eNB receives the HANOVER SUCCESS message, it shall consider all other CHO preparations accepted for this UE under the same UE-associated signalling connection in the target eNB as cancelled.

Interactions with other procedures

If a CONDITIONAL HANOVER CANCEL message was received for this UE prior the reception of the HANOVER SUCCESS message, the source eNB node shall consider that the UE successfully executed the handover. The source eNB may initiate Handover Cancel procedure towards the other signalling connections or other candidate target eNBs for this UE, if any.

8.2.5.3 Unsuccessful Operation

Not applicable.

8.2.5.4 Abnormal Conditions

If the HANOVER SUCCESS message refers to a context that does not exist, the source eNB shall ignore the message.

8.2.6 Conditional Handover Cancel

8.2.6.1 General

The Conditional Handover Cancel procedure is used to enable a target eNB to cancel an already prepared conditional handover.

The procedure uses UE-associated signalling.

8.2.6.2 Successful Operation



Figure 8.2.6.2-1: Conditional Handover Cancel, successful operation

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

The *New eNB UE X2AP ID* IE and, if available, the *New eNB UE X2AP ID Extension* IE shall be included.

At the reception of the CONDITIONAL HANDOVER CANCEL message, the source eNB shall consider that the target eNB is about to remove any reference to, and release any resources previously reserved for candidate cells associated to the UE-associated signalling identified by the *Old eNB UE X2AP ID* IE (or the *Old eNB UE X2AP ID Extension* IE if included) and the *New eNB UE X2AP ID* IE (or the *New eNB UE X2AP ID Extension* IE if included).

If the *Candidate Cells To Be Cancelled List* IE is also included, the source eNB shall consider that only the resources reserved for the cells identified by the included ECGI are about to be released.

8.2.6.3 Unsuccessful Operation

Not applicable.

8.2.6.4 Abnormal Conditions

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

If one or more candidate cells in the *Candidate Cells To Be Cancelled List* IE included in the CONDITIONAL HANDOVER CANCEL message were not prepared using the same UE-associated signaling connection, the source eNB shall ignore those non-associated candidate cells.

8.2.7 Early Status Transfer

8.2.7.1 General

The purpose of the Early Status Transfer procedure is to transfer the COUNT of the first downlink SDU that the source eNB forwards to the target eNB or the COUNT for discarding already forwarded downlink SDUs for respective E-RAB during DAPS Handover or Conditional Handover.

For Dual Connectivity or EN-DC, the Early Status Transfer procedure is also used, during a Conditional Handover, from the SeNB to the MeNB as specified in TS 36.300 [15], or from the en-gNB to the MeNB as specified in TS 37.340 [32].

The procedure uses UE-associated signalling.

8.2.7.2 Successful Operation

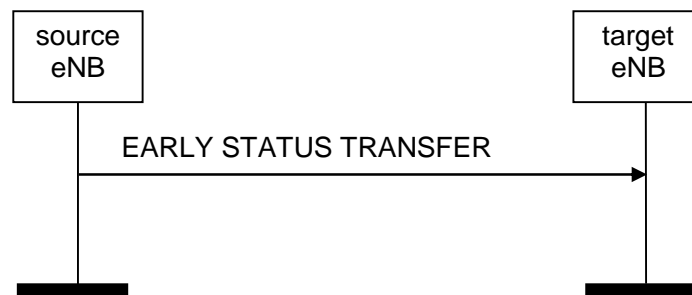


Figure 8.2.7.2-1: Early Status Transfer during DAPS Handover or Conditional Handover, successful operation

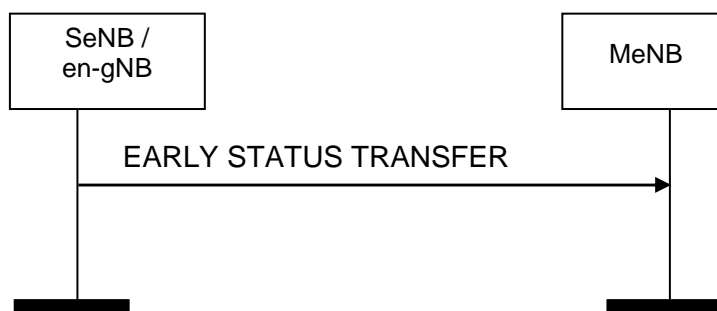


Figure 8.2.7.2-2: Early Status Transfer during Conditional Handover in dual connectivity or EN-DC operation, successful operation

From source eNB to target eNB

The *E-RABs Subject To Early Status Transfer List* IE included in the EARLY STATUS TRANSFER message contains the E-RAB ID(s) corresponding to the E-RAB(s) subject to be simultaneously served by the source and the target eNBs during DAPS Handover or the E-RAB(s) transferred during Conditional Handover.

For each E-RAB for which the *FIRST DL COUNT Value* IE is received in the EARLY STATUS TRANSFER message, the target eNB shall use it as the COUNT of the first downlink SDU that the source eNB forwards to the target eNB. If the *FIRST DL COUNT Value Extended* IE or *FIRST DL COUNT Value for PDCP SN Length 18* IE is included in the *E-RABs Subject To Early Status Transfer Item* IE, the target eNB shall, if supported, use this value instead of the value contained in the *FIRST DL COUNT Value* IE.

For each E-RAB for which the *DISCARD DL COUNT Value* IE is received in the EARLY STATUS TRANSFER message, the target eNB does not transmit forwarded downlink SDUs to the UE whose COUNT is less than the provided and discards them if transmission has not been attempted. If the *DISCARD DL COUNT Value Extended* IE or *DISCARD DL COUNT Value for PDCP SN Length 18* IE is included in the *E-RABs Subject To Early Status Transfer Item* IE, the target eNB shall, if supported, use this value instead of the value contained in the *DISCARD DL COUNT Value* IE.

From SeNB (respectively, en-gNB) to MeNB, the source eNB for Conditional Handover

The *E-RABs Subject To Early Status Transfer List* IE included in the EARLY STATUS TRANSFER message contains the E-RAB ID(s) corresponding to the E-RAB(s) transferred during Conditional Handover.

For each E-RAB in the *E-RABs Subject To Early Status Transfer List* IE, the source eNB shall forward to the target, the value of the received *FIRST DL COUNT Value* IE or *DISCARD DL COUNT Value* IE. If the *FIRST DL COUNT Value Extended* IE or *FIRST DL COUNT Value for PDCP SN Length 18* IE is included, if supported, this value is forwarded instead of the value contained in the *FIRST DL COUNT Value* IE. If the *DISCARD DL COUNT Value Extended* IE or *DISCARD DL COUNT Value for PDCP SN Length 18* IE is included, if supported, this value is forwarded instead of the value contained in the *DISCARD DL COUNT Value* IE.

If the en-gNB sends the message to the MeNB, then the *SgNB UE X2AP ID* IE shall be included in the EARLY 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.

8.2.7.3 Abnormal Conditions

If the target eNB receives this message for a UE for which no prepared DAPS Handover or Conditional Handover exists at the target eNB, the target eNB shall ignore the message.

8.3 Global Procedures

8.3.1 Load Indication

8.3.1.1 General

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

The procedure uses non UE-associated signalling.

8.3.1.2 Successful Operation

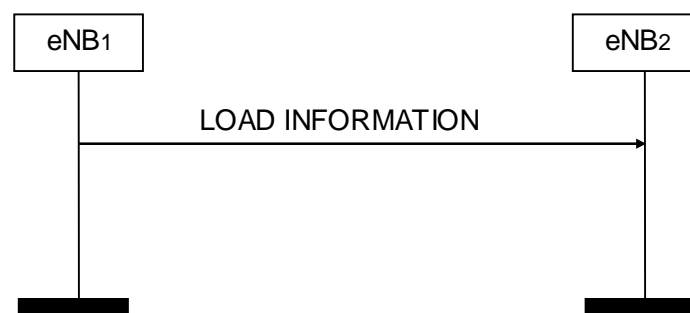


Figure 8.3.1.2-1: Load Indication, successful operation

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

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

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

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

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

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

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

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

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

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

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

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

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

If the *CoMP Information* IE is received in the LOAD INFORMATION message, the receiving eNB may take the IE into account for RRM. The receiving eNB shall consider the *CoMP Information* IE valid starting in the subframe indicated by the *Start SFN* IE and *Start Subframe Number* IE, if present. If the *Start SFN* IE and *Start Subframe Number*

IE are not present, then the receiving eNB shall consider the *CoMP Information IE* as immediately valid. The receiving eNB shall consider the *CoMP Information IE* valid until an update of the same IE, received in a new LOAD INFORMATION message, is considered valid.

8.3.1.3 Unsuccessful Operation

Not applicable.

8.3.1.4 Abnormal Conditions

Void.

8.3.2 Error Indication

8.3.2.1 General

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

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

8.3.2.2 Successful Operation



Figure 8.3.2.2-1: Error Indication, successful operation.



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.

NOTE: Exchange of application level configuration data also applies between two eNBs in case the SN (i.e. the en-gNB) does not broadcast system information other than for radio frame timing and SFN, as specified in the TS 37.340 [32]. How to use this information when this option is used is not explicitly specified.

The procedure uses non UE-associated signalling.

8.3.3.2 Successful Operation

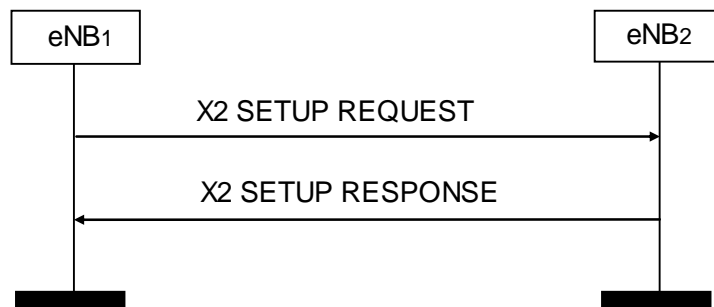


Figure 8.3.3.2-1: X2 Setup, successful operation

An eNB₁ initiates the procedure by sending the X2 SETUP REQUEST message to a candidate eNB₂. The candidate eNB₂ replies with the X2 SETUP RESPONSE message. The initiating eNB₁ shall transfer the complete list of its served cells and, if available, a list of supported GU Group Ids to the candidate eNB₂. The candidate eNB₂ shall reply with the complete list of its served cells and shall include, if available, a list of supported GU Group Ids in the reply.

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

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

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

The initiating eNB₁ may include the *PRACH Configuration* IE in the X2 SETUP REQUEST message. The candidate eNB₂ may also include the *PRACH Configuration* IE in the X2 SETUP RESPONSE message. The eNB receiving the IE may use this information for RACH optimisation.

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

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

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

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

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

The initiating eNB₁ may include the *BandwidthReducedSI* IE in the X2 SETUP REQUEST message. The candidate eNB₂ 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.

The initiating eNB₁ may include the *NPRACH Configuration* IE in the X2 SETUP REQUEST message. The candidate eNB₂ may also include the *NPRACH Configuration* IE in the X2 SETUP RESPONSE message. The eNB receiving the IE may use this information for RACH optimization.

Interaction with the EN-DC Configuration Update procedure:

The receiving eNB may forward the *Intended TDD DL-UL Configuration NR* IE received in the *NR Neighbour Information* IE in the X2 SETUP REQUEST message or in the X2 SETUP RESPONSE message to neighbouring eNBs by triggering the EN-DC Configuration Update procedure.

Interaction with the eNB Configuration Update procedure:

The receiving eNB may forward the *Intended TDD DL-UL Configuration NR* IE received in the *NR Neighbour Information* IE in the X2 SETUP REQUEST message or in the X2 SETUP RESPONSE message to neighbouring eNBs by triggering the eNB Configuration Update procedure.

8.3.3.3 Unsuccessful Operation

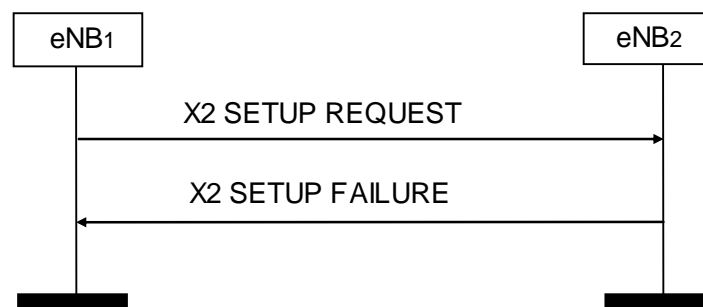


Figure 8.3.3.3-1: X2 Setup, unsuccessful operation

If the candidate eNB₂ cannot accept the setup it shall respond with an X2 SETUP FAILURE message with appropriate cause value.

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

8.3.3.4 Abnormal Conditions

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

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

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

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

8.3.4 Reset

8.3.4.1 General

The purpose of the Reset procedure is to align the resources in eNB₁ and eNB₂, 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

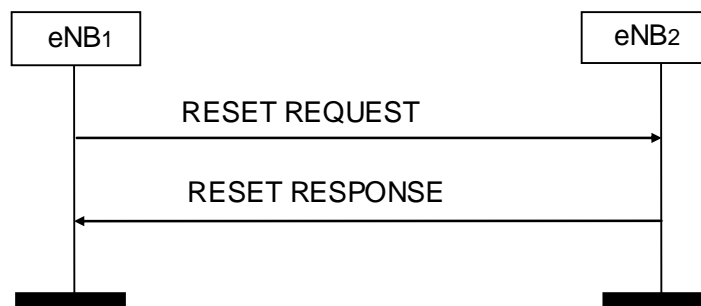


Figure 8.3.4.2-1: Reset, successful operation

The procedure is initiated with a RESET REQUEST message sent from the eNB₁ to the eNB₂. Upon receipt of this message, eNB₂ shall abort any other ongoing procedures over X2 between eNB₁ and eNB₂. The eNB₂ shall delete all the context information related to the eNB₁, 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 eNB₂ shall respond with a RESET RESPONSE message.

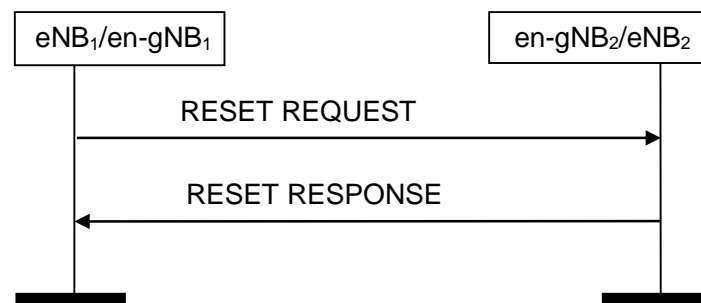


Figure 8.3.4.2-2: Reset, successful operation for EN-DC.

The procedure is initiated with a RESET REQUEST message sent from the eNB₁/en-gNB₁ to en-gNB₂/eNB₂. Upon receipt of this message, eNB₂/en-gNB₂ shall abort any other ongoing procedures over X2 between both nodes. eNB₂/en-gNB₂ shall delete all the context information related to eNB₁/en-gNB₁, 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, eNB₂/en-gNB₂ 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.

NOTE: Update of application level configuration data also applies between two eNBs in case the SN (i.e. the en-gNB) does not broadcast system information other than for radio frame timing and SFN, as specified in the TS 37.340 [32]. How to use this information when this option is used is not explicitly specified.

The procedure uses non UE-associated signalling.

8.3.5.2 Successful Operation

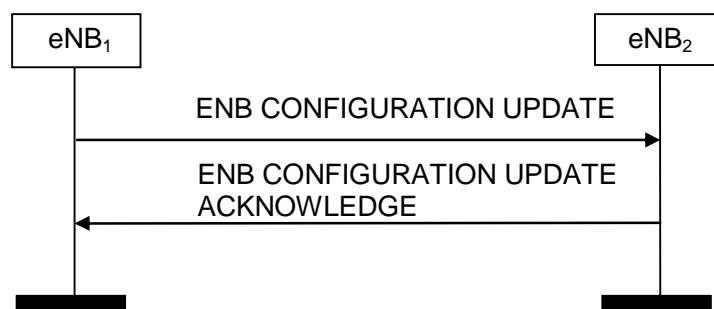


Figure 8.3.5.2-1: eNB Configuration Update, successful operation

An eNB₁ initiates the procedure by sending an ENB CONFIGURATION UPDATE message to a peer eNB₂. 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 eNB₁ has just taken into operational use.

Upon reception of an ENB CONFIGURATION UPDATE message, eNB₂ shall update the information for eNB₁ as follows:

Update of Served Cell Information:

- If *Served Cells To Add* IE is contained in the ENB CONFIGURATION UPDATE message, eNB₂ shall add cell information according to the information in the *Served Cell Information* IE.
- If *Number of Antenna Ports* IE is contained in the *Served Cell Information* IE in the ENB CONFIGURATION UPDATE message, eNB₂ may use this information according to TS 36.331 [9].
- If the *PRACH Configuration* IE is contained in the *Served Cell Information* IE in the ENB CONFIGURATION UPDATE message, the eNB receiving the IE may use this information for RACH optimisation.
- If *Served Cells To Modify* IE is contained in the ENB CONFIGURATION UPDATE message, eNB₂ shall modify information of cell indicated by *Old ECGI* IE according to the information in the *Served Cell Information* IE.

- If *MBSFN Subframe Info* IE is contained in the *Served Cell Information* IE in the ENB CONFIGURATION UPDATE message, eNB₂ may use this information according to TS 36.331 [9]. If a MBSFN subframe indicated in the *MBSFN Subframe Info* IE coincides with an ABS, the eNB₂ shall consider that the subframe is designated as ABS by the sending eNB.
- If *BandwidthReducedSI* IE is contained in the *Served Cell Information* IE in the ENB CONFIGURATION UPDATE message, eNB₂ 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 eNB₁ 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 eNB₂ shall overwrite the served cell information and the whole list of neighbour cell information for the affected served cell.

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

When the MBMS Service Area Identities of a cell in eNB₁ 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.

- If the *NPRACH 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 optimization.

Update of GU Group Id List:

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

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

If the *NR Neighbour Information* IE is contained in the ENB CONFIGURATION UPDATE message, eNB₂ may use this information to update its neighbour cell relations or use it for other functions. 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, eNB₂ shall reply with the ENB CONFIGURATION UPDATE ACKNOWLEDGE message to inform the initiating eNB₁ that the requested update of application data was performed successfully. In case the peer eNB₂ receives an ENB CONFIGURATION UPDATE without any IE except for *Message Type* IE it shall reply with ENB CONFIGURATION UPDATE ACKNOWLEDGE message without performing any updates to the existing configuration.

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

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

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

Interaction with the eNB Configuration Update procedure:

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

The receiving eNB may forward the *Intended TDD DL-UL Configuration NR* IE received in the *NR Neighbour Information* IE in the ENB CONFIGURATION UPDATE message to neighbouring eNBs by triggering the eNB Configuration Update procedure.

Interaction with the EN-DC Configuration Update procedure:

The receiving eNB may forward the *Intended TDD DL-UL Configuration NR* IE received in the *NR Neighbour Information* IE in the ENB CONFIGURATION UPDATE message to neighbouring en-gNBs by triggering the EN-DC Configuration Update procedure.

8.3.5.3 Unsuccessful Operation

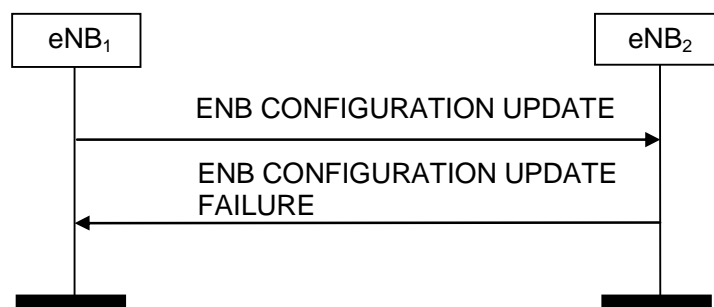


Figure 8.3.5.3-1: eNB Configuration Update, unsuccessful operation

If the eNB₂ can not accept the update it shall respond with an ENB CONFIGURATION UPDATE FAILURE message and appropriate cause value.

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

8.3.5.4 Abnormal Conditions

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

8.3.6 Resource Status Reporting Initiation

8.3.6.1 General

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

The procedure uses non UE-associated signalling.

8.3.6.2 Successful Operation

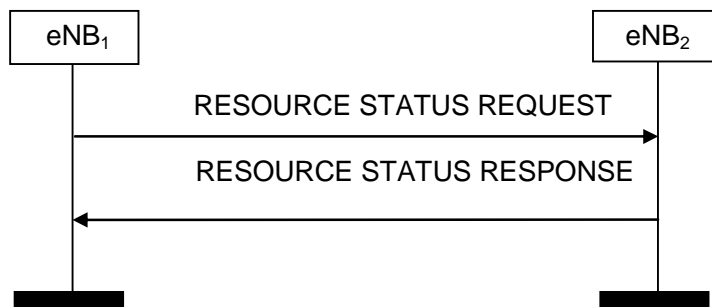


Figure 8.3.6.2-1: Resource Status Reporting Initiation, successful operation

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

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

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

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

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

- the *Radio Resource Status* IE, if the first bit, "PRB Periodic" of the *Report Characteristics* IE included in the RESOURCE STATUS REQUEST message is set to 1;
- the *S1 TNL Load Indicator* IE, if the second bit, "TNL Load Ind Periodic" of the *Report Characteristics* IE included in the RESOURCE STATUS REQUEST message is set to 1;
- the *Hardware Load Indicator* IE, if the third bit, "HW Load Ind Periodic" of the *Report Characteristics* IE included in the RESOURCE STATUS REQUEST message is set to 1;
- the *Composite Available Capacity Group* IE, if the fourth bit, "Composite Available Capacity Periodic" of the *Report Characteristics* IE included in the RESOURCE STATUS REQUEST message is set to 1. If *Cell Capacity Class Value* IE is included within the *Composite Available Capacity Group* IE, this IE is used to assign weights to the available capacity indicated in the *Capacity Value* IE;
- the *ABS Status* IE, if the fifth bit, "ABS Status Periodic" of the *Report Characteristics* IE included in the RESOURCE STATUS REQUEST message is set to 1 and eNB₁ had indicated the ABS pattern to eNB₂;

- the *RSRP Measurement Report List IE*, if the sixth bit, "RSRP Measurement Report Periodic" of the *Report Characteristics IE* included in the RESOURCE STATUS REQUEST message is set to 1;
- the *CSI Report IE*, if the seventh bit, "CSI Report Periodic" of the *Report Characteristics IE* included in the RESOURCE STATUS REQUEST message is set to 1.

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

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

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

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

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

8.3.6.3 Unsuccessful Operation

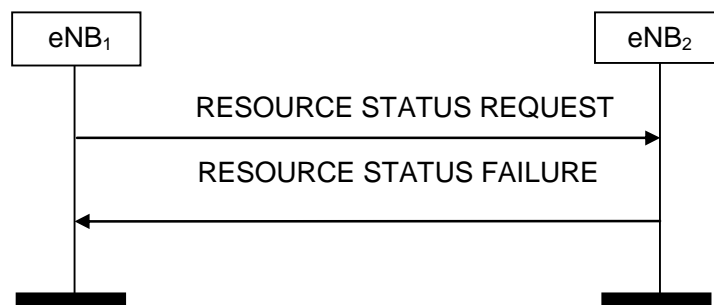


Figure 8.3.6.3-1: Resource Status Reporting Initiation, unsuccessful operation

If none of the requested measurements can be initiated, eNB₂ shall send a RESOURCE STATUS FAILURE message. The *Cause IE* shall be set to an appropriate value e.g. "Measurement Temporarily not Available" or "Measurement not Supported For The Object" for each requested measurement object. The eNB may use the *Complete Failure Cause Information IE* to enhance the failure cause information per measurement in the RESOURCE STATUS FAILURE message.

8.3.6.4 Abnormal Conditions

If the initiating eNB₁ does not receive either RESOURCE STATUS RESPONSE message or RESOURCE STATUS FAILURE message, the eNB₁ may reinitiate the Resource Status Reporting Initiation procedure towards the same eNB, provided that the content of the new RESOURCE STATUS REQUEST message is identical to the content of the previously unacknowledged RESOURCE STATUS REQUEST message.

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

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

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

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

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

If the eNB₂ received a RESOURCE STATUS REQUEST message which includes the *Registration Request* IE set to "start" and the *eNB1 Measurement ID* IE corresponding to an existing on-going load measurement reporting, then eNB₂ shall initiate a RESOURCE STATUS FAILURE message, the cause shall be set to appropriate value e.g. "ExistingMeasurementID".

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

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

8.3.7 Resource Status Reporting

8.3.7.1 General

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

The procedure uses non UE-associated signalling.

8.3.7.2 Successful Operation



Figure 8.3.7.2-1: Resource Status Reporting, successful operation

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

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

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

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

8.3.7.3 Unsuccessful Operation

Not applicable.

8.3.7.4 Abnormal Conditions

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

8.3.8 Mobility Settings Change

8.3.8.1 General

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

The procedure uses non UE-associated signalling.

8.3.8.2 Successful Operation

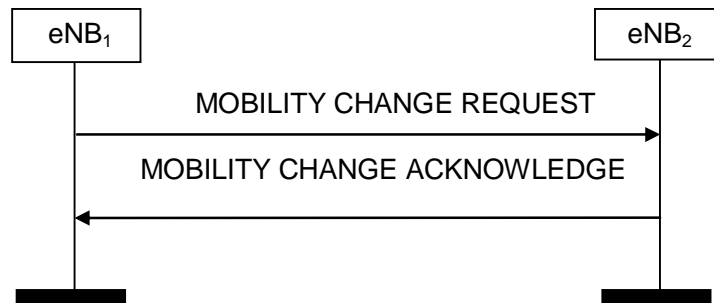


Figure 8.3.8.2-1: Mobility Settings Change, successful operation

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

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

8.3.8.3 Unsuccessful Operation

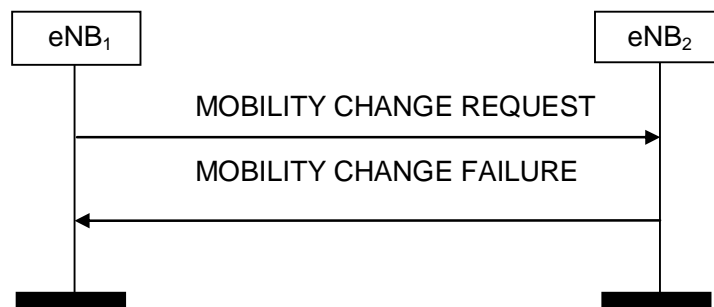


Figure 8.3.8.3-1: Mobility Settings Change, unsuccessful operation

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

8.3.8.4 Abnormal Conditions

Void.

8.3.9 Radio Link Failure Indication

8.3.9.1 General

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

The procedure uses non UE-associated signalling.

8.3.9.2 Successful Operation

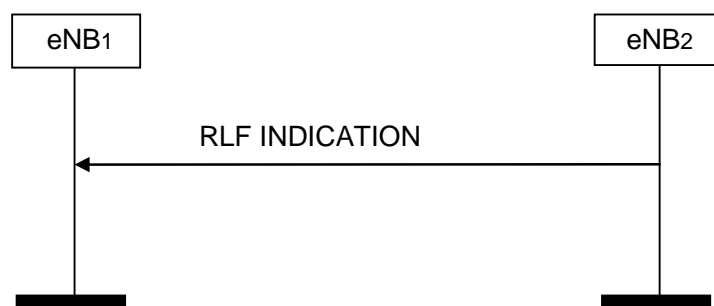


Figure 8.3.9.2-1: Radio Link Failure Indication, successful operation

eNB₂ initiates the procedure by sending the RLF INDICATION message to eNB₁ following a re-establishment attempt or an RLF Report reception from a UE at eNB₂, when eNB₂ considers that the UE may have previously suffered a connection failure at a cell controlled by eNB₁.

eNB₂ may include the *ShortMAC-I* IE in the RLF INDICATION message, e.g., in order to aid the eNB₁ to resolve a potential PCI confusion situation or to aid the eNB₁ to identify the UE.

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

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

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

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

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

eNB₂ may include the *NB-IoT RLF Report Container* IE in the RLF INDICATION message, which may be used by the eNB₁ to determine the nature of the failure. If the *NB-IoT RLF Report Container* IE is included in the RLF INDICATION message sent after successful re-establishment, the eNB₂ shall use the *Re-establishment Cell ECGI* IE in the RLF INDICATION message to indicate the ECGI of the cell where the re-establishment was successful.

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 HANOVER REPORT message to another eNB. By sending the message eNB₁ indicates to eNB₂ that a mobility-related problem was detected.

If the *Handover Report Type* IE is set to "HO too early" or "HO to wrong cell", then the eNB₁ indicates to eNB₂ that, following a successful handover from a cell of eNB₂ to a cell of eNB₁, a radio link failure occurred and the UE attempted RRC Re-establishment either at the original cell of eNB₂ (Handover Too Early), or at another cell (Handover to Wrong Cell). The detection of Handover Too Early and Handover to Wrong Cell events is made according to TS 36.300 [15].

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

- the *Mobility Information* IE, if the *Mobility Information* IE was sent for this handover from eNB₂;

- the *Source cell C-RNTI* IE.

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

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

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

If the *Handover Report Type* IE is set to "Inter-system ping-pong", then the eNB₁ indicates to eNB₂ that a completed handover from a cell of eNB₂ to a cell in NG-RAN might have resulted in an inter-system ping-pong and the UE was successfully handed over to a cell of eNB₁ (indicated with the *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. If the *Handover Report Type* IE is set to "Inter-system ping-pong", then the *Target cell in NG-RAN* IE shall be included in the HANDOVER REPORT message.

8.3.10.3 Unsuccessful Operation

Not applicable.

8.3.10.4 Abnormal Conditions

Void.

8.3.11 Cell Activation

8.3.11.1 General

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

The procedure uses non UE-associated signalling.

8.3.11.2 Successful Operation

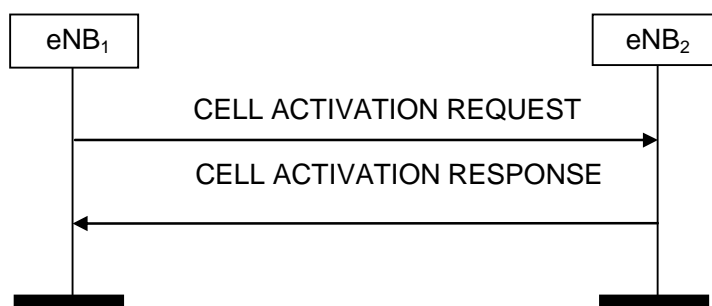


Figure 8.3.11.2-1: Cell Activation, successful operation

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

Upon receipt of this message, eNB₂ 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:

eNB₂ shall not send an ENB CONFIGURATION UPDATE message to eNB₁ 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 eNB₁ is used to update the information about cell activation state of eNB₂ cells in eNB₁.

8.3.11.3 Unsuccessful Operation

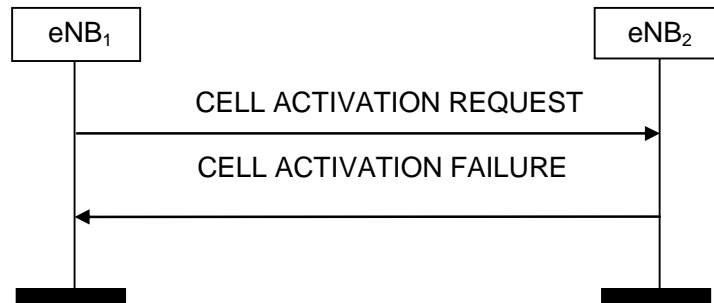


Figure 8.3.11.3-1: Cell Activation, unsuccessful operation

If the eNB₂ 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

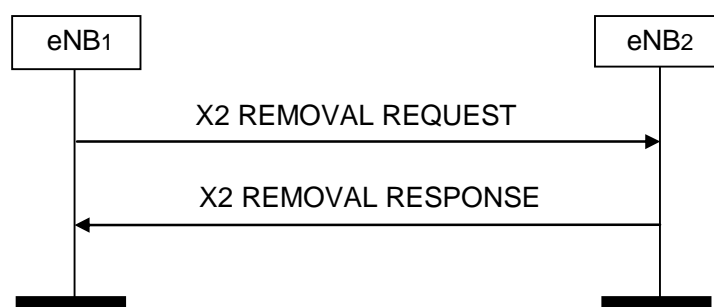


Figure 8.3.12.2-1: X2 Removal, successful operation

An eNB₁ initiates the procedure by sending the X2 REMOVAL REQUEST message to a candidate eNB₂. Upon reception of the X2 REMOVAL REQUEST message the candidate eNB₂ shall reply with the X2 REMOVAL RESPONSE message. After receiving the X2 REMOVAL RESPONSE message, the initiating eNB₁ shall initiate removal of the TNL association towards eNB₂ and may remove all resources associated with that signaling connection. The candidate eNB₂ may then remove all resources associated with that signaling connection.

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

8.3.12.3 Unsuccessful Operation

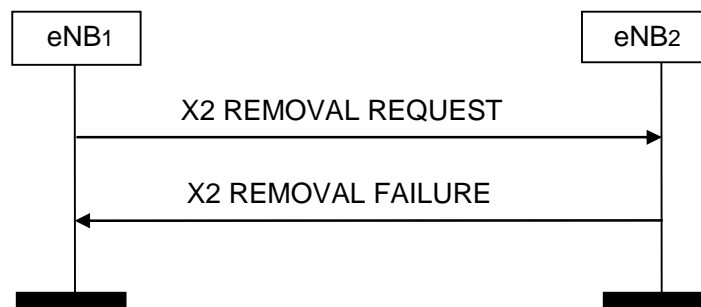


Figure 8.3.12.3-1: X2 Removal, unsuccessful operation

If the candidate eNB₂ cannot accept to remove the signaling connection with eNB₁ 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

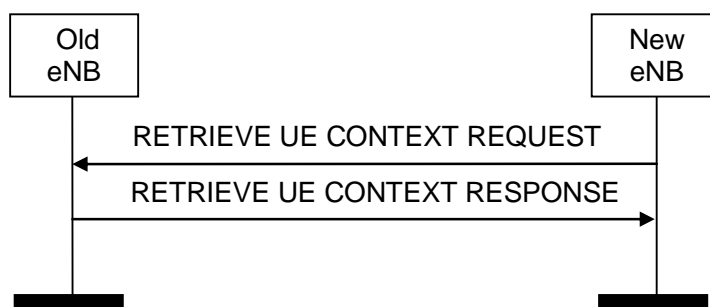


Figure 8.3.13.2-1: Retrieve UE Context, successful operation

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*,
- *Additional RRM Policy Index 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*,
- *EPC Handover Restriction List Container 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.

If the *Bearer Type IE* is included in the RETRIEVE UE CONTEXT RESPONSE message and is set to "non IP", then the new eNB shall not perform IP header compression for the concerned E-RAB.

If the *Ethernet Type IE* is included in the RETRIEVE UE CONTEXT RESPONSE message and is set to "True", then the new eNB shall, if supported, take this into account to perform header compression appropriately for the concerned E-RAB.

If the *NR 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 NR V2X services.

If the *NR V2X Services Authorized IE* is contained in the RETRIEVE UE CONTEXT RESPONSE 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 *PC5 QoS Parameters IE* is contained in the RETRIEVE UE CONTEXT RESPONSE message, the target eNB shall, if supported, use it for the concerned UE's NR sidelink communication as specified in TS 23.285 [41].

If the *UE Radio Capability ID IE* is contained in the RETRIEVE UE CONTEXT RESPONSE message, the target eNB shall, if supported, store this information in the UE context and use it as specified in TS 23.401 [12].

If the *IMS voice EPS fallback from 5G IE* is contained in the RETRIEVE UE CONTEXT RESPONSE message, the new eNB shall, if supported, store this information in the UE context and consider that the UE was previously handed over from NG-RAN to E-UTRAN due to an IMS voice fallback.

8.3.13.3 Unsuccessful Operation

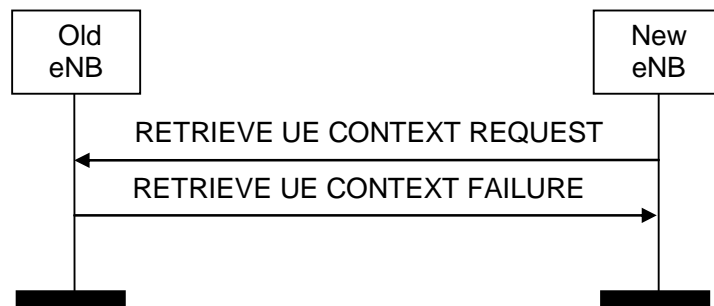


Figure 8.3.13.3-1: Retrieve UE Context, unsuccessful operation

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 interface instance 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

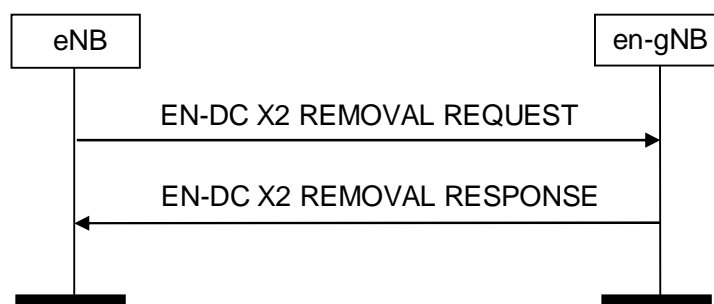


Figure 8.3.14.2-1: eNB Initiated EN-DC X2 Removal, successful operation

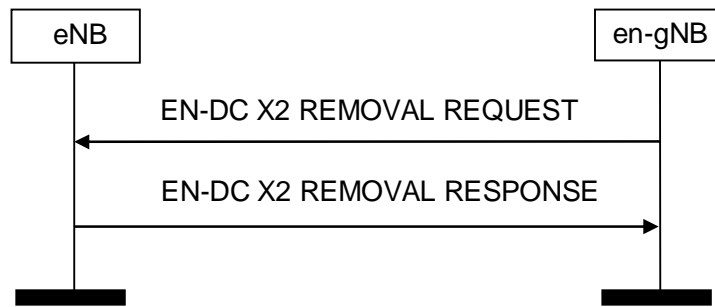


Figure 8.3.14.2-2: en-gNB Initiated EN-DC X2 Removal, successful operation

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 interface instance. The candidate eNB may then remove all resources associated with that interface instance.

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 interface instance with eNB if the *X2 Benefit Value* of the interface instance 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 interface instance. The candidate eNB may then remove all resources associated with that interface instance.

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 interface instance with en-gNB if the *X2 Benefit Value* of the interface instance determined at the candidate eNB is lower than the value of the *X2 Removal Threshold* IE.

8.3.14.3 Unsuccessful Operation

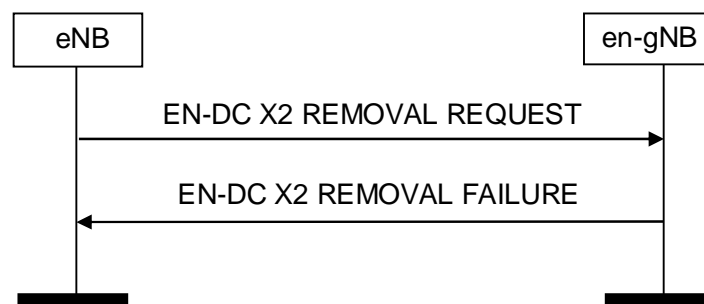


Figure 8.3.14.3-1: eNB Initiated EN-DC X2 Removal, unsuccessful operation

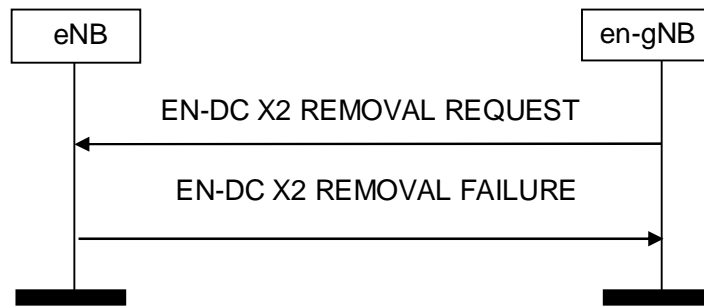


Figure 8.3.14.3-2: en-gNB Initiated EN-DC X2 Removal, unsuccessful operation

If the candidate receiving node cannot accept to remove the interface instance 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].

For Dual Connectivity or EN-DC, the Data Forwarding Address Indication procedure is used during a Conditional Handover to provide data forwarding related information from the MeNB to the SeNB as specified in TS 36.300 [15], or from the MeNB to the en-gNB as specified in TS 37.340 [32].

The procedure uses UE-associated signalling.

8.3.15.2 Successful Operation

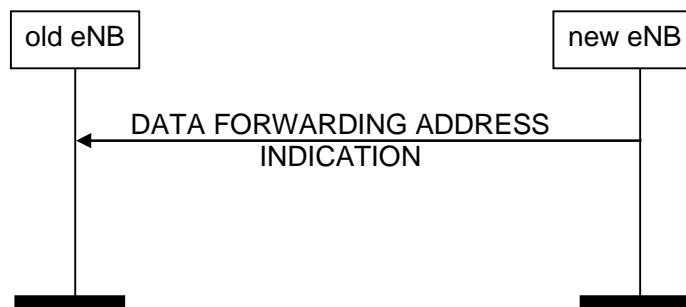


Figure 8.3.15.2-1: Data Forwarding Address Indication, successful operation

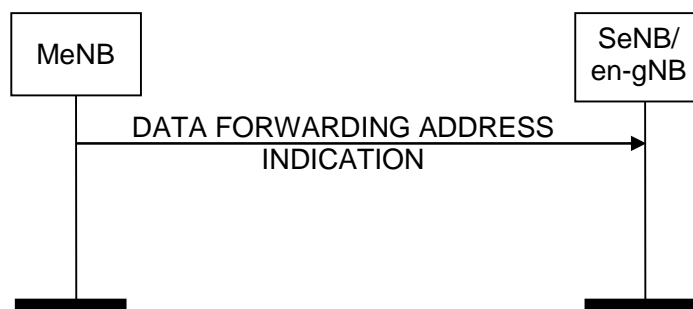


Figure 8.3.15.2-2: Data Forwarding Address Indication for Conditional Handover, successful operation

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*.

If the DATA FORWARDING ADDRESS INDICATION message includes the *CHO DC Indicator IE*, the SeNB (respectively, the en-gNB for EN-DC) shall, if supported, consider that the DATA FORWARDING ADDRESS INDICATION message concerns a Conditional Handover, and act as specified in TS 36.300 [15] for dual connectivity (respectively, act as specified in TS 37.340 [32] for EN-DC).

If the DATA FORWARDING ADDRESS INDICATION message includes the *CHO DC Early Data Forwarding Indicator IE* set to “stop”, the SeNB (respectively, the en-gNB for EN-DC) shall, if supported and if already initiated, stop early data forwarding for the provided E-RABs Data Forwarding Address information.

EN-DC

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

8.3.15.3 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

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

8.4.3 Unsuccessful Operation

Not Applicable

8.4.4 Abnormal Condition

Not Applicable.

8.5 X2AP Message Transfer

8.5.1 General

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

8.5.2 Successful Operation



Figure 8.5.2-1: X2AP Message Transfer, successful operation

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

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

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

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

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

8.5.3 Unsuccessful Operation

Not Applicable.

8.5.4 Abnormal Condition

Not Applicable.

8.6 Procedures for Dual Connectivity

8.6.1 SeNB Addition Preparation

8.6.1.1 General

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

The procedure uses UE-associated signalling.

8.6.1.2 Successful Operation

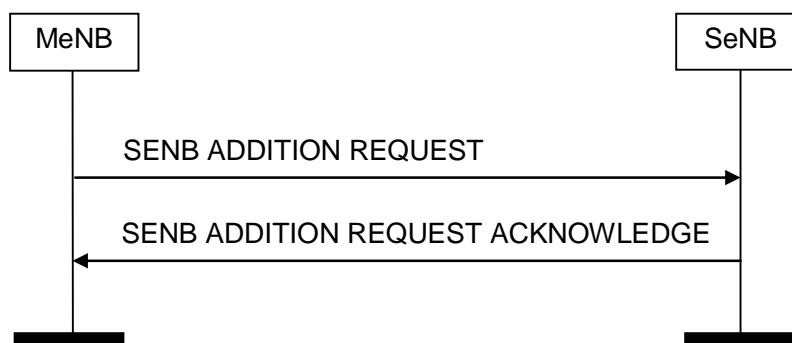


Figure 8.6.1.2-1: SeNB Addition Preparation, successful operation

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

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

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

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

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

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

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

For each E-RAB configured with the SCG bearer option

- the SeNB shall choose the ciphering algorithm based on the information in the *UE Security Capabilities* IE and locally configured priority list of AS encryption algorithms and apply the key indicated in the *SeNB Security Key* IE as specified in the TS 33.401 [18].
- the MeNB may propose to apply forwarding of downlink data by including the *DL Forwarding* IE within the *E-RABs To be Added Item* IE of the SENB ADDITION REQUEST message. For each E-RAB that it has decided to admit, the SeNB may include the *DL Forwarding GTP Tunnel Endpoint* IE within the *E-RABs Admitted To Be Added Item* IE of the SENB ADDITION REQUEST ACKNOWLEDGE message to indicate that it accepts the proposed forwarding of downlink data for this bearer. This GTP tunnel endpoint may be different from the corresponding 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 *Bearer Type* IE for the concerned E-RAB is received by the SeNB and is set to "non IP", the SeNB shall, if supported, not perform IP header compression for the concerned E-RAB.
- If the *Ethernet Type* IE for the concerned E-RAB is received by the SeNB and is set to "True", the SeNB shall, if supported, take this into account to perform header compression appropriately 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.

If the *Source DL Forwarding IP Address* IE is included in the SENB ADDITION REQUEST message, the SeNB shall, if supported, store this information and use it as part of its ACL functionality configuration actions, if such ACL functionality is deployed.

If the *Source DL Forwarding IP Address* IE is included in the SENB ADDITION REQUEST ACKNOWLEDGE message, the MeNB shall, if supported, store this information and use it as part of its ACL functionality configuration actions, if such ACL functionality is deployed.

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

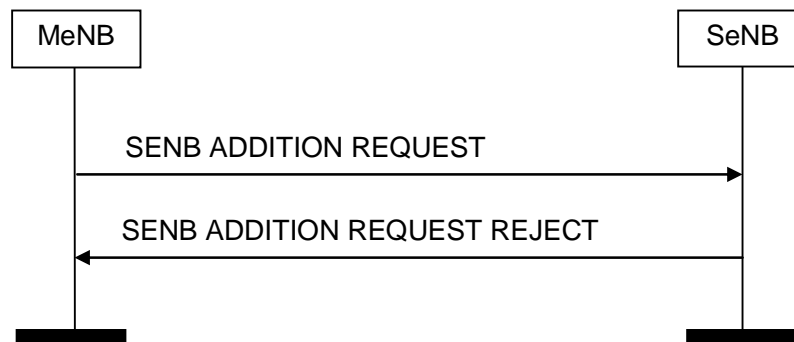


Figure 8.6.1.3-1: SeNB Addition Preparation, unsuccessful operation

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

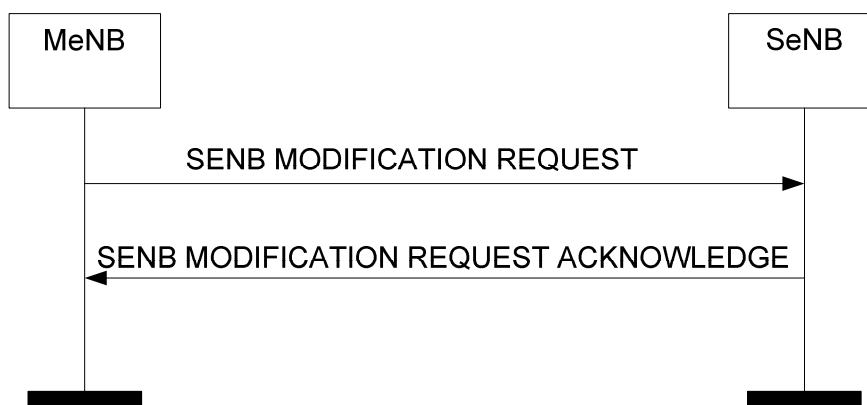


Figure 8.6.3.2-1: MeNB initiated SeNB Modification Preparation, successful operation

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.
- If the *Bearer Type* IE for the concerned E-RAB is received by the SeNB and is set to "non IP", the SeNB shall, if supported, not perform IP header compression for the concerned E-RAB.
- If the *Ethernet Type* IE for the concerned E-RAB is received by the SeNB and is set to "True", the SeNB shall, if supported, take this into account to perform header compression appropriately 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 MODIFICATION 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].

If the *Source DL Forwarding IP Address* IE is included in the SENB MODIFICATION REQUEST message, the SeNB shall, if supported, store this information and use it as part of its ACL functionality configuration actions, if such ACL functionality is deployed.

If the *Source DL Forwarding IP Address* IE is included in the SENB MODIFICATION REQUEST ACKNOWLEDGE message, the MeNB shall, if supported, store this information and use it as part of its ACL functionality configuration actions to identify source TNL address for data forwarding in case of subsequent handover preparation, if such ACL functionality is deployed.

Interactions with the SeNB Reconfiguration Completion procedure:

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

8.6.3.3 Unsuccessful Operation

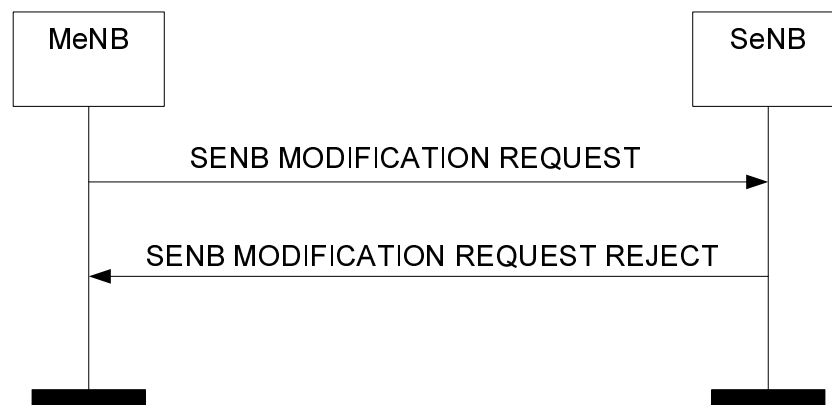


Figure 8.6.3.3-1: MeNB initiated SeNB Modification Preparation, unsuccessful operation

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

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

8.6.3.4 Abnormal Conditions

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

If the SeNB receives a 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

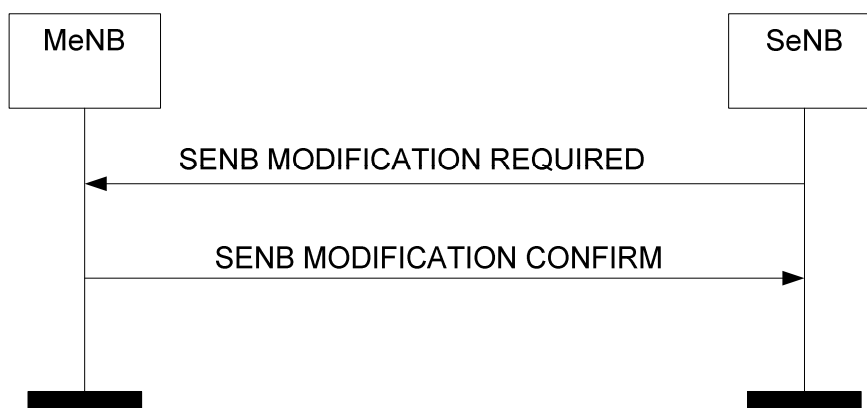


Figure 8.6.4.2-1: SeNB initiated SeNB Modification, successful operation.

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 $T_{D\text{Coverall}}$.

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

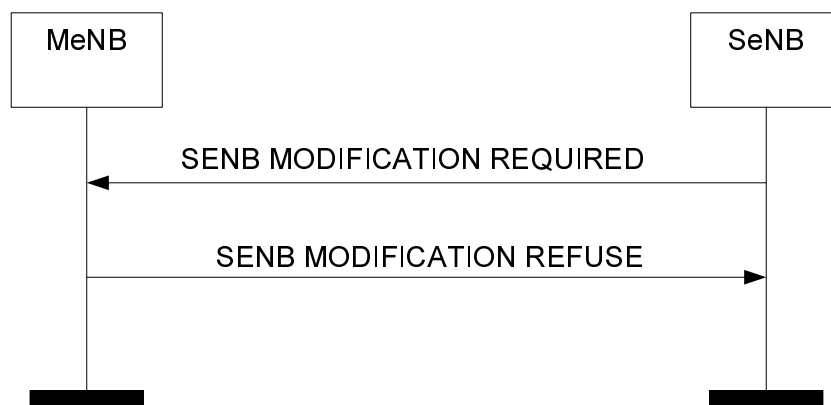


Figure 8.6.4.3-1: SeNB initiated SeNB Modification, unsuccessful operation.

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 $T_{D\text{Coverall}}$ 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

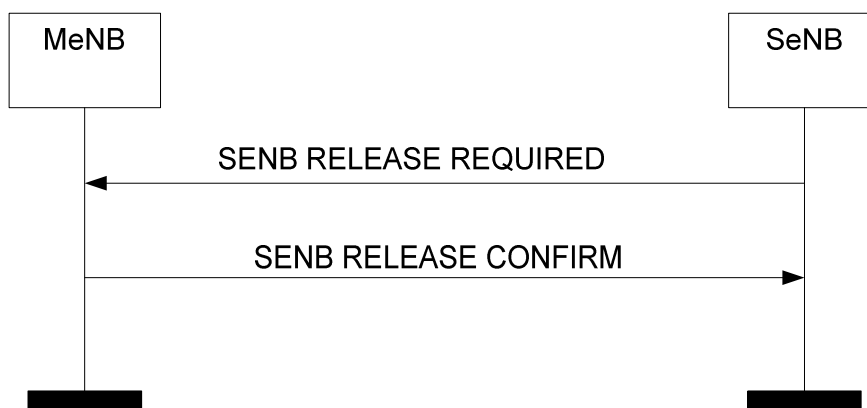


Figure 8.6.6.2-1: SeNB initiated SeNB Release, successful operation.

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

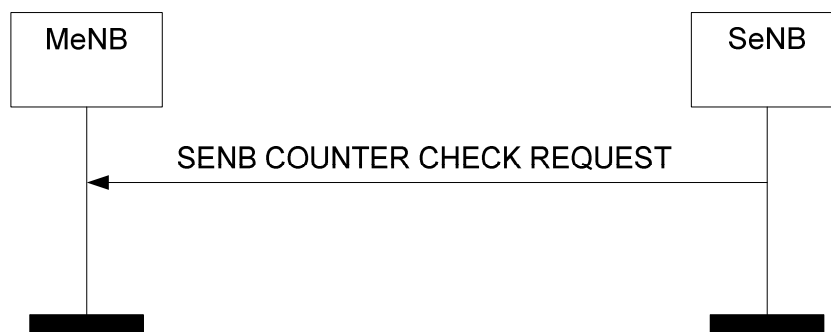


Figure 8.6.7.2-1: SeNB Counter Check procedure, successful operation.

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 1: 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.

NOTE 2: Exchange of application level configuration data also applies between eNB and en-gNB in case the SN (i.e. the en-gNB) does not broadcast system information other than for radio frame timing and SFN, as specified in the TS 37.340 [32]. How to use this information when this option is used is not explicitly specified.

The procedure uses non UE-associated signalling.

8.7.1.2 Successful Operation

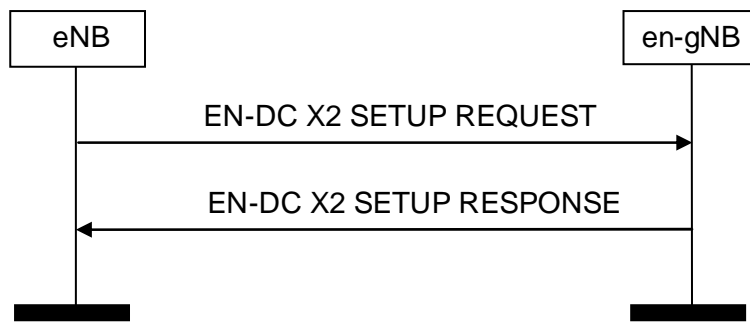


Figure 8.7.1.2-1: eNB Initiated EN-DC X2 Setup, successful operation

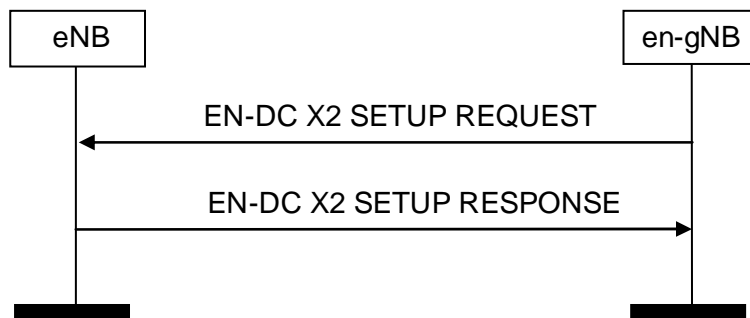


Figure 8.7.1.2-2: en-gNB Initiated EN-DC X2 Setup, successful operation

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. In the current version of this specification an eNB shall not include the *Interface Instance Indication* IE in the *Initiating NodeType* IE in the EN-DC X2 SETUP REQUEST message.

If the *SFN Offset* IE is included in the EN-DC X2 SETUP REQUEST or EN-DC X2 SETUP RESPONSE message, the receiving node shall, if supported, use this information to deduce the SFN0 time offset of the reported cell. The receiving node shall consider the received *SFN Offset* IE content valid until reception of an update of the IE for the same cell(s).

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 or if supported, a partial list of its served cells together with the *Partial List Indicator* IE, according to the received information in *Cell and Capacity Assistance Information* IE in EN-DC X2 SETUP REQUEST message. 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.

If the *Partial List Indicator* IE is set to "partial" in the EN-DC X2 SETUP RESPONSE message from the en-gNB, the eNB shall, if supported, assume that the en-gNB has included in the *List of Served Cells NR* IE a partial list of cells.

If the EN-DC X2 SETUP REQUEST message contains the *TNL Transport Layer Address info* IE, the receiving en-gNB shall, if supported, take this into account for IPSEC tunnel establishment.

If the EN-DC X2 SETUP RESPONSE message contains the *TNL Transport Layer Address info* IE, the receiving eNB shall, if supported, take this into account for IPSEC tunnel establishment.

If the *NR Cell PRACH Configuration* IE is included in the *Served NR Cell Information* IE contained in the EN-DC X2 SETUP RESPONSE message, the eNB may store the information.

If the *CSI-RS Transmission Indication* IE is contained in the EN-DC X2 SETUP REQUEST message, the en-gNB may use this information for neighbour NR cell's CSI-RS measurement.

If the *Intended TDD DL-UL Configuration NR* IE is contained in the *NR Neighbour Information* IE in the EN-DC X2 SETUP REQUEST message, en-gNB should take this information into account for cross-link interference management. The en-gNB shall consider the received *Intended TDD DL-UL Configuration NR* IE content valid until reception of an update of the IE for the same cell(s).

Interaction with the eNB Configuration Update procedure:

The receiving eNB may forward the *Intended TDD DL-UL Configuration NR* IE received in the *Served NR Cell Information* IE in the EN-DC X2 SETUP RESPONSE message to neighbouring eNBs by triggering the eNB Configuration Update procedure.

Interaction with the EN-DC Configuration Update procedure:

The receiving eNB may forward the *Intended TDD DL-UL Configuration NR* IE received in the *Served NR Cell Information* IE in the EN-DC X2 SETUP RESPONSE message to neighbouring en-gNBs by triggering the EN-DC Configuration Update procedure.

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 or if supported, a partial list of its served cells together with the *Partial List Indicator* IE in the EN-DC X2 SETUP REQUEST message 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.

If the *Partial List Indicator* IE is set to "partial" in the EN-DC X2 SETUP REQUEST message from the en-gNB, the eNB shall, if supported, assume that the en-gNB has included in the *List of Served Cells NR* IE a partial list of cells.

If the *Cell and Capacity Assistance Information* IE is present in the EN-DC X2 SETUP RESPONSE message from the eNB, the en-gNB shall, if supported, store the collected information to be used for future interface management.

If the EN-DC X2 SETUP REQUEST message contains the *TNL Transport Layer Address info* IE, the receiving eNB shall, if supported, take this into account for IPSEC tunnel establishment.

If the EN-DC X2 SETUP RESPONSE message contains the *TNL Transport Layer Address info* IE, the receiving en-gNB shall, if supported, take this into account for IPSEC tunnel establishment.

If the *NR Cell PRACH Configuration* IE is included in the *Served NR Cell Information* IE contained in the EN-DC X2 SETUP REQUEST message, the eNB may store the information.

If the *CSI-RS Transmission Indication* IE is contained in the EN-DC X2 SETUP REQUEST message, the eNB should take it into account when forwarding neighbour NR cell's CSI-RS configuration.

If the *Intended TDD DL-UL Configuration NR* IE is contained in the *NR Neighbour Information* IE in the EN-DC X2 SETUP RESPONSE message, en-gNB should take this information into account for cross-link interference

management. The en-gNB shall consider the received *Intended TDD DL-UL Configuration NR IE* content valid until reception of an update of the IE for the same cell(s).

Interaction with the eNB Configuration Update procedure:

The receiving eNB may forward the *Intended TDD DL-UL Configuration NR IE* received in the *Served NR Cell Information IE* in the EN-DC X2 SETUP REQUEST message to neighbouring eNBs by triggering the eNB Configuration Update procedure.

Interaction with the EN-DC Configuration Update procedure:

The receiving eNB may forward the *Intended TDD DL-UL Configuration NR IE* received in the *Served NR Cell Information IE* in the EN-DC X2 SETUP REQUEST message to neighbouring en-gNBs by triggering the EN-DC Configuration Update procedure.

8.7.1.3 Unsuccessful Operation

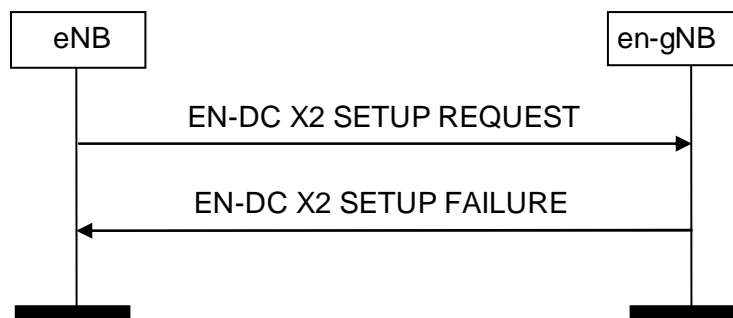


Figure 8.7.1.3-1: eNB Initiated EN-DC X2 Setup, unsuccessful operation

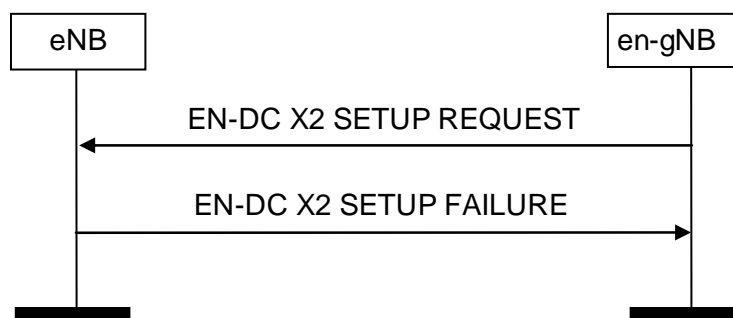


Figure 8.7.1.3-2: en-gNB Initiated EN-DC X2 Setup, unsuccessful operation

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

If the *Message Oversize Notification IE* is included in the EN-DC X2 SETUP FAILURE, the initiating node shall, if supported, deduce that the failure is due to a too large EN-DC X2 SETUP REQUEST message and ensure that the total number of served cells in following EN-DC X2 SETUP REQUEST message is equal to or lower than the value of the *Message Oversize Notification IE*.

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.

NOTE: Update of application level configuration data also applies between eNB and en-gNB in case the SN (i.e. the en-gNB) does not broadcast system information other than for radio frame timing and SFN, as specified in the TS 37.340 [32]. How to use this information when this option is used is not explicitly specified.

The procedure uses non UE-associated signalling.

8.7.2.2 Successful Operation

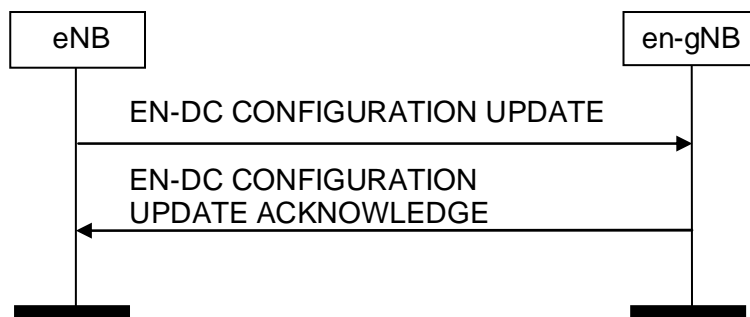


Figure 8.7.2.2-1: eNB Initiated EN-DC Configuration Update, successful operation

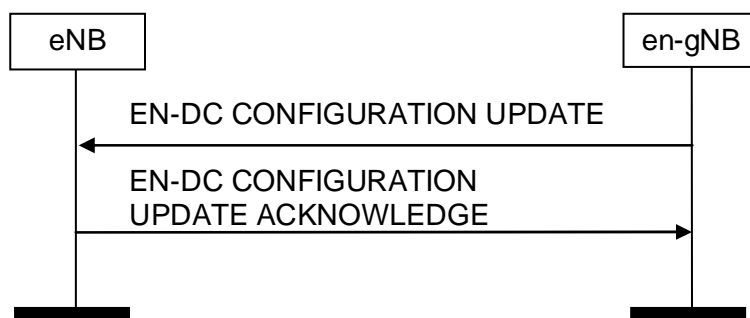


Figure 8.7.2.2-2: en-gNB Initiated EN-DC Configuration Update, successful operation

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.

If the *SFN Offset* IE is included in the EN-DC CONFIGURATION UPDATE or EN-DC CONFIGURATION UPDATE ACKNOWLEDGE message, the receiving node shall, if supported, use this information to update the SFN0 time offset of the reported cell.

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 shall, if supported, 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 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.

If the EN-DC CONFIGURATION UPDATE message contains the *TNL Transport Layer Address info* IE, the receiving en-gNB shall, if supported, take this into account for IPSEC tunnel establishment.

If the EN-DC CONFIGURATION UPDATE ACKNOWLEDGE message contains the *TNL Transport Layer Address info* IE, the receiving eNB shall, if supported, take this into account for IPSEC tunnel establishment.

If the *NR Cell PRACH Configuration* IE is included in the *Served NR Cell Information* IE contained in the EN-DC CONFIGURATION UPDATE ACKNOWLEDGE message, the eNB may update the information.

If the *CSI-RS Transmission Indication* IE is contained in the EN-DC CONFIGURATION UPDATE message, the en-gNB may use this information for neighbour NR cell's CSI-RS measurement.

If the *Intended TDD DL-UL Configuration NR* IE is contained in the *NR Neighbour Information* IE in the EN-DC CONFIGURATION UPDATE message, en-gNB should take this information into account for cross-link interference management. The en-gNB shall consider the received *Intended TDD DL-UL Configuration NR* IE content valid until reception of an update of the IE for the same cell(s).

Interaction with the eNB Configuration Update procedure:

The receiving eNB may forward the *Intended TDD DL-UL Configuration NR* IE received in the *Served NR Cell Information* IE in the EN-DC CONFIGURATION UPDATE ACKNOWLEDGE message to neighbouring eNBs by triggering the eNB Configuration Update procedure.

Interaction with the EN-DC Configuration Update procedure:

The receiving eNB may forward the *Intended TDD DL-UL Configuration NR* IE received in the *Served NR Cell Information* IE in the EN-DC CONFIGURATION UPDATE ACKNOWLEDGE message to neighbouring en-gNBs by triggering the EN-DC Configuration Update procedure.

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 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*.

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

If the EN-DC CONFIGURATION UPDATE message contains the *TNL Transport Layer Address info IE*, the receiving eNB shall, if supported, take this into account for IPSEC tunnel establishment.

If the EN-DC CONFIGURATION UPDATE ACKNOWLEDGE message contains the *TNL Transport Layer Address info IE*, the receiving en-gNB shall, if supported, take this into account for IPSEC tunnel establishment.

If the *NR Cell PRACH Configuration IE* is included in the *Served NR Cell Information IE* contained in the EN-DC CONFIGURATION UPDATE message, the eNB may update the information.

If the *CSI-RS Transmission Indication IE* is contained in the EN-DC CONFIGURATION UPDATE message, the eNB should take it into account when forwarding neighbour NR cell's CSI-RS configuration.

Update of SCTP associations:

If the *TNL Association to Add List IE* is included in the EN-DC CONFIGURATION UPDATE message, the receiving eNB shall, if supported, use it to establish the TNL association(s) with the en-gNB. The eNB shall report to the en-gNB, in the EN-DC CONFIGURATION UPDATE ACKNOWLEDGE message, the successful establishment of the TNL association(s) with the en-gNB as follows:

- A list of successfully established TNL associations shall be included in the *TNL Association Setup List IE*;
- A list of TNL associations that failed to be established shall be included in the *TNL Association Failed to Setup List IE*.

If the *TNL Association to Remove List IE* is included in the EN-DC CONFIGURATION UPDATE message, the receiving eNB shall, if supported, initiate removal of the TNL association(s) indicated by the received Transport Layer information towards the en-gNB.

If the *TNL Association to Update List IE* is included in the EN-DC CONFIGURATION UPDATE message the receiving eNB shall, if supported, update the TNL association(s) indicated by the received Transport Layer information towards the en-gNB.

If the *Intended TDD DL-UL Configuration NR IE* is contained in the *NR Neighbour Information IE* in the EN-DC CONFIGURATION UPDATE ACKNOWLEDGE message, en-gNB should take this information into account for

cross-link interference management. The en-gNB shall consider the received *Intended TDD DL-UL Configuration NR* IE content valid until reception of an update of the IE for the same cell(s).

Interaction with the eNB Configuration Update procedure:

The receiving eNB may forward the *Intended TDD DL-UL Configuration NR* IE received in the *Served NR Cell Information* IE in the EN-DC CONFIGURATION UPDATE message to neighbouring eNBs by triggering the eNB Configuration Update procedure.

Interaction with the EN-DC Configuration Update procedure:

The receiving eNB may forward the *Intended TDD DL-UL Configuration NR* IE received in the *Served NR Cell Information* IE in the EN-DC CONFIGURATION UPDATE message to neighbouring en-gNBs by triggering the EN-DC Configuration Update procedure.

8.7.2.3 Unsuccessful Operation

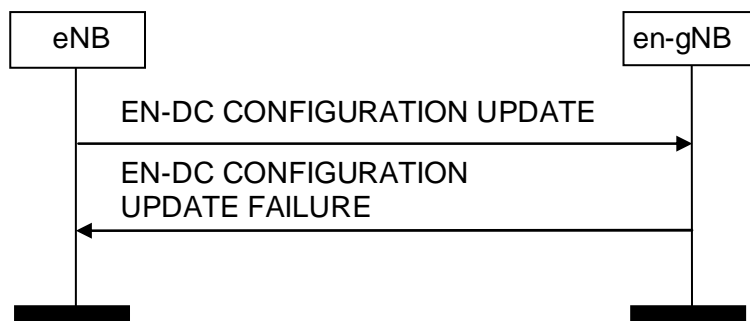


Figure 8.7.2.3-1: eNB Initiated EN-DC Configuration Update, unsuccessful operation

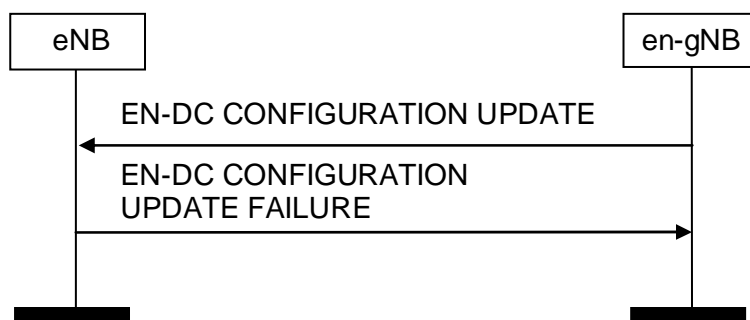


Figure 8.7.2.3-2: en-gNB Initiated EN-DC Configuration Update, unsuccessful operation

If the candidate receiving 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 receiving 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

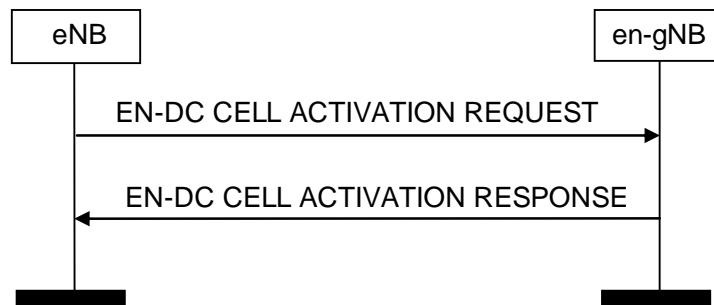


Figure 8.7.3.2-1: EN-DC Cell Activation, successful operation

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

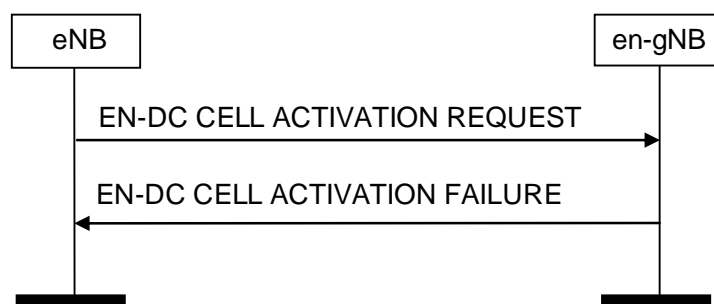


Figure 8.7.3.3-1: EN-DC Cell Activation, unsuccessful operation

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

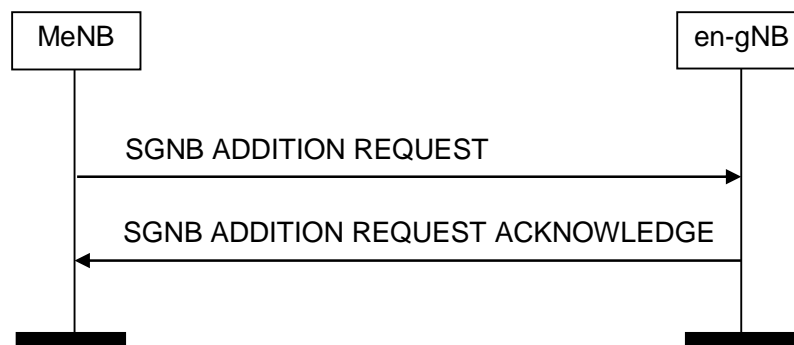


Figure 8.7.4.2-1: SgNB Addition Preparation, successful operation

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, or to coordinate with sidelink resources used in 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.

If the SGNB ADDITION REQUEST message contains the *Additional RRM Policy Index* 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.
- If the *Bearer Type* IE for the concerned E-RAB is received by the en-gNB and is set to "non IP", the en-gNB shall, if supported, not perform IP header compression for the concerned E-RAB.

- If the *Ethernet Type* IE for the concerned E-RAB is received by the en-gNB and is set to "True", the en-gNB shall, if supported, take this into account to perform header compression appropriately for the concerned E-RAB.

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 entity 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.

The SgNB may include the *Location Information at SgNB* IE in the SGNB ADDITION REQUEST ACKNOWLEDGE message, if respective information is available at the SgNB.

If the *Location Information at SgNB Reporting* IE set to "pscell" is included in the SGNB ADDITION REQUEST, the SgNB shall 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 shall store the included information so that it may be transferred 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]. If the *Trace Activation* IE includes the *MDT Configuration NR* IE, the en-gNB shall take it into account for MDT function 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 SGNB ADDITION REQUEST message, the en-gNB 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].

The MeNB 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 SGNB ADDITION REQUEST message.

If the *UE Context Reference at Source NG-RAN* IE is contained in the SGNB ADDITION REQUEST message, the en-gNB shall, if supported, store this information and use it for UE context retrieval and allocate data forwarding resources as specified in TS 37.340 [32].

If the *Requested Fast MCG recovery via SRB3* IE set to "true" is included in the SGNB ADDITION REQUEST message and the en-gNB decides to configure fast MCG link recovery via SRB3 as specified in TS 37.340 [32], the en-gNB shall, if supported, include the *Available fast MCG recovery via SRB3* IE set to "true" in the SGNB ADDITION REQUEST ACKNOWLEDGE message.

If the *UE Radio Capability ID* IE is contained in the SGNB ADDITION REQUEST message, the en-gNB shall, if supported, store this information and use it as specified in TS 23.401 [12].

If the SGNB ADDITION REQUEST message contains the *IAB Node Indication* IE, the en-gNB shall, if supported, consider that the request is for an IAB node.

For each requested E-RAB configured as MN-terminated split bearer/SCG bearer, if the *QoS Mapping Information* IE is contained in the *GTP Tunnel Endpoint* IE in the SGNB ADDITION REQUEST ACKNOWLEDGE message, the MeNB shall, if supported, use it to set DSCP and/or flow label fields for the downlink IP packets which are transmitted from MeNB to en-gNB through the GTP tunnels indicated by the *GTP Tunnel Endpoint* IE.

If the *Source NG-RAN Node ID* IE is included in the SGNB ADDITION REQUEST message, the en-gNB shall, if supported, use it to decide the direct data forwarding path availability with the indicated source NG-RAN node, and if the direct data forwarding path is available, include the *Direct Forwarding Path Availability* IE in the SGNB ADDITION REQUEST ACKNOWLEDGE message.

If the *Source DL Forwarding IP Address* IE or both *Source DL Forwarding IP Address* IE and *Source Node DL Forwarding IP Address* IE is included in the SGNB ADDITION REQUEST message, the en-gNB shall, if supported, store this information and use it as part of its ACL functionality configuration actions, if such ACL functionality is deployed.

If the *Source DL Forwarding IP Address* IE is included in the SGNB ADDITION REQUEST ACKNOWLEDGE message, the MeNB shall, if supported, store this information and use it as part of its ACL functionality configuration actions to identify source TNL address for data forwarding in case of subsequent handover preparation, if such ACL functionality is deployed.

Interactions with the MeNB initiated SgNB Modification procedure:

If the en-gNB provides for an E-RAB for which the PDCP entity 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 $T_{D\text{Coverall}}$ when sending the SGNB ADDITION REQUEST ACKNOWLEDGE message to the MeNB. The reception of the SGNB RECONFIGURATION COMPLETE message shall stop the timer $T_{D\text{Coverall}}$.

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 Activity Notification procedures according to the requested notification level.

8.7.4.3 Unsuccessful Operation

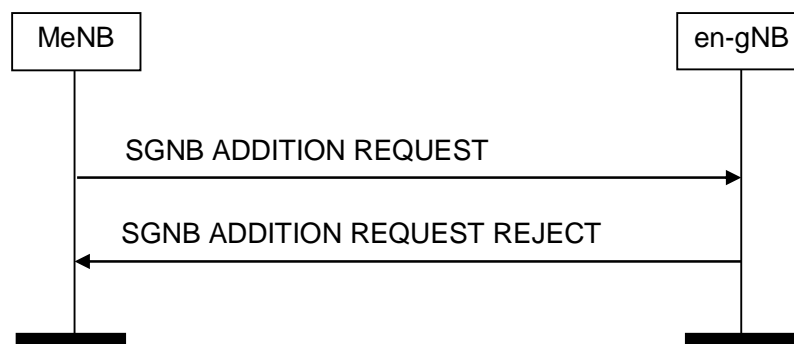


Figure 8.7.4.3-1: SgNB Addition Preparation, unsuccessful operation

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 entity 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 entity 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 Reconfiguration 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

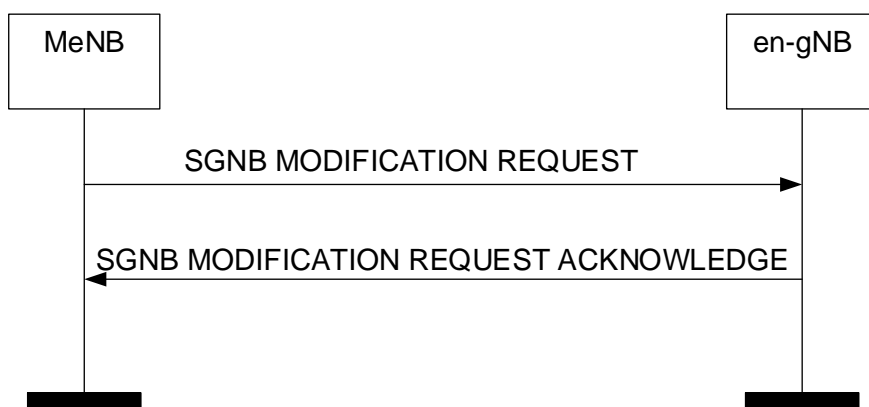


Figure 8.7.6.2-1: MeNB initiated SgNB Modification Preparation, successful operation

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;
- the *Requested fast MCG recovery via SRB3* IE;
- the *Requested fast MCG recovery via SRB3 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, or to coordinate with sidelink resources used in 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.
- If the *Bearer Type* IE for the concerned E-RAB is received by the en-gNB and is set to "non IP", then the en-gNB shall, if supported, not perform IP header compression for the concerned E-RAB.
- If the *Ethernet Type* IE for the concerned E-RAB is received by the en-gNB and is set to "True", the en-gNB shall take this into account to perform header compression appropriately for the concerned E-RAB.

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 admissible 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 entity 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.

If the SGNB MODIFICATION REQUEST message contains the *Additional RRM Policy Index 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 *Requested Fast MCG recovery via SRB3 IE* set to "true" is included in the SGNB MODIFICATION REQUEST message and the en-gNB decides to configure fast MCG link recovery via SRB3 as specified in TS 37.340 [32], the en-gNB shall, if supported, include the *Available fast MCG recovery via SRB3 IE* set to "true" in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message. If the *Requested Fast MCG recovery via SRB3 Release IE* set to "true" is included in the SGNB MODIFICATION REQUEST message and the en-gNB decides to release fast MCG link recovery via SRB3, the en-gNB shall, if supported, include the *Release fast MCG recovery via SRB3 IE* set to "true" in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message.

If the en-gNB receives for an E-RAB to be setup for which the PDCP entity 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.

The en-gNB may include the *Location Information at SgNB* IE in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message, if respective information is available at the en-gNB.

If the *Location Information at en-gNB Reporting* IE set to "pscell" is included in the SGNB MODIFICATION REQUEST, the SgNB shall 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 shall store the included information so that it may be transferred towards the MME.

If the *Lower Layer presence status change* IE set to "release lower layers" is included in the SGNB MODIFICATION REQUEST message, the en-gNB shall act as specified in TS 37.340 [32].

If the *Lower Layer presence status change* IE set to "re-establish lower layers" is included in the SGNB MODIFICATION REQUEST message, the en-gNB shall act as specified in TS 37.340 [32].

If the *Lower Layer presence status change* IE set to "suspend lower layers" is included in the SGNB MODIFICATION REQUEST message, the en-gNB shall act as specified in TS 37.340 [32].

If the *Lower Layer presence status change* IE set to "resume lower layers" is included in the SGNB MODIFICATION REQUEST message, the en-gNB shall act as specified in TS 37.340 [32].

If the SGNB MODIFICATION REQUEST message contains the *IAB Node Indication* IE, the en-gNB shall, if supported, consider that the request is for an IAB node.

For each requested E-RAB configured as MN-terminated split bearer/SCG bearer, if the *QoS Mapping Information* IE is contained in the *GTP Tunnel Endpoint* IE in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message, the MeNB shall, if supported, use it to set DSCP and/or flow label fields for the downlink IP packets which are transmitted from MeNB to SgNB through the GTP tunnels indicated by the *GTP Tunnel Endpoint* IE.

If the *Source DL Forwarding IP Address* IE is included in the SGNB MODIFICATION REQUEST message, the en-gNB shall, if supported, store this information and use it as part of its ACL functionality configuration actions, if such ACL functionality is deployed.

If the *Source DL Forwarding IP Address* IE is included in the SGNB MODIFICATION REQUEST ACKNOWLEDGE message, the MeNB shall, if supported, store this information and use it as part of its ACL functionality configuration actions to identify source TNL address for data forwarding in case of subsequent handover preparation, if such ACL functionality is deployed.

Interactions with the MeNB initiated SgNB Modification procedure:

If the en-gNB provides for an E-RAB to be setup for which the PDCP entity 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 $T_{D\text{Coverall}}$ when sending the SGNB MODIFICATION REQUEST ACKNOWLEDGE message to the MeNB. The reception of the SGNB RECONFIGURATION COMPLETE message shall stop the timer $T_{D\text{Coverall}}$.

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.

Interaction with the SgNB initiated SgNB Modification Preparation procedure:

If the MeNB receives the SGNB MODIFICATION REQUIRED message and the requested SN modification procedure needs further information from MeNB, the MeNB shall send SGNB MODIFICATION REQUEST message to en-gNB in response to a previously SgNB initiated SgNB Modification procedure.

8.7.6.3 Unsuccessful Operation

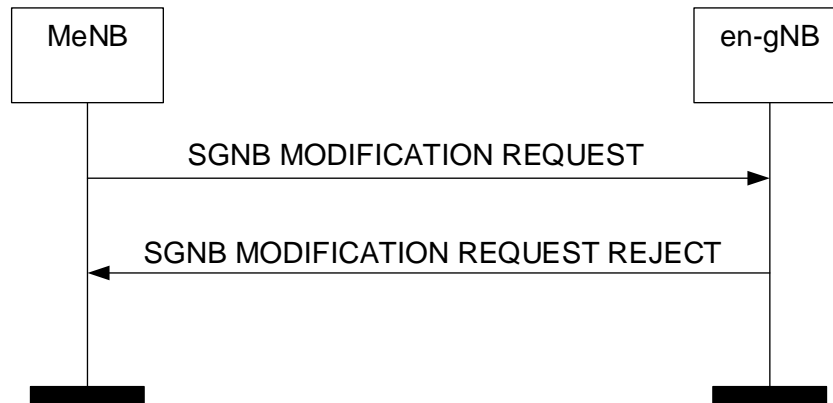


Figure 8.7.6.3-1: MeNB initiated SgNB Modification Preparation, unsuccessful operation

If the en-gNB does not admit any modification requested by the MeNB, or a failure occurs during the MeNB initiated SgNB Modification 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 setup which the PDCP entity 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 entity 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 Reconfiguration 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

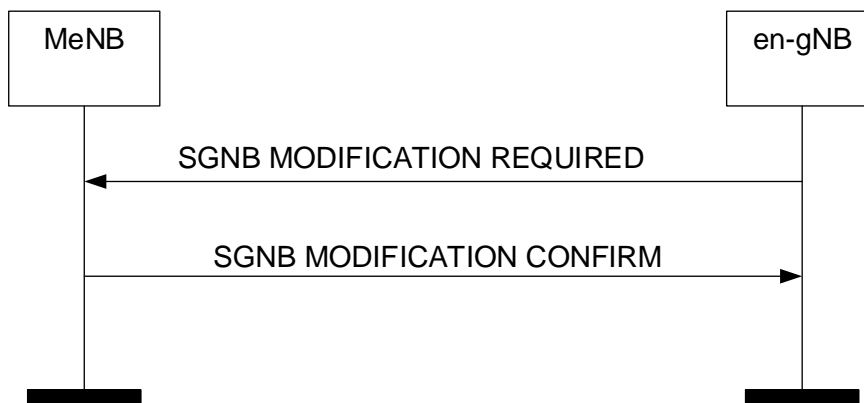


Figure 8.7.7.2-1: SgNB initiated SgNB Modification, successful operation.

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 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.

If the *SCG resources* IE in the *EN-DC Resource Configuration* IE in the SGNB MODIFICATION REQUIRED message for all the E-RABs of the UE are set to “not present”, the MeNB shall, if supported, deduce that the SCG resources are removed.

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, or to coordinate with sidelink resources used in 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 entity 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 shall store the included information so that it may be transferred towards the MME.

For each requested E-RAB configured as MN-terminated split bearer/SCG bearer, if the *QoS Mapping Information IE* is included in the *GTP Tunnel Endpoint IE* in the SGNB MODIFICATION REQUIRED message, the MeNB shall, if supported, use it to set DSCP and/or flow label fields for the downlink IP packets which are transmitted from MeNB to SgNB through the GTP tunnels indicated by the *GTP Tunnel Endpoint IE*.

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*.

The en-gNB may receive, after having initiated the SgNB initiated SgNB modification procedure, the SGNB MODIFICATION REQUEST message including the *SN triggered IE*.

8.7.7.3 Unsuccessful Operation

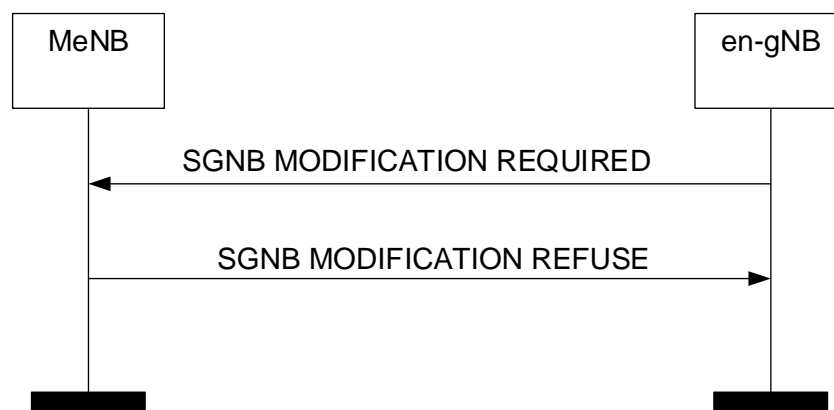


Figure 8.7.7.3-1: SgNB initiated SgNB Modification, unsuccessful operation.

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 entity 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 and/or the *SN triggered* IE set to "True", 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

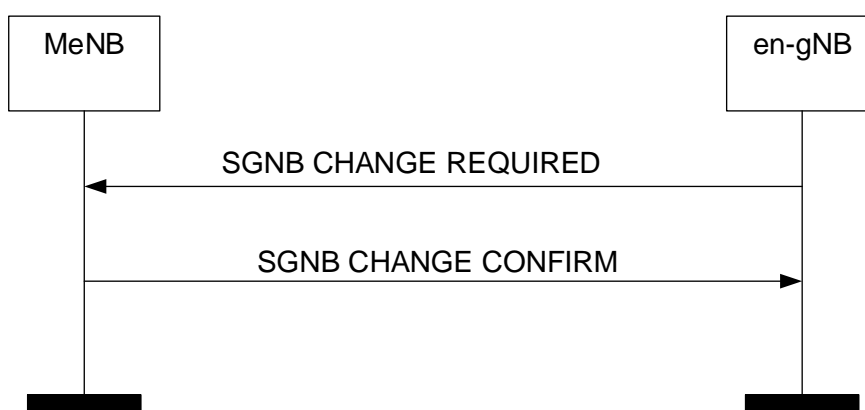


Figure 8.7.8.2-1: SgNB Change, successful operation.

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

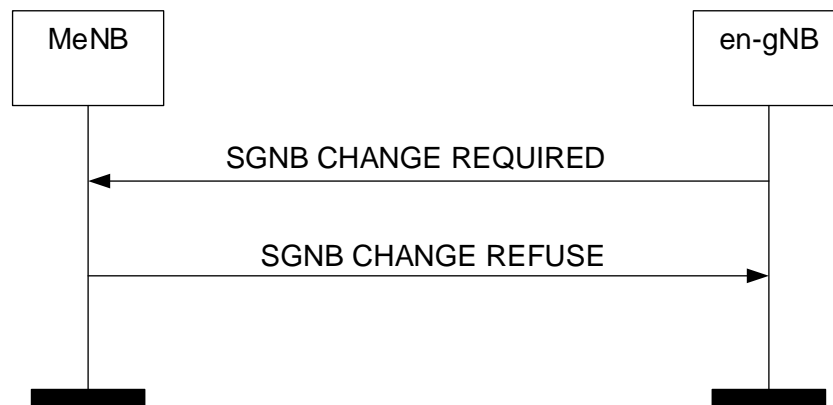


Figure 8.7.8.3-1: SgNB Change, unsuccessful operation.

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

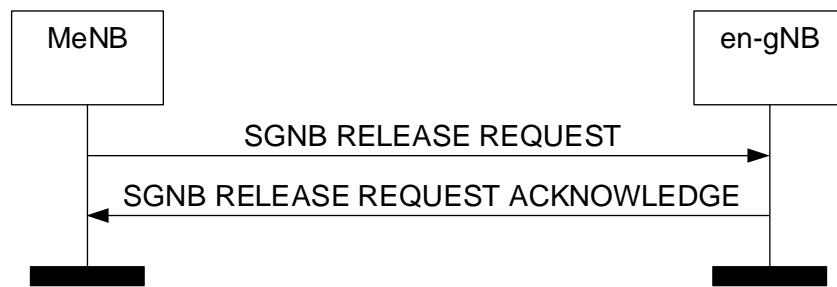


Figure 8.7.9.2-1: MeNB initiated SgNB Release, successful operation

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.

If the MeNB did not include the *SgNB UE X2AP ID* IE in the SGNB RELEASE REQUEST message, the MeNB shall ignore the *SgNB UE X2AP ID* IE in the SGNB RELEASE REQUEST ACKNOWLEDGE message.

Upon successful completion of the procedure, the MeNB shall start counting time, so that information regarding time since Secondary Node Release may be transferred towards the MME as specified in TS 36.413 [4].

Interaction with SN Status Transfer procedure:

If the *UE Context Kept Indicator* IE set to "True" and the *E-RABs transferred to MeNB* IE are included in the SGNB RELEASE REQUEST message, then the en-gNB shall, if supported, include the uplink/downlink PDCP SN and HFN status for the listed E-RABs, as specified in TS 37.340 [32].

8.7.9.3 Unsuccessful Operation

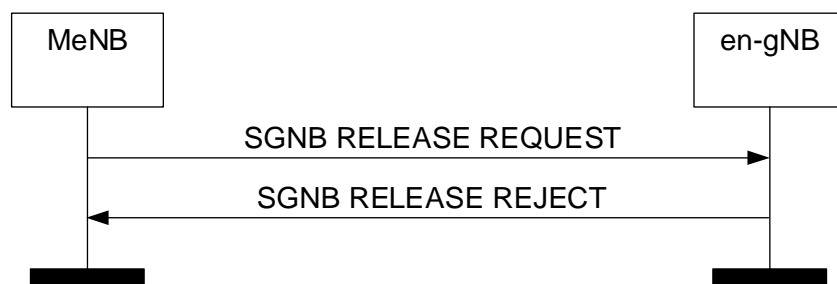


Figure 8.7.9.3-1: MeNB initiated SgNB Release, unsuccessful operation

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.

If the MeNB did not include the *SgNB UE X2AP ID IE* in the SGNB RELEASE REQUEST message, the MeNB shall ignore the *SgNB UE X2AP ID IE* in the SGNB RELEASE REQUEST REJECT message.

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 release 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

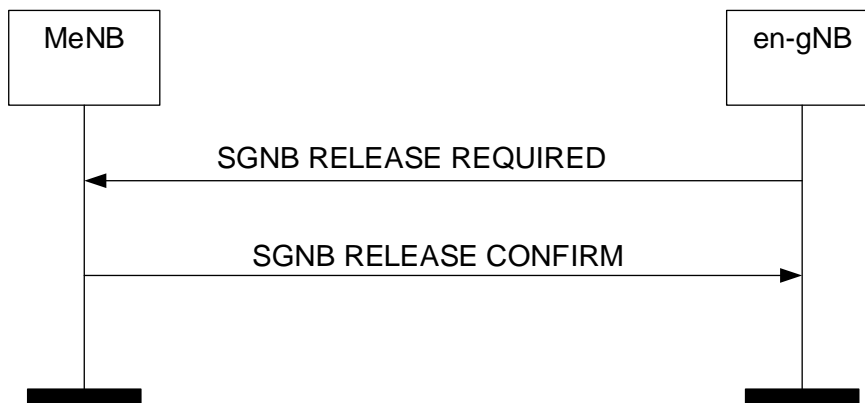


Figure 8.7.10.2-1: SgNB initiated SgNB Release, successful operation.

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.

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.

If the *SgNB to MeNB Container IE* is included in the SGNB RELEASE REQUIRED message, the MeNB may use the contained information to apply delta configuration.

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

Upon successful completion of the procedure, the MeNB shall start counting time, so that information regarding time since Secondary Node Release may be transferred towards the MME as specified in TS 36.413 [4].

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

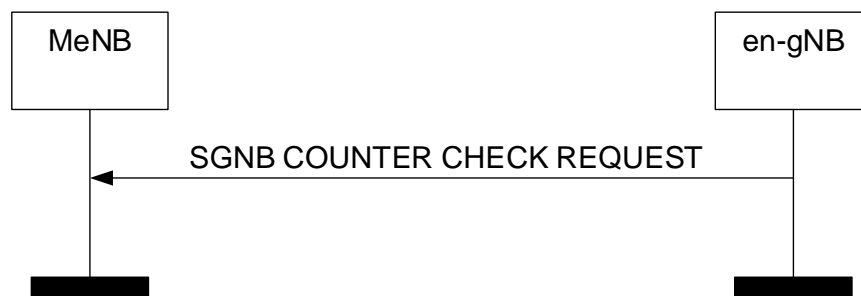


Figure 8.7.11.2-1: SgNB Counter Check procedure, successful operation.

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 is also used to enable transfer of the NR RRC message container with an IAB information from the MeNB to the en-gNB, when received from the IAB-MT.

The procedure is also to enable transfer of the NR RRC message container with the NR *RRCReconfigurationComplete* message 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 UE Assistance 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

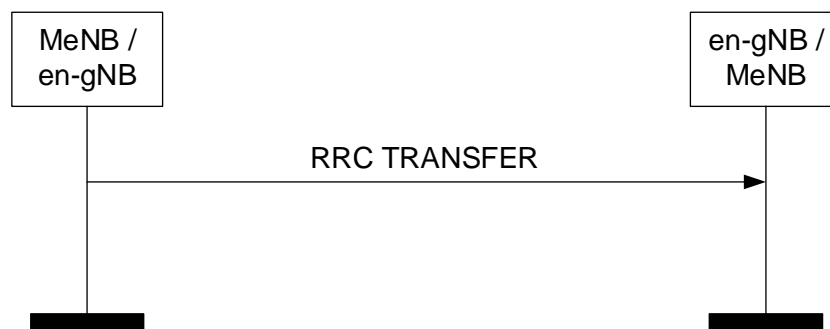


Figure 8.7.12.2-1: RRC Transfer procedure, successful operation.

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 does not include the *RRC Container* IE in the *Split SRB* IE, or the *RRC container* IE in the *NR UE Report* IE, or the *RRC Container* IE in the *Fast MCG Recovery via SRB3 from MN to SN* IE, or the *RRC Container* IE in the *Fast MCG Recovery via SRB3 from SN to MN* 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 en-gNB receives the *RRC Container* IE in the *Fast MCG Recovery from MeNB to SgNB* IE, the en-gNB shall, if supported, deliver the contained RRC Container 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. If the MeNB receives the *RRC Container* IE in the *Fast MCG Recovery from SgNB to MeNB* IE, the MeNB shall, if supported, consider MCG link failure detected at the UE as specified in TS 37.340 [32].

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

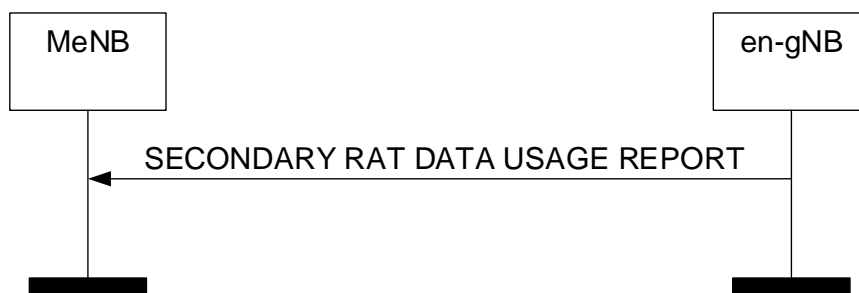


Figure 8.7.13.2-1: Secondary RAT Data Usage Report procedure, successful operation.

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

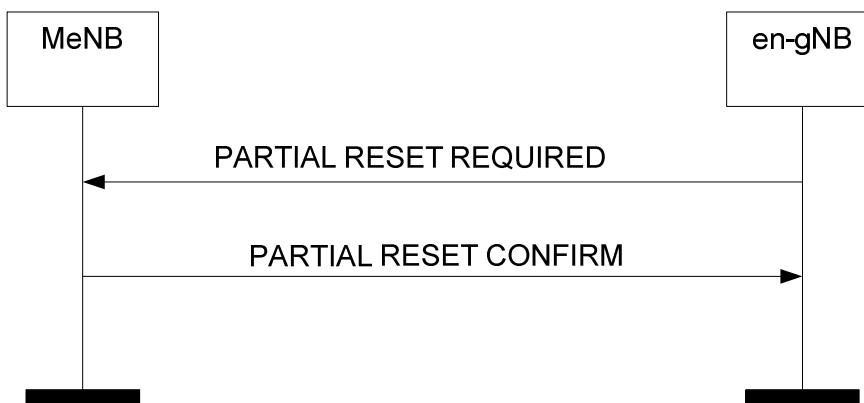


Figure 8.7.14.2-1: en-gNB initiated Partial Reset of EN-DC, successful operation.

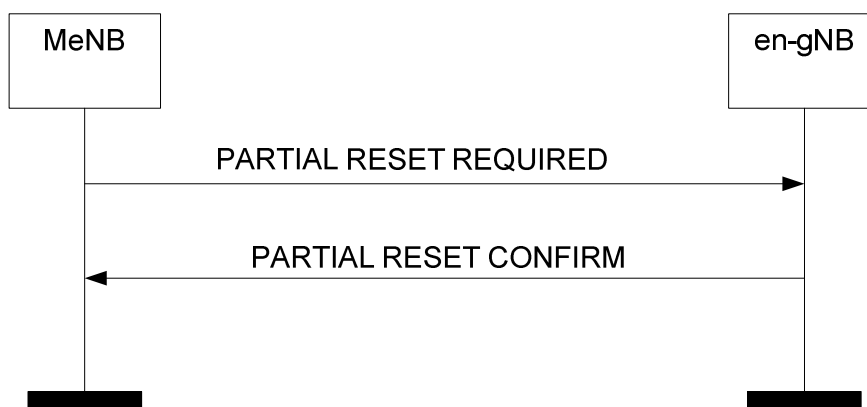


Figure 8.7.14.2-2: eNB initiated Partial Reset of EN-DC, successful operation.

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 SIAP ID* IE (and the *MeNB UE SIAP 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

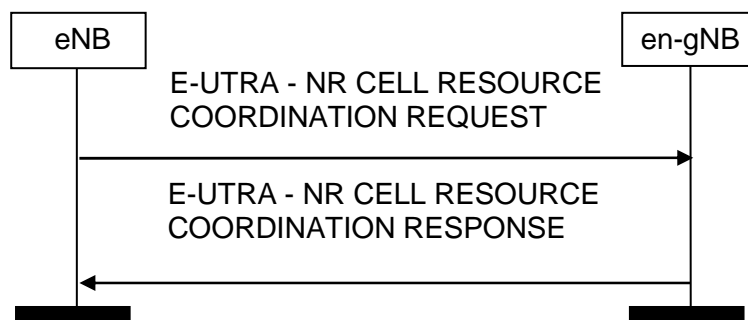


Figure 8.7.15.2-1: eNB-initiated E-UTRA – NR Cell Resource Coordination request, successful operation

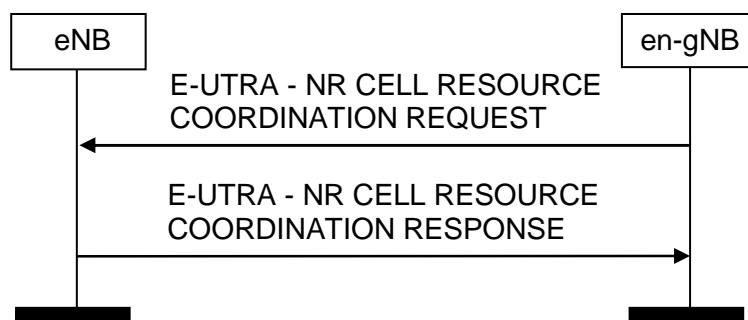


Figure 8.7.15.2-2: en-gNB-initiated E-UTRA – NR Cell Resource Coordination request, successful operation

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

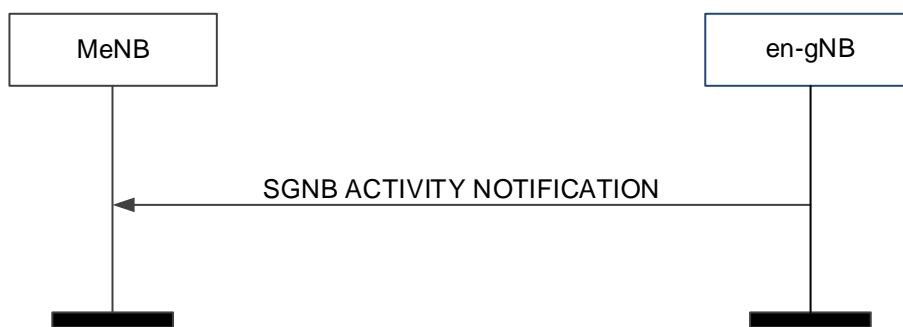


Figure 8.7.16.2-1: Activity Notification procedure, successful operation

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

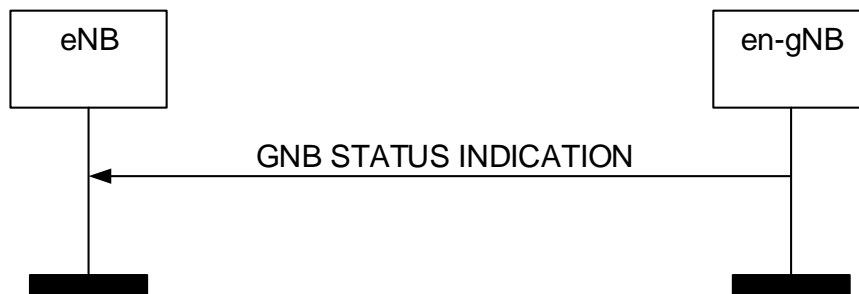


Figure 8.7.17.2-1: gNB Status Indication procedure, successful operation

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

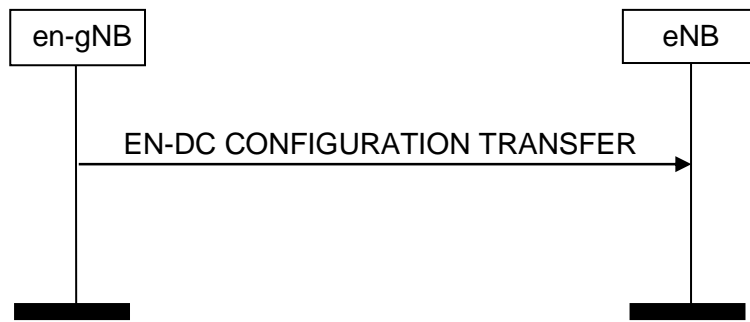


Figure 8.7.18.2-2: en-gNB initiated EN-DC Configuration Transfer, successful operation

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]. If the *Trace Activation IE* includes the *MDT Configuration NR IE*, the en-gNB shall take it into account for MDT function as described in TS 37.320 [31].

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 operation

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.

8.7.21 EN-DC Resource Status Reporting Initiation

8.7.21.1 General

This procedure is used by the eNB to request the reporting of load measurements to the en-gNB .

The procedure uses non UE-associated signalling.

8.7.21.2 Successful Operation

8.7.21.2.1 Successful Operation - eNB-initiated

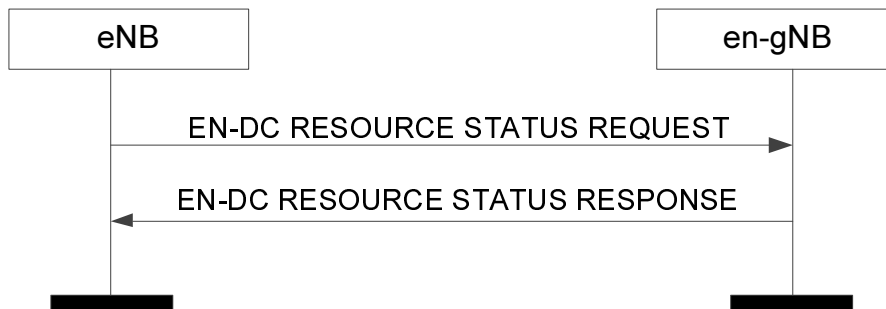


Figure 8.7.21.2-1: EN-DC Resource Status Reporting Initiation, successful operation - eNB-initiated

The procedure is initiated with an EN-DC RESOURCE STATUS REQUEST message sent from the eNB to the en-gNB to start a measurement, stop a measurement, add cells to report for a measurement.

If the *Report Characteristics EN-DC* IE is included in the EN-DC RESOURCE STATUS REQUEST message and indicates cell specific measurements, the *NR Cell To Report EN-DC List* IE shall be included.

Upon receipt of the EN-DC RESOURCE STATUS REQUEST message, the en-gNB:

- shall initiate the requested measurement according to the parameters given in the request in case the *Registration Request EN-DC* IE set to "start"; or
- shall stop all cells measurements and terminate the reporting in case the *Registration Request EN-DC* IE is set to "stop"; or
- shall add cells indicated in the *NR Cell To Report EN-DC List* IE list to the measurements initiated before for the given measurement IDs, in case the *Registration Request EN-DC* IE is set to "add". If measurements are already initiated for a cell indicated in the *NR Cell To Report EN-DC List* IE, this information shall be ignored.

The en-gNB shall send an EN-DC RESOURCE STATUS RESPONSE message to the eNB to indicate that all of the requested measurement objects the measurement can be initiated.

Interaction with other procedures

When starting a measurement, the *Report Characteristics EN-DC* IE in the EN-DC RESOURCE STATUS REQUEST indicates the type of objects en-gNB shall perform measurements on. For each cell, the en-gNB shall include in the EN-DC RESOURCE STATUS UPDATE message:

- the *NR Radio Resource Status* IE, if the first bit, "PRB Periodic" of the *Report Characteristics EN-DC* IE included in the EN-DC RESOURCE STATUS REQUEST message is set to "1". If the cell for which *NR Radio Resource Status* IE is requested to be reported supports more than one SSB, the *NR Radio Resource Status* IE for such cell shall include the *SSB Area Radio Resource Status Item* IE for all SSB areas supported by the cell. If the *SSB To Report List* IE is included for a cell, the *NR Radio Resource Status* IE for such cell shall include the requested *SSB Area Radio Resource Status List* IE.
- the *TNL Capacity Indicator* IE, if the second bit, "TNL Capacity Ind Periodic" of the *Report Characteristics EN-DC* IE included in the EN-DC RESOURCE STATUS REQUEST message is set to "1". The received *TNL Capacity Indicator* IE represents the lowest TNL capacity available for the cell.

- the *NR Composite Available Capacity Group IE*, if the third bit, "Composite Available Capacity Periodic" of the *Report Characteristics EN-DC IE* included in the EN-DC RESOURCE STATUS REQUEST message is set to "1". If *Cell Capacity Class Value IE* is included within the *NR Composite Available Capacity Group IE*, this IE is used to assign weights to the available capacity indicated in the *Capacity Value IE*. If the cell for which *NR Composite Available Capacity Group IE* is requested to be reported supports more than one SSB, and if the *SSB To Report List IE* is included for a cell, the *NR Composite Available Capacity Group IE* for such cell shall include the requested *SSB Area Capacity Value List IE*, providing the SSB area capacity with respect to the Cell Capacity Class Value.

If the *Reporting Periodicity EN-DC IE* in the EN-DC RESOURCE STATUS REQUEST is present, this indicates the periodicity for the reporting of periodic measurements. The en-gNB shall only report more than once if the *Reporting Periodicity EN-DC IE* is included.

8.7.21.2.2 Successful Operation - en-gNB-initiated

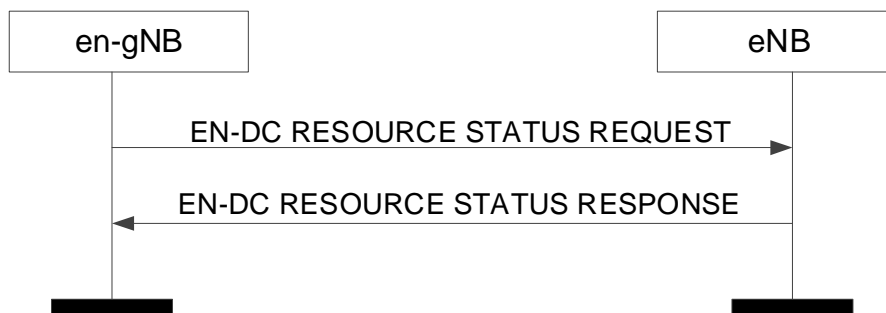


Figure 8.7.21.2-2: EN-DC Resource Status Reporting Initiation, successful operation - en-gNB-initiated

The procedure is initiated with an EN-DC RESOURCE STATUS REQUEST message sent from the en-gNB to the eNB to start a measurement, stop a measurement, add cells to report for a measurement.

If the *Report Characteristics EN-DC IE* is included in the EN-DC RESOURCE STATUS REQUEST message and indicates cell specific measurements, the *E-UTRA Cell To Report EN-DC List IE* shall be included.

Upon receipt of the EN-DC RESOURCE STATUS REQUEST message, the eNB:

- shall initiate the requested measurement according to the parameters given in the request in case the *Registration Request EN-DC IE* set to "start"; or
- shall stop all cells measurements and terminate the reporting in case the *Registration Request EN-DC IE* is set to "stop"; or
- shall add cells indicated in the *E-UTRA Cell To Report EN-DC List IE* list to the measurements initiated before for the given measurement IDs, in case the *Registration Request EN-DC IE* is set to "add". If measurements are already initiated for a cell indicated in the *E-UTRA Cell To Report EN-DC List IE*, this information shall be ignored. The eNB shall ignore the *E-UTRA Cell To Report EN-DC List IE*, if included.

The eNB shall send an EN-DC RESOURCE STATUS RESPONSE message to the en-gNB to indicate that all of the requested measurement objects the measurement can be initiated.

Interaction with other procedures, en-gNB-initiated operation

When starting a measurement, the *Report Characteristics EN-DC IE* in the EN-DC RESOURCE STATUS REQUEST indicates the type of objects eNB shall perform measurements on. For each cell, the eNB shall include in the EN-DC RESOURCE STATUS UPDATE message:

- the *Radio Resource Status IE*, if the first bit, "PRB Periodic" of the *Report Characteristics EN-DC 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 EN-DC 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 EN-DC* 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 EN-DC* IE included in the RESOURCE STATUS REQUEST message is set to "1". If the *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;

If the *Reporting Periodicity EN-DC* IE in the EN-DC RESOURCE STATUS REQUEST is present, this indicates the periodicity for the reporting of periodic measurements. The eNB shall only report more than once if the *Reporting Periodicity EN-DC* IE is included.

8.7.21.3 Unsuccessful Operation

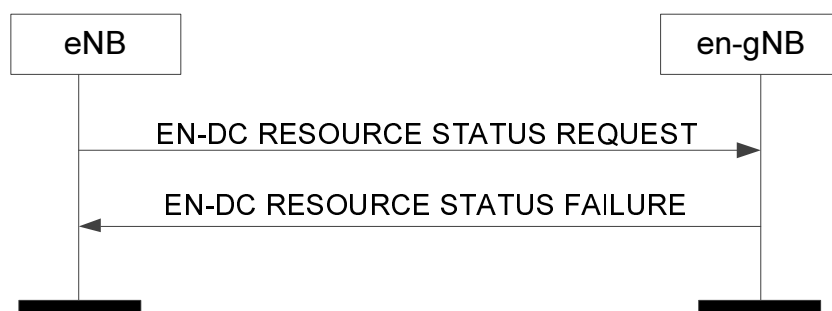


Figure 8.7.21.3-1: EN-DC Resource Status Reporting Initiation, unsuccessful operation - eNB-initiated

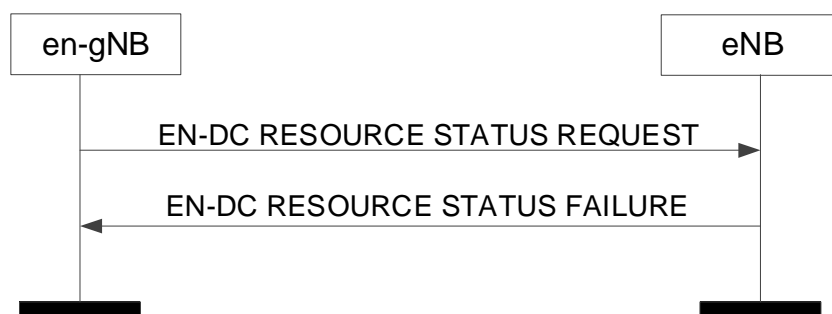


Figure 8.7.21.3-2: EN-DC Resource Status Reporting Initiation, unsuccessful operation - en-gNB-initiated

If any of the requested measurements cannot be initiated, the en-gNB or the eNB shall send an EN-DC RESOURCE STATUS FAILURE message.

8.7.21.4 Abnormal Conditions

Void.

8.7.22 EN-DC Resource Status Reporting

8.7.22.1 General

This procedure is initiated by the en-gNB or by the eNB to report the result of measurements admitted by the en-gNB or by the eNB following a successful EN-DC Resource Status Reporting Initiation procedure.

The procedure uses non UE-associated signalling.

8.7.22.2 Successful Operation

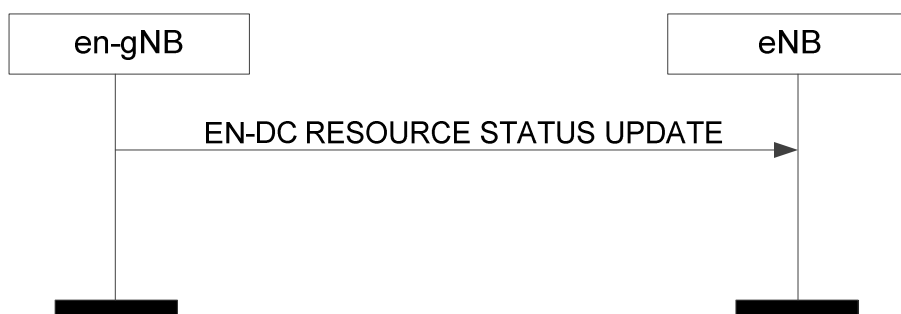


Figure 8.7.22.2-1: EN-DC Resource Status Reporting, successful operation - en-gNB-initiated



Figure 8.7.22.2-2: EN-DC Resource Status Reporting, successful operation - eNB-initiated

The en-gNB or the eNB shall report the results of the admitted measurements in the EN-DC RESOURCE STATUS UPDATE message. The admitted measurements are the measurements that were successfully initiated during the preceding EN-DC Resource Status Reporting Initiation procedure.

8.7.22.3 Unsuccessful Operation

Not applicable.

8.7.22.4 Abnormal Conditions

Void.

8.7.23 Cell Traffic Trace

8.7.23.1 General

The purpose of the Cell Traffic Trace procedure is to send the allocated Trace Recording Session Reference and the Trace Reference to the MeNB. The procedure uses UE-associated signalling.

8.7.23.2 Successful Operation



Figure 8.7.23.2-1: Cell Traffic Trace procedure. Successful operation.

The procedure is initiated with a CELL TRAFFIC TRACE message sent from the en-gNB to the MeNB.

If the *Privacy Indicator* IE is included in the message, the MeNB shall take the information into account for anonymisation of MDT data as specified in TS 32.422 [6].

8.7.24 UE Radio Capability ID Mapping

8.7.24.1 General

The purpose of the UE Radio Capability ID Mapping procedure is to enable an en-gNB to request a connected eNB to provide the UE Radio Capability information that maps to a specific UE Radio Capability ID.

The procedure uses non-UE-associated signalling.

8.7.24.2 Successful Operation

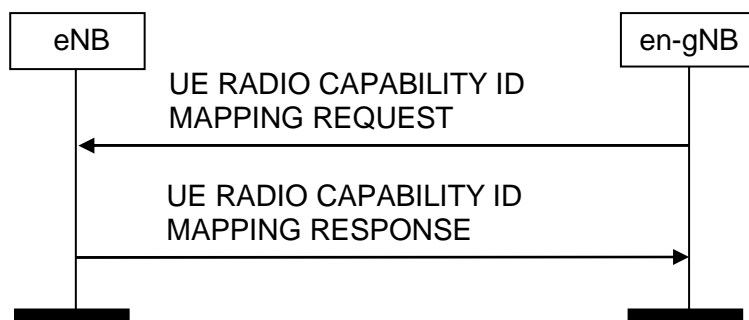


Figure 8.7.24.2-1: UE Radio Capability ID Mapping procedure. Successful operation

The en-gNB initiates the procedure by sending a UE RADIO CAPABILITY ID MAPPING REQUEST message to the eNB.

Upon receipt of the UE RADIO CAPABILITY ID MAPPING REQUEST message, the eNB shall include the UE Radio Capability information that maps to the UE Radio Capability ID indicated in the UE RADIO CAPABILITY ID MAPPING REQUEST message in the UE RADIO CAPABILITY ID MAPPING RESPONSE message.

8.7.24.3 Unsuccessful Operation

Not applicable.

8.8 IAB Procedures

8.8.1 F1-C Traffic Transfer

8.8.1.1 General

The purpose of the F1-C Traffic Transfer procedure is to deliver F1-C traffic to the MeNB so that it is then forwarded to the IAB-node, or deliver F1-C traffic to the en-gNB, if it was received from the IAB-node.

The procedure uses UE-associated signalling.

8.8.1.2 Successful Operation



Figure 8.8.1.2-1: F1-C Traffic Transfer procedure, successful operation.

Either the MeNB initiates the procedure by sending the F1-C TRAFFIC TRANSFER message including the received F1-C traffic to the en-gNB, or the en-gNB initiates the procedure by sending the F1-C TRAFFIC TRANSFER message to the MeNB.

Upon reception of the F1-C TRAFFIC TRANSFER message, the MeNB shall deliver the contained F1-C traffic to the IAB-node as specified in TS 36.331 [9].

Upon reception of the F1-C TRAFFIC TRANSFER message, the en-gNB shall handle the received F1-C traffic as specified in TS 38.473 [44] and TS 38.472 [48].

8.8.1.3 Unsuccessful Operation

Not applicable.

8.8.1.4 Abnormal Conditions

Not Applicable.

9 Elements for X2AP Communication

9.0 General

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

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

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

9.1 Message Functional Definition and Content

9.1.1 Messages for Basic Mobility Procedures

9.1.1.1 HANDOVER REQUEST

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

Direction: source eNB → 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
>>>Ethernet Type	O		9.2.157		YES	ignore
>>>DAPS Request Information	O		9.2.154		YES	ignore
>>>Source DL Forwarding IP Address	O		BIT STRING (1..160, ...)	Identifies the TNL address used by the source node for data forwarding.	YES	ignore
>RRC Context	M		OCTET STRING	Includes the RRC <i>HandoverPreparationInformation</i> message as defined in subclause 10.2.2 of TS 36.331 [9], or the RRC <i>HandoverPreparationInformation-NB</i> 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
>EPC Handover Restriction List Container	O		9.2.153		YES	ignore
>Additional RRM Policy Index	O		9.2.25a		YES	ignore
>NR UE Sidelink Aggregate Maximum Bit Rate	O		9.2.159	This IE applies only if the UE is authorized for NR V2X services.	YES	ignore
>UE Radio Capability ID	O		9.2.171		YES	reject
>IMS voice EPS fallback from 5G	O		ENUMERATED (true, ...)		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		–	
NR UE Security Capabilities	O		9.2.107		YES	ignore
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.	–	
Aerial UE subscription information	O		9.2.129		YES	ignore

Subscription Based UE Differentiation Information	O		9.2.136		YES	ignore
Conditional Handover Information Request	O				YES	reject
>CHO Trigger	M		ENUMERATED (CHO-initiation, CHO-replace, ...)		–	
>New eNB UE X2AP ID	C-ifCHOmod		eNB UE X2AP ID 9.2.24	Allocated at the target eNB	–	
>New eNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the target eNB	–	
>Estimated Arrival Probability	O		INTEGER (1..100)		–	
NR V2X Services Authorized	O		9.2.158		YES	ignore
PC5 QoS Parameters	O		9.2.160	This IE applies only if the UE is authorized for NR V2X services.	YES	ignore
IAB Node Indication	O		ENUMERATED (true, ...)		YES	reject

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

Condition	Explanation
ifCHOmod	This IE shall be present if the <i>CHO Trigger</i> IE is present and set to "CHO-replace".

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	–	
>>DAPS Response Information	O		9.2.155		YES	reject
E-RABs Not Admitted List	O		E-RAB List 9.2.28	A value for <i>E-RAB ID</i> shall only be present once in <i>E-RABs Admitted List</i> IE and in <i>E-RABs Not Admitted List</i> 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

E-RABs transferred to MeNB	O		E-RAB List 9.2.28	In case of EN-DC, indicates that SN Status is needed for the listed E-RABs from the SgNB..	YES	ignore
Conditional Handover Information Acknowledge	O				YES	reject
>Requested Target Cell ID	M		ECGI 9.2.14	Target cell indicated in the corresponding HANDOVER REQUEST message	–	
>Maximum Number of CHO Preparations	O		9.2.156		–	

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
Requested Target Cell ID	O		ECGI 9.2.14	Target cell indicated in the corresponding HANDOVER REQUEST message	YES	reject

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 $(N + \text{First Missing SDU Number})$ modulo $(1 + \text{the maximum value of the PDCP-SN})$. 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
Candidate Cells To Be Cancelled List		<i>0.. <maxnoof CellsinCH 0></i>			YES	reject
>Target Cell ID	M		ECGI 9.2.14		–	

Range bound	Explanation
maxnoofCellsinCHO	Maximum no. cells that can be prepared for a conditional handover. Value is 8.

9.1.1.7 HANDOVER SUCCESS

This message is sent by the target eNB to the source eNB to indicate the successful access of the UE toward the target eNB.

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	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	M		eNB UE X2AP ID 9.2.24	Allocated at the target eNB	YES	reject
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	ignore
Target Cell ID	M		ECGI 9.2.14	Target cell indicated in the corresponding Handover Preparation procedure	YES	reject

9.1.1.8 CONDITIONAL HANDOVER CANCEL

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

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	ignore
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	reject
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	ignore
New eNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the target eNB	YES	reject
Candidate Cells To Be Cancelled List		0 .. <maxnoof CellsInCH O>			YES	reject
>Target Cell ID	M		ECGI 9.2.14		–	

Range bound	Explanation
maxnoofCellsInCHO	Maximum no. cells that can be prepared for a conditional handover. Value is 8.

9.1.1.9 EARLY STATUS TRANSFER

This message is sent by the source eNB to the target eNB to transfer the COUNT value related to the forwarded downlink SDUs during DAPS Handover or Conditional Handover.

During a Conditional Handover with EN-DC or Dual Connectivity, this message is also used to transfer the COUNT value related to the forwarded downlink SDUs. In case of EN-DC, the COUNT value is transferred from the en-gNB to the eNB, while in case of Dual Connectivity, the COUNT value is transferred from the SeNB to the MeNB.

Direction: source eNB → target eNB (DAPS Handover or Conditional Handover).

Direction: en-gNB → MeNB (Conditional Handover with EN-DC), SeNB → MeNB (Conditional Handover with Dual Connectivity)

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	ignore
Old eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated for DAPS handover or Conditional handover at the source eNB	YES	reject
New eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated for DAPS handover or Conditional handover at the target eNB	YES	reject
Old eNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated for DAPS handover or Conditional handover at the source eNB	YES	reject
New eNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated for DAPS handover or Conditional handover at the target eNB	YES	reject
CHOICE Procedure Stage	M				YES	reject
>First DL COUNT						
>>E-RABs Subject To Early Status Transfer List		1 .. <maxnoofBearers>			–	
>>>E-RABs Subject To Early Status Transfer Item					–	
>>>>E-RAB ID	M		9.2.23		–	
>>>>FIRST DL COUNT Value	M		COUNT Value 9.2.15	PDCP-SN and Hyper frame number of the first DL SDU that the source eNB/SeNB/en-gNB forwards to the target eNB/MeNB in case of 12 bit long PDCP-SN	–	
>>>>FIRST DL COUNT Value Extended	O		COUNT Value Extended 9.2.66	PDCP-SN and Hyper frame number of the first DL SDU that the source eNB/SeNB/en-gNB forwards to the target eNB/MeNB in case of 15 bit long PDCP-SN	–	
>>>>FIRST 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 of the first DL SDU that the source eNB/SeNB/en-gNB forwards to the target eNB/MeNB in case of 18 bit long PDCP-SN	–	
>DL Discarding						
>>E-RABs Subject To DL Discarding List	M	1			–	
>>>E-RABs Subject To DL Discarding Item		1 .. <maxnoofBearers>			–	
>>>>E-RAB ID	M		9.2.23		–	
>>>>DISCARD DL COUNT Value	M		COUNT Value 9.2.15	PDCP-SN and Hyper frame number for which the target eNB/MeNB should discard forwarded DL SDUs associated with lower values in case of 12 bit long PDCP-SN	–	

>>>>DISCARD DL COUNT Value Extended	O		COUNT Value Extended 9.2.66	PDCP-SN and Hyper frame number for which the target eNB/MeNB should discard forwarded DL SDUs associated with lower values in case of 15 bit long PDCP-SN	–	
>>>>DISCARD 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 for which the target eNB/MeNB should discard forwarded DL SDUs associated with lower values in case of 18 bit long PDCP-SN	–	
SgNB UE X2AP ID	O		en-gNB UE X2AP ID 9.2.100	Allocated for EN-DC at the en-gNB.	YES	ignore

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

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: eNB₁ → eNB₂.

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: eNB₁ → eNB₂ 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 for a SN Status Transfer procedure at 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 for a SN Status Transfer procedure at 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 for a SN Status Transfer procedure at 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/EN-DC at the MeNB or for a SN Status Transfer procedure at 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: eNB₁ → eNB₂.

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 <i>EARFCN</i> 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		-	
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: eNB₂ → eNB₁.

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 <i>EARFCN</i> 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: eNB₂ → eNB₁.

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: eNB₁ → eNB₂, 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: eNB₂ → eNB₁, 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: eNB₁ → eNB₂.

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 <i>EARFCN</i> 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 <i>EARFCN</i> 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 .. <maxCelllineNB>		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 .. <maxCelllineNB>		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 .. <maxCelllineNB>				

>>>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		
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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 <i>Cell Deployment Status Indicator</i> 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: eNB₂ → eNB₁.

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: eNB₂ → eNB₁.

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 eNB₁ to neighbouring eNB₂ to initiate the requested measurement according to the parameters given in the message.

Direction: eNB₁ → eNB₂.

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- ifRegistrati onRequest StoporPart ialStoporA dd		INTEGER (1..4095,...)	Allocated by eNB ₂	YES	ignore
Registration Request	M		ENUMERAT ED(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 .. <maxCel lineNB>			EACH	ignore
>>Cell ID	M		ECGI 9.2.14		–	
Reporting Periodicity	O		ENUMERAT ED(1000ms, 2000ms, 5000ms,100 00ms, ...)	Periodicity that can be used for reporting of PRB Periodic, TNL Load Ind Periodic, HW Load Ind Periodic, Composite Available Capacity Periodic or ABS Status Periodic.	YES	ignore
Partial Success Indicator	O		ENUMERAT ED(partial success allowed, ...)	Included if partial success is allowed	YES	ignore
Reporting Periodicity of RSRP Measurement Report	O		ENUMERAT ED(120ms, 240ms, 480ms, 640ms, ...)	Periodicity that can be used for the reporting of RSRP Measurement Report Periodic.	YES	ignore

Reporting Periodicity of CSI Report	O		ENUMERATED(5ms, 10ms, 20ms, 40ms, 80ms, ...)	Periodicity that can be used for the reporting of CSI Report Periodic.	YES	ignore
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Range bound	Explanation
maxCelllineNB	Maximum no. cells that can be served by an eNB. Value is 256.

Condition	Explanation
ifRegistrationRequestStoporPartialStoporAdd	This IE shall be present if the <i>Registration Request</i> IE is set to the value "stop", "partial stop" or "add".

9.1.2.12 RESOURCE STATUS RESPONSE

This message is sent by the eNB₂ to indicate that the requested measurement, for all or for a subset of the measurement objects included in the measurement is successfully initiated.

Direction: eNB₂ → eNB₁.

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 .. <maxCellLineNB>			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.
maxCellLineNB	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 eNB₂ to indicate that for none of the requested measurement objects the measurement can be initiated.

Direction: eNB₂ → eNB₁.

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.. <maxCellLineNB>			EACH	ignore
>>Cell ID	M		ECGI 9.2.14		–	
>>Measurement Failure Cause List		1			–	
>>>Measurement Failure Cause Item		1.. <maxFailedMeasurements>			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
maxCellLineNB	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 eNB₂ to neighbouring eNB₁ to report the results of the requested measurements.

Direction: eNB₂ → eNB₁.

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 eNB₁ to neighbouring eNB₂ to initiate adaptation of mobility parameters.

Direction: eNB₁ → eNB₂.

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 eNB₂ to indicate that the eNB₂ Proposed Mobility Parameter proposed by eNB₁ was accepted.

Direction: eNB₂ → eNB₁.

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 eNB₂ to indicate that the eNB₂ Proposed Mobility Parameter proposed by eNB₁ was refused.

Direction: eNB₂ → eNB₁.

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 eNB₂ to indicate an RRC re-establishment attempt or a reception of an RLF Report from a UE that suffered a connection failure at eNB₁.

Direction: eNB₂ → eNB₁.

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	<i>RLF-Report-r9</i> IE contained in the <i>UEInformationResponse</i> message (TS 36.331 [9])	YES	ignore
RRC Conn Setup Indicator	O		ENUMERATED(RRC Conn Setup, ...)	Included if the RLF Report within the <i>UE RLF Report Container</i> 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 Reestablishment Cause in <i>RRCConnectionReestablishmentRequest</i> message (TS 36.331 [9])	YES	ignore
UE RLF Report Container for extended bands	O		OCTET STRING	<i>RLF-Report-v9e0</i> IE contained in the <i>UEInformationResponse</i> message (TS 36.331 [9])	YES	ignore
NB-IoT RLF Report Container	O		OCTET STRING	<i>RLF-Report-NB-r16</i> IE contained in the <i>UEInformationResponse-NB</i> message (TS 36.331 [9])	YES	ignore

9.1.2.19 HANDOVER REPORT

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

Direction: eNB₁ → eNB₂.

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, Inter System 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- ifHandoverR eportType HoToWrong Cell		ECGI 9.2.14	ECGI of cell where UE attempted re- establishment	YES	ignore
Target cell in UTRAN	C- ifHandoverR eportType InterRATpin gpong		OCTET STRING	Encoded according to <i>UTRAN Cell ID</i> in the <i>Last Visited UTRAN Cell Information</i> 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 <i>UE RLF Report Container for extended bands</i> IE received in the RLF INDICATION message.	YES	ignore
Target cell in NG-RAN	C- ifHandoverR eportType Inter-system pingpong		OCTET STRING	Encoded according to <i>NG-RAN CGI</i> IE in TS 38.413 [39].	YES	ignore

Condition	Explanation
ifHandoverReportType HoToWrongCell	This IE shall be present if the <i>Handover Report Type</i> IE is set to the value "HO to wrong cell"
ifHandoverReportType InterRATpingpong	This IE shall be present if the <i>Handover Report Type</i> IE is set to the value "InterRAT ping-pong"
ifHandoverReportType Inter-system pingpong	This IE shall be present if the <i>Handover Report Type</i> IE is set to the value "Inter-system 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: eNB₁ → eNB₂.

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: eNB₂ → eNB₁.

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: eNB₂ → eNB₁.

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: eNB₁ → eNB₂.

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: eNB₁ → eNB₂.

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: eNB₁ → eNB₂.

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: eNB₂ → eNB₁.

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: eNB₂ → eNB₁.

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 See Note 1)	YES	reject
Resume ID	M		9.2.91		YES	reject
ShortMAC-I	M		BIT STRING (SIZE (16))	RRC Resume: Corresponds to the <i>ShortResumeMAC-I</i> in the <i>RRCConnectionResumeRequest</i> message as defined in TS 36.331 [9] RRC Reestablishment: Corresponds to the <i>ShortMAC-I</i> in the <i>RRCConnectionReestablishmentRequest</i> 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 <i>cellIdentity</i> within the <i>VarShortResumeMAC-Input</i> as specified in TS 36.331 [9]. RRC Reestablishment: Corresponds to the <i>cellIdentity</i> within the <i>VarShortMAC-Input</i> 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

NOTE 1: The ASN.1 definition of the RETRIEVE UE CONTEXT REQUEST message contains the a wrong IE-Id, which references the *SeNB UE X2AP ID Extension* IE instead of the *New eNB UE X2AP ID Extension* IE. The old eNB interprets the content of this IE as the Extended eNB UE X2AP ID, which, together with the *New eNB UE X2AP ID* IE represents the eNB UE X2AP ID allocated at the new eNB.

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 .. <maxno of Bearer s>			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
>>>Ethernet Type	O		9.2.157		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 <i>HandoverPreparationInformation-NB</i> 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
>Additional RRM Policy Index	O		9.2.25a		YES	ignore
>EPC Handover Restriction List Container	O		9.2.153		YES	ignore
>NR UE Sidelink Aggregate Maximum Bit Rate	O		9.2.159	This IE applies only if the UE is authorized for NR V2X services.	YES	ignore
>UE Radio Capability ID	O		9.2.171		YES	reject
>IMS voice EPS fallback from 5G	O		ENUMERATED (true, ...)		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
NR V2X Services Authorized	O		9.2.158		YES	ignore
PC5 QoS Parameters	O		9.2.160	This IE applies only if the UE is authorized for NR V2X services.	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 <i>Initiating NodeType</i>	M				YES	reject
> <i>eNB</i>						
>>Global eNB ID	M		9.2.22		YES	reject
>>List of Served E-UTRA Cells		1 .. < <i>maxCellineNB</i> >		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	–	
>>Interface Instance Indication	O		9.2.143	NOTE: In the current version of this specification this IE is not included in the <i>Initiating Node Type</i> IE.	YES	reject
>>Cell and Capacity Assistance Information	O		9.2.146		YES	ignore
> <i>en-gNB</i>						
>>Global en-gNB ID	M		9.2.112		YES	reject
>>List of Served NR Cells		1 .. < <i>maxCellinengNB</i> >		List of cells served by the en-gNB. If a partial list of cells is signalled, it contains at least one cell per carrier configured at the gNB.	YES	reject
>>>Served NR Cell Information	M		9.2.110		–	
>>>NR Neighbour Information	O		9.2.98	NR neighbours.	–	
>>Partial List Indicator	O		ENUMERATED (partial, ...)	Value "partial" indicates that a partial list of cells is included in the <i>List of Served NR Cells</i> IE	YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject
TNL Transport Layer Address info	O		9.2.149		YES	ignore

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 <i>Responding NodeType</i>	M				YES	reject
> <i>eNB</i>						
>>Global eNB ID	M		9.2.22		YES	reject
>>>List of Served E-UTRA Cells		1 .. < <i>maxCellineNB</i> >		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	–	
>>Cell and Capacity Assistance Information	O		9.2.146		YES	ignore
> <i>en-gNB</i>						
>>Global en-gNB ID	M		9.2.112		YES	reject
>>>List of Served NR Cells		1 .. < <i>maxCellinengNB</i> >		List of cells served by the en-gNB. If a partial list of cells is signalled, it contains at least one cell per carrier configured at the gNB.	YES	reject
>>>Served NR Cell Information	M		9.2.110		–	
>>>NR Neighbour Information	O		9.2.98	NR neighbours	–	
>>Partial List Indicator	O		ENUMERATED (partial, ...)	Value “partial” indicates that a partial list of cells is included in the <i>List of Served NR Cells</i> IE	YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject
TNL Transport Layer Address info	O		9.2.149		YES	ignore

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
Message Oversize Notification	O		9.2.148		YES	ignore

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				YES	reject
>eNB						
>>Cell Assistance Information	O		9.2.115		YES	reject
>>>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	-	
>>>>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	-	
>>>>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 .. <maxCellinegNB>			GLOBAL	reject
>>>>>Served NR Cell Information	M		9.2.110		-	
>>>>>NR Neighbour Information	O		9.2.98	NR neighbours	-	
>>>>>Served NR Cells To Modify		0 .. <maxCellinegNB>			GLOBAL	reject
>>>>>Old NR-CGI	M		NR CGI 9.2.111		-	
>>>>>Served NR Cell Information	M		9.2.110		-	
>>>>>NR Neighbour Information	O		9.2.98	NR neighbours	-	
>>>>>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
>>>>>Served NR Cells To Delete		0 .. <maxCellinegNB>			GLOBAL	reject

>>>Old NR-CGI	M		NR CGI 9.2.111		-	
Interface Instance Indication	O		9.2.143		YES	reject
TNL Transport Layer Address info	O		9.2.149		YES	ignore
TNLA To Add List		<i>0..1</i>			YES	ignore
>TNLA To Add Item IEs		<i>1..<maxnoofTNL Associations></i>			-	
>>TNLA Transport Layer Information	M		9.2.150	CP Transport Layer Information of the en-gNB	-	-
>>TNLA Usage	M		9.2.151		-	-
TNLA To Update List		<i>0..1</i>			YES	ignore
>TNLA To Update Item IEs		<i>1..<maxnoofTNL Associations></i>			-	
>>TNLA Transport Layer Information	M		9.2.150	CP Transport Layer Information of the en-gNB	-	-
>>TNLA Usage	O		9.2.151		-	-
TNLA To Remove List		<i>0..1</i>			YES	ignore
>TNLA To Remove Item IEs		<i>1..<maxnoofTNL Associations></i>			-	
>>TNLA Transport Layer Information	M		9.2.150	CP Transport Layer Information of the en-gNB	-	-

Range bound	Explanation
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.
maxCellingNB	Maximum no. cells that can be served by an en-gNB. Value is 16384.
maxnoofTNLAssociations	Maximum numbers of TNL Associations between the eNB and the en-gNB. Value is 32.

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				YES	reject
>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.	–	
Interface Instance Indication	O		9.2.143		YES	reject
Criticality Diagnostics	O		9.2.7		YES	ignore
TNL Transport Layer Address info	O		9.2.149		YES	ignore
TNLA Setup List		0..1			YES	ignore
>TNLA Setup Item		1..<maxnoofTNLAssociations>			–	
>>TNLA Transport Layer Address	M		9.2.150	CP Transport Layer Information of the en-gNB	–	
TNLA Failed to Setup List		0..1			YES	ignore
>TNLA Failed To Setup Item		1..<maxnoofTNLAssociations>			–	
>>TNLA Transport Layer Address	M		9.2.150	CP Transport Layer Information of the en-gNB	–	
>>Cause	M		9.2.6		–	

Range bound	Explanation
maxCellinengNB	Maximum no. cells that can be served by an en-gNB. Value is 16384.
maxnoofTNLAssociations	Maximum numbers of TNL Associations between the eNB and the en-gNB. Value is 32.

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 .. < <i>maxCellinengNB</i> >				
>>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 .. < <i>maxCellinengNB</i> >				
>>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 interface instance.

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 <i>Initiating Node Type</i>	M					
> <i>eNB</i>						
>>Global eNB ID	M		9.2.22		YES	reject
> <i>en-gNB</i>						
>>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 interface instance.

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 <i>Initiating Node Type</i>	M					
> <i>eNB</i>						
>>Global eNB ID	M		9.2.22		YES	reject
> <i>en-gNB</i>						
>>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 interface instance 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.

During a Conditional Handover with EN-DC or Dual Connectivity, this message is also used to provide data forwarding related information. In case of EN-DC, the data forwarding related information is transferred from the eNB to the en-gNB, while in case of Dual Connectivity, the data forwarding related information is transferred from the MeNB to the SeNB.

Direction: new eNB → old eNB.

Direction: MeNB → en-gNB (Conditional Handover with EN-DC), MeNB → SeNB (Conditional Handover with Dual Connectivity)

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	–	
CHO DC Indicator	O		ENUMERATED (true, ...)	Indicating that the DATA FORWARDING ADDRESS INDICATION message is for a Conditional Handover.	YES	reject
CHO DC Early Data Forwarding Indicator	O		ENUMERATED (stop, ...)		YES	ignore
SgNB UE X2AP ID	O		en-gNB UE X2AP ID 9.2.100	Allocated for EN-DC at the en-gNB.	YES	ignore

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 <i>EN-DC SON Configuration Transfer</i> IE as defined in TS 36.413 [4].	YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

9.1.2.45 EN-DC RESOURCE STATUS REQUEST

This message is sent by the eNB to the en-gNB or by the en-gNB to the eNB to initiate the requested measurement according to the parameters given in the message.

Direction: E-UTRAN node₁ → E-UTRAN node₂ (eNB → en-gNB, en-gNB → eNB).

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
E-UTRAN node1 Measurement ID	M		INTEGER (1..4095, ...)	Allocated by the E-UTRAN node1.	YES	reject
E-UTRAN node2 Measurement ID	C- ifRegistrati onRequest StoporAdd		INTEGER (1..4095, ...)	Allocated by the E-UTRAN node2.	YES	ignore
Registration Request EN-DC	M		ENUMERATED (start, stop, add, ...)	Type of request for which the resource status is required.	YES	reject
Reporting Periodicity EN-DC	O		ENUMERATED (500ms, 1000ms, 2000ms, 5000ms, 10000ms, ...)	Periodicity that can be used for reporting of PRB Periodic, TNL Capacity Ind Periodic, Composite Available Capacity Periodic. Also used as the averaging window length for all measurement object if supported.	YES	ignore
Report Characteristics EN-DC	C- ifRegistrati onRequest Start		BITSTRING (SIZE(32))	When sent by the eNB, each position in the bitmap indicates measurement object the en-gNB is requested to report. First Bit = PRB Periodic, Second Bit = TNL Capacity Ind Periodic, Third Bit = Composite Available Capacity Periodic, Fourth Bit = Number of Active UEs. Other bits shall be ignored by the en-gNB. When sent by the en-gNB, each position in the bitmap indicates measurement object the eNB 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. Other bits shall be ignored by the eNB.	YES	ignore
NR Cell To Report EN-DC List		0..1		NR cell ID list to which the request applies.	YES	ignore
>NR Cell To Report EN-DC Item		1 .. <maxCell linengNB >			EACH	ignore
>>NR Cell ID	M		NR CGI 9.2.111		–	

>>SSB To Report List		0..1		SSB list to which the request applies.	YES	ignore
>>>SSB To Report Item		1 .. <maxno ofSSBAreas>			EACH	ignore
>>>>SSB Index	M		9.2.167		–	
Interface Instance Indication	O		9.2.143		YES	reject
E-UTRA Cell To Report EN-DC List		0..1		E-UTRA cell ID list to which the request applies.	YES	ignore
>E-UTRA Cell To Report EN-DC Item		1 .. <maxCellLineNB>			EACH	ignore
>>E-UTRA Cell ID	M		ECGI 9.2.14		–	

Condition	Explanation
ifRegistrationRequestStoporAdd	This IE shall be present if the <i>Registration Request EN-DC</i> IE is set to the value "stop", or "add".
ifRegistrationRequestStart	This IE shall be present if the <i>Registration Request EN-DC</i> IE is set to the value "start".

Range bound	Explanation
maxCellinengNB	Maximum no. cells that can be served by an en-gNB. Value is 16384.
maxnoofSSBAreas	Maximum no. SSB Areas that can be served by a NG-RAN node cell. Value is 64.
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.

9.1.2.46 EN-DC RESOURCE STATUS RESPONSE

This message is sent by the en-gNB or by the eNB to indicate that the requested measurement, for all of the measurement objects included in the measurement is successfully initiated.

Direction: E-UTRAN node₂ → E-UTRAN node₁ (en-gNB → eNB, eNB → en-gNB).

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
E-UTRAN node1 Measurement ID	M		INTEGER (1..4095, ...)	Allocated by the E-UTRAN node ₁ .	YES	reject
E-UTRAN node2 Measurement ID	M		INTEGER (1..4095, ...)	Allocated by the E-UTRAN node ₂ .	YES	reject
Criticality Diagnostics	O		9.2.7		YES	ignore
Interface Instance Indication	O		9.2.143		YES	reject

9.1.2.47 EN-DC RESOURCE STATUS FAILURE

This message is sent by the en-gNB or by the eNB to indicate that for any of the requested measurement objects the measurement cannot be initiated.

Direction: E-UTRAN node₂ → E-UTRAN node₁ (en-gNB → eNB, eNB → en-gNB).

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
E-UTRAN node1 Measurement ID	M		INTEGER (1..4095, ...)	Allocated by the E-UTRAN node ₁ .	YES	reject
E-UTRAN node2 Measurement ID	M		INTEGER (1..4095, ...)	Allocated by the E-UTRAN node 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
Interface Instance Indication	O		9.2.143		YES	reject

9.1.2.48 EN-DC RESOURCE STATUS UPDATE

This message is sent by the en-gNB or by the eNB to the en-gNB to the eNB to report the results of the requested measurements.

Direction: E-UTRAN node₂ → E-UTRAN node₁ (en-gNB → eNB, eNB → en-gNB).

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	ignore
E-UTRAN node1 Measurement ID	M		INTEGER (1..4095, ...)	Allocated by the E-UTRAN node ₁ .	YES	reject
E-UTRAN node2 Measurement ID	M		INTEGER (1..4095, ...)	Allocated by the E-UTRAN node ₂ .	YES	reject
NR Cell Measurement Result		0..1		Concerned NR cells in the en-gNB.	YES	ignore
>NR Cell Measurement Result Item		1 .. <maxCellinengNB>			EACH	ignore
>>NR Cell ID	M		NR CGI 9.2.111		–	
>>NR Radio Resource Status	O		9.2.162		–	
>>TNL Capacity Indicator	O		9.2.161		–	
>>NR Composite Available Capacity Group	O		9.2.163		–	
>>Number of Active UEs	O		INTEGER (0..16777215, ...)	As defined in TS 38.314 [45]. Value "1" is equivalent to 0.1 Active UEs, value "2" is equivalent to 0.2 Active UEs, value n is equivalent to n/10 Active UEs.	–	
Interface Instance Indication	O		9.2.143		YES	reject
E-UTRA Cell Measurement Result		0..1		Concerned E-UTRA cells in the eNB.	YES	ignore
>E-UTRA Cell Measurement Result Item		1 .. <maxCellineNB>			EACH	ignore
>>E-UTRA 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		–	

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

9.1.2.49 CELL TRAFFIC TRACE

This message is sent by en-gNB to transfer the trace information to the MeNB.

Direction: en-gNB → MeNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		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 <i>Trace Activation</i> IE	YES	ignore
Trace Collection Entity IP Address	M		Transport Layer Address 9.2.2.1	Defined in TS 32.422 [6]	YES	ignore
Privacy Indicator	O		ENUMERATED (Immediate MDT, ...)		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	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		–	
>>>>Bearer Type	O		9.2.92		YES	ignore
>>>>Ethernet Type	O		9.2.157		YES	ignore
>>>>Source DL Forwarding IP Address	O		BIT STRING (1..160, ...)	Identifies the TNL address used by the source node for data forwarding.	YES	ignore
>>>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.	–	
>>>>Source DL Forwarding IP Address	O		BIT STRING (1..160, ...)	Identifies the TNL address used by the source node for data forwarding.	YES	ignore

MeNB to SeNB Container	M		OCTET STRING	Includes the <i>SCG-ConfigInfo</i> 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 <i>Bearer Option</i> 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	–	
>>>>Source DL Forwarding IP Address	O		BIT STRING (1..160, ...)	Identifies the TNL address used by the source node for data forwarding.	YES	ignore
>>>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.	–	
>>>>Source DL Forwarding IP Address	O		BIT STRING (1..160, ...)	Identifies the TNL address used by the source node for data forwarding.	YES	ignore
E-RABs Not Admitted List	O		E-RAB List 9.2.28	A value for <i>E-RAB ID</i> shall only be present once in <i>E-RABs Admitted List</i> IE and in <i>E-RABs Not Admitted List</i> 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
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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 <i>Response Type</i>	M					
>> <i>Configuration successfully applied</i>						
>>>MeNB to SeNB Container	O		OCTET STRING	Includes the SCG- <i>ConfigInfo</i> message as defined in TS 36.331 [9]	-	
>> <i>Configuration rejected by the MeNB</i>						
>>>Cause	M		9.2.6		-	
>>>MeNB to SeNB Container	O		OCTET STRING	Includes the SCG- <i>ConfigInfo</i> 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		<i>0..1</i>			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		<i>0..1</i>			–	
>>E-RABs To Be Added Item		<i>1 .. <maxnoofBearers></i>			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		–	
>>>>>Bearer Type	O		9.2.92		YES	ignore
>>>>>Ethernet Type	O		9.2.157		YES	ignore
>>>>>Source DL Forwarding IP Address	O		BIT STRING (1..160, ...)	Identifies the TNL address used by the source node for data forwarding.	YES	ignore
>>>>>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.	–	
>>>>>Source DL Forwarding IP Address	O		BIT STRING (1..160, ...)	Identifies the TNL address used by the source node for data forwarding.	YES	ignore
>E-RABs To Be Modified List		<i>0..1</i>			–	

>>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 <i>Bearer Option</i>	M					
>>>>SCG <i>Bearer</i>						
>>>>>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	–	
>>>>>Source DL Forwarding IP Address	O		BIT STRING (1..160, ...)	Identifies the TNL address used by the source node for data forwarding.	YES	ignore
>>>>>Split <i>Bearer</i>						
>>>>>>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.	–	
>>>>>>Source DL Forwarding IP Address	O		BIT STRING (1..160, ...)	Identifies the TNL address used by the source node for data forwarding.	YES	ignore
>E-RABs Admitted To Be Modified List		0..1			–	
>>E-RABs Admitted To Be Modified Item		1.. <maxnoofBearers >			EACH	ignore
>>>CHOICE <i>Bearer Option</i>	M					
>>>>SCG <i>Bearer</i>						
>>>>>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 <i>E-RAB ID</i> shall only be present once in <i>E-RABs Admitted List</i> IE and in <i>E-RABs Not Admitted List</i> IE.	YES	ignore
SeNB to MeNB Container	O		OCTET STRING	Includes the <i>SCG-Config</i> 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 <i>Bearer Option</i>	M					
>>>SCG <i>Bearer</i>						
>>>>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	–	
>>>> <i>Split Bearer</i>						
>>>>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		<i>0..1</i>			YES	ignore
>E-RABs To Be Released Item		<i>1 .. <maxnoofBearers ></i>			–	
>>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 .. <maxnoofBeare rs>			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 admissible E-RAB Level QoS Parameters	C- ifMCGand SCGpresent _GBR		GBR QoS Information 9.2.10	Includes the GBR QoS Information admissible by the MCG.	–	
>>>>DL Forwarding	O		9.2.5		–	
>>>>MeNB DL GTP Tunnel Endpoint at MCG	C- ifMCGpres ent		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
>>>>Bearer Type	O		9.2.92		YES	ignore
>>>>Ethernet Type	O		9.2.157		YES	ignore
>>>>Source DL Forwarding IP Address	O		BIT STRING (1..160, ...)	Identifies the TNL address used by the source MN for data forwarding.	YES	ignore
>>>>Source Node DL Forwarding IP Address	O		BIT STRING (1..160, ...)	This IE is present only for the case of SA to EN-DC handover and it is used to identify the TNL address allocated by the source NG-RAN node for data forwarding.	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- ifMCGand SCGprese nt		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 status 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
Additional RRM Policy Index	O		9.2.25a		YES	ignore
Requested Fast MCG recovery via SRB3	O		ENUMERATED (true, ...)	Indicates that the resources for fast MCG recovery via SRB3 are requested.	YES	ignore
UE Context Reference at Source NG-RAN	O		RAN UE NGAP ID 9.2.152		YES	ignore
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 Radio Capability ID	O		9.2.171		YES	reject
IAB Node Indication	O		ENUMERATED (true, ...)		YES	reject
Source NG-RAN Node ID	O		Global RAN Node ID 9.2.176		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 <i>MCG resources</i> and <i>SCG resources</i> IEs in the <i>EN-DC Resource Configuration</i> IE are set to the value "present".
ifMCGpresent	This IE shall be present if, for the E-RAB requested to be added, the <i>MCG resources</i> IE in the <i>EN-DC Resource Configuration</i> 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 <i>MCG resources</i> and <i>SCG resources</i> IEs in the <i>EN-DC Resource Configuration</i> IE are set to the value "present", and <i>GBR QoS Information</i> IE is present in <i>Full E-RAB Level QoS Parameters</i> IE.
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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
>>>>Source DL Forwarding IP Address	O		BIT STRING (1..160, ...)	Identifies the TNL address used by the source node for data forwarding.	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
Available fast MCG recovery via SRB3	O		ENUMERATED (true, ...)	Indicates the fast MCG recovery via SRB3 is enabled.	YES	ignore
Direct Forwarding Path Availability	O		ENUMERATED (direct path available, ...)	Indicates direct forwarding path is available between the target en-gNB and source NG-RAN node for SA to EN-DC handover.	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 <i>MCG resources</i> IE in the <i>EN-DC Resource Configuration</i> IE is set to the value "present".
ifMCGandSCGpresent	This IE shall be present if, for the E-RAB admitted to be added, the <i>MCG resources</i> and <i>SCG resources</i> IEs in the <i>EN-DC Resource Configuration</i> 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 <i>MCG resources</i> and <i>SCG resources</i> IEs in the <i>EN-DC Resource Configuration</i> IE are set to the value "present", and the <i>GBR QoS Information</i> IE is present in the <i>Requested MCG E-RAB Level QoS Parameters</i> 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 <i>Response Type</i>	M					
>> <i>Configuration successfully applied</i>						
>>>MeNB to SgNB Container	O		OCTET STRING	Includes the NR <i>RRReconfiguration Complete</i> message as defined in TS 38.331 [31].	-	
>> <i>Configuration rejected</i>						
>>>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		–	
>Lower Layer presence status change	O		9.2.145		–	
>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 admissible E-RAB Level QoS Parameters	C- ifMCGand SCGpresent GBR		GBR QoS Information 9.2.10	Includes the GBR QoS Information admissible 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
>>>>>Bearer Type	O		9.2.92		YES	ignore
>>>>>Ethernet Type	O		9.2.157		YES	ignore
>>>>>Source DL Forwarding IP Address	O		BIT STRING (1..160, ...)	Identifies the TNL address used by the source node for data forwarding.	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 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- ifMCGand SCGpresent		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 status 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 admissible E-RAB Level QoS Parameters	O		GBR QoS Information 9.2.10	Includes the GBR QoS information admissible 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		YES	ignore
>Additional RRM Policy Index	O		9.2.25a		YES	ignore
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		ECCI 9.2.14	Indicates the cell ID for PCell in MeNB.	YES	ignore
Requested Fast MCG recovery via SRB3	O		ENUMERATED (true, ...)	Indicates that the resources for fast MCG recovery via SRB3 are requested.	YES	ignore

Requested Fast MCG recovery via SRB3 Release	O		ENUMERATED (true, ...)	Indicates that the resources for fast MCG recovery via SRB3 are requested to be released.	YES	ignore
SN triggered	O		ENUMERATED (True, ...)		YES	ignore
IAB Node Indication	O		ENUMERATED (true, ...)		YES	reject

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 <i>MCG resources</i> and <i>SCG resources</i> IEs in the <i>EN-DC Resource Configuration</i> IE are set to the value "present".
ifMCGpresent	This IE shall be present if, for the E-RAB requested to be added, the <i>MCG resources</i> IE in the <i>EN-DC Resource Configuration</i> 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 <i>MCG resources</i> and <i>SCG resources</i> IEs in the <i>EN-DC Resource Configuration</i> IE are set to the value "present", and <i>GBR QoS Information</i> IE is present in <i>Full E-RAB Level QoS Parameters</i> 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
>>>>Source DL Forwarding IP Address	O		BIT STRING (1..160, ...)	Identifies the TNL address used by the source node for data forwarding.	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 <i>E-RAB ID</i> shall only be present once in <i>E-RABs Admitted List</i> IE and in <i>E-RABs Not Admitted List</i> IE.	YES	ignore
SgNB to MeNB Container	O		OCTET STRING	Includes the NR <i>CG-Config</i> 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		ENUMERATE D (srb1, srb2, srb1&2, ...)	Indicates admitted SRBs	YES	ignore
Admitted split SRBs release	O		ENUMERATE D (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
Available fast MCG recovery via SRB3	O		ENUMERATE D (true, ...)	Indicates the fast MCG recovery via SRB3 is enabled.	YES	ignore
Release fast MCG recovery via SRB3	O		ENUMERATE D (true, ...)	Indicates the fast MCG recovery via SRB3 is released.	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 <i>MCG resources</i> and <i>SCG resources</i> IEs in the <i>EN-DC Resource Configuration</i> IE are set to the value "present".
ifMCGpresent	This IE shall be present if, for the E-RAB admitted to be added, the <i>MCG resources</i> IE in the <i>EN-DC Resource Configuration</i> 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 <i>MCG resources</i> and <i>SCG resources</i> IEs in the <i>EN-DC Resource Configuration</i> IE are set to the value "present", and the <i>GBR QoS Information</i> IE is present in the <i>Requested MCG E-RAB Level QoS Parameters</i> 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 .. <maxnoofBeare rs>			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 .. <maxnoofBeare rs>			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 <i>CG-ConfigInfo</i> 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 transport bearer used for forwarding of UL PDUs	–	
>>>>DL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the 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
E-RABs transferred to MeNB	O		E-RAB List 9.2.28	Indicates the target MeNB reconfigured the listed E-RABs as MN-terminated bearers.	YES	ignore

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 confirm 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	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

9.1.4.14 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.	–	
SgNB to MeNB Container	O		OCTET STRING	Includes the NR <i>CG-Config</i> message as defined in TS 38.331 [31].	YES	ignore

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 <i>CG-Config</i> 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			YES	reject
>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	–	
>SRB Type	M		ENUMERATED (srb1, srb2, ...)	The SRB type	–	
>Delivery Status	O		9.2.104	DL RRC delivery status of split SRB	–	
NR UE Report		0..1			YES	reject
>RRC Container	M		OCTET STRING	Includes the UL-DCCH-Message as defined in subclause 6.2.1 of TS 38.331 [31] containing the <i>MeasurementReport</i> message, or the <i>FailureInformation</i> message, or the <i>RRCReconfigurationComplete</i> message, or the <i>UEAssistanceInformation</i> message, or the <i>IABotherInformation</i> message.	–	
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject
Fast MCG Recovery via SRB3 from SgNB to MeNB		0..1			YES	ignore
>RRC Container	O		OCTET STRING	Includes the <i>UL-DCCH-Message</i> as defined in subclause 6.2.1 of TS 36.331 [9] containing <i>MCGFailureInformation</i> message.	–	
Fast MCG Recovery via SRB3 from MeNB to SgNB		0..1			YES	ignore

>RRC Container	O		OCTET STRING	Includes the <i>DL-DCCH-Message</i> as defined in subclause 6.2.1 of TS 36.331 [9] containing the <i>RRCCONNECTIONRelease</i> message, or the <i>RRCCONNECTIONRelease</i> message, or the <i>MobilityFromEUTRACommand</i> message.	–	
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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	Assigned Criticality
Message Type	M		9.2.13		YES	reject
UEs to be Reset List		1			YES	reject
>UEs To Be Reset Item		1.. <maxnoof UEs>				
>>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 .. <maxnoof UESineng NBDU>				
>>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 <i>Initiating Node Type</i>	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 9.2.111		-	
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 <i>Responding NodeType</i>	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 <i>Spectrum Sharing Group ID</i> .	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 <i>Spectrum Sharing Group ID</i> .	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 9.2.111		-	
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		<i>0..<maxnoofBearers></i>			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
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject

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 <i>Trace Activation</i> IE	YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject

9.1.4.30 UE Radio Capability ID Mapping Request

This message is sent by the en-gNB and is used to request the UE Radio Capability information that maps to a specific UE Radio Capability ID.

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
UE Radio Capability ID	M		9.2.171		YES	reject

9.1.4.31 UE Radio Capability ID Mapping Response

This message is sent by the eNB and is used to provide the UE Radio Capability information that maps to a specific UE Radio Capability ID indicated in the UE RADIO CAPABILITY ID MAPPING REQUEST message.

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
UE Radio Capability ID	M		9.2.171		YES	reject
UE Radio Capability	M		9.2.173		YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore

9.1.5 Messages for IAB Procedures

9.1.5.1 F1-C TRAFFIC TRANSFER

This message is sent by the en-gNB to the MeNB or by the MeNB to the en-gNB to transfer the F1-C traffic to and from an IAB-node.

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	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
F1-C Traffic Container	M		OCTET STRING	Contains an F1-C interface SCTP CHUNK and IP header, or an IP packet to protect the traffic on the F1-C interface as defined in TS 33.501 [50]. This IE corresponds to the <i>dedicatedInfoF1c-r16</i> defined in TS 36.331 [9].	YES	reject
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB.	YES	reject

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. The QoS Mapping Information is used to set the IP header of packets in case that the en-gNB serves the IAB, and the packets belonging to MN-terminated split bearer/SCG bearer are transmitted from MeNB to en-gNB.

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]	–	
QoS Mapping Information	O		9.2.172		YES	reject

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, MinimumWithoutVend orSpecificExtension, MediumWithoutVend orSpecificExtension, MaximumWithoutVen dorSpecificExtension, ...)	Defined in TS 32.421 [7]	–	
Trace Collection Entity IP Address	M		BIT STRING (1..160,...)	For File based Reporting. Defined in TS 32.422 [6]. For details on the Transport Layer Address, see TS 36.424 [8], TS 36.414 [19]. This IE is ignored if the <i>Trace Collection Entity URI</i> IE is present.	–	
MDT Configuration	O		9.2.56		YES	ignore
UE Application layer measurement configuration	O		9.2.121		YES	ignore
MDT Configuration NR	O		OCTET STRING	Defined in TS 38.413 [39]. Only the immediate MDT configurations are included in the IE in this version of the specification.	YES	ignore
Trace Collection Entity URI	O		URI 9.2.174	For Streaming based Reporting. Defined in TS 32.422 [11]. Replaces Trace Collection Entity IP Address if present.	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		<i>0..<maxnoof EPLMNs></i>		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		<i>0..<maxnoof EPLMNsPlusOne></i>		intra E-UTRAN roaming restrictions	–	
>PLMN Identity	M		9.2.4	The PLMN of forbidden TACs	–	
>Forbidden TACs		<i>1..<maxnoof ForbTACs></i>			–	
>>TAC	M		OCTET STRING(2)	The forbidden TAC	–	
Forbidden LAs		<i>0..<maxnoof EPLMNsPlusOne></i>		inter-3GPP RAT roaming restrictions	–	
>PLMN Identity	M		9.2.4		–	
>Forbidden LACs		<i>1..<maxnoof ForbLACs></i>			–	
>>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(NR restricted in EPS as Secondary RAT, ...)	Restriction to use NR when the NR is used as secondary RAT in EN-DC.	YES	ignore

Core Network Type Restrictions		<i>0..<maxnoofEPLMNsPlusOne></i>		Includes any of the Serving PLMN or any PLMN of the Equivalent PLMNs listed in the <i>Mobility Restriction List</i> 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
Unlicensed Spectrum Restriction	O		ENUMERATED(UnlicensedRestricted, ...)	Restriction to use unlicensed spectrum in the form of LAA or LWA/LWIP or NR-U as described in TS 23.401 [11].	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)	<ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> -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		<p>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 Group ID, Unknown MME Code, Encryption And/Or Integrity Protection Algorithms Not Supported, ReportCharacteristicsEmpty, NoReportPeriodicity, ExistingMeasurementID, Unknown eNB Measurement ID, Measurement Temporarily not Available, Unspecified,...,Load Balancing, Handover Optimisation, Value out of allowed range, Multiple E-RAB ID instances, Switch Off Ongoing, Not supported QCI value, Measurement not supported for the object, TDcoverall Expiry, TDcprep Expiry, Action Desirable for Radio Reasons, Reduce Load, Resource Optimisation, Time Critical action, Target not Allowed, No Radio Resources Available, Invalid QoS combination, Encryption Algorithms Not Supported, Procedure cancelled, RRM purpose, Improve user bit rate, User Inactivity, Radio Connection With UE Lost, Failure in the Radio Interface Procedure, Bearer Option not Supported, MCG Mobility, SCG Mobility, Count reaches max value, Unknown Old en-gNB UE X2AP ID, PDCP Overload, CHO-CPC resources to be changed, UE Power Saving, Insufficient UE Capabilities, Normal Release, Unknown E-UTRAN node Measurement ID)</p>	
>Transport Layer				
>>Transport Layer Cause	M		<p>ENUMERATED (Transport Resource Unavailable, Unspecified,...)</p>	

>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 SgNB UE X2AP ID is unknown.
PDCP Overload	The procedure is initiated due to PDCP resource limitation.
CHO-CPC resources to be changed	The prepared resources for CHO or CPC for a UE are to be changed.
UE Power Saving	The procedure is initiated to accommodate the preference indicated by UE to release the SCG for UE power saving purpose. In the current version of this specification applicable for Dual Connectivity and EN-DC only.
Insufficient UE Capabilities	The procedure can't proceed due to insufficient UE capabilities.
Normal Release	The release is due to normal reasons.
Unknown E-UTRAN node Measurement ID	The action failed because some E-UTRAN node Measurement-ID is unknown.

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		<i>0..<maxNrOfErrors></i>		
>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		<i>1..<maxnoof BPLMNs></i>		Broadcast PLMNs in SIB1 associated to the E-UTRA Cell Identity in the <i>Cell ID</i> IE.	–	
>PLMN Identity	M		9.2.4		–	
CHOICE <i>EUTRA-Mode-Info</i>	M				–	
> <i>FDD</i>						
>> 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 <i>UL EARFCN</i> IE is ignored.	YES	reject
>>>DL EARFCN Extension	O		EARFCN Extension 9.2.65	If this IE is present, the value signalled in the <i>DL EARFCN</i> 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-NumOccasionDifferencePrecoder	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 <i>EARFCN</i> 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,...)		–	
>>>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
>>>NB-IoT UL DL Alignment Offset	O		NB-IoT UL DL Alignment Offset 9.2.144	Corresponds to the TDD-UL-DL-AlignmentOffset-NB in TS 36.331 [9].	YES	reject
Number of Antenna Ports	O		9.2.43		YES	ignore
PRACH Configuration	O		PRACH Configuration 9.2.50		YES	ignore
MBSFN Subframe Info		<i>0..<maxnoof MBSFN></i>		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		<i>0..<maxnoof MBMSServiceAreaIdentities ></i>		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 <i>FreqBandIndicationPriority</i> , and whether <i>FreqBandIndicatorPriority</i> is broadcasted in SIB 1 (see TS 36.331 [9])	YES	ignore
BandwidthReducedSI	O		ENUMERATED (scheduled, ...)	This IE indicates that the <i>SystemInformationBlockType1-BR</i> 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		<i>0..<maxnoof BPLMNs></i>		This IE corresponds to the <i>cellAccessRelatedInfo</i> IE in <i>SIB1</i> as specified in TS 36.331 [9]. All PLMN Identities and associated information contained in the <i>cellAccessRelatedInfo</i> IE are included and provided in the same order as broadcast in <i>SIB1</i> .	YES	ignore
>Broadcast PLMNs		<i>1..<maxnoof BPLMNs></i>		Broadcast PLMN IDs in <i>SIB1</i> associated to the <i>E-UTRA Cell Identity</i> IE.	–	
>>PLMN Identity	M		9.2.4		–	
>TAC	M		OCTET STRING(2)		–	
>E-UTRA Cell Identity	M		BIT STRING (28)		–	
NPRACH Configuration	O		NPRACH Configuration 9.2.170		YES	ignore
SFN Offset	O		9.2.175		YES	ignore

Range bound	Explanation
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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.

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 <i>Extended E-RAB Maximum Bit Rate Downlink</i> IE is included, the <i>E-RAB Maximum Bit Rate Downlink</i> 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 <i>Extended E-RAB Maximum Bit Rate Uplink</i> IE is included, the <i>E-RAB Maximum Bit Rate Uplink</i> 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 <i>Extended E-RAB Guaranteed Bit Rate Downlink</i> IE is included, the <i>E-RAB Guaranteed Bit Rate Downlink</i> 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 <i>Extended E-RAB Guaranteed Bit Rate Uplink</i> IE is included, the <i>E-RAB Guaranteed Bit Rate Uplink</i> 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 <i>Extended UE Aggregate Maximum Bit Rate Downlink</i> IE is included, the <i>UE Aggregate Maximum Bit Rate Downlink</i> IE shall be ignored.	–	
UE Aggregate Maximum Bit Rate Uplink	M		Bit Rate 9.2.11	If the <i>Extended UE Aggregate Maximum Bit Rate Uplink</i> IE is included, the <i>UE Aggregate Maximum Bit Rate Uplink</i> 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 <i>E-UTRAN Cell Identifier</i> IE value correspond to the value of the <i>eNB ID</i> IE contained in the <i>Global eNB ID</i> 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		<i>1..<maxnoofPRBs ></i>		
>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 <i>Enhanced RNTP</i> 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, ...)	<p>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.</p> <p>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.</p> <p>The bit string may span across multiple contiguous subframes (maximum 40). The length of the bit string is an integer multiple of $2 \times N_{RB}^{DL}$.</p> <p>N_{RB}^{DL} is defined in TS 36.211 [10]. The Enhanced RNTP pattern is continuously repeated.</p>		
>RNTP High Power Threshold	M		ENUMERATE D (-∞, -11, -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, ...)	Defined as the $RNTP_{threshold}$ in TS 36.213 [11].		
>Enhanced RNTP Start Time		0..1				
>>Start SFN	M		INTEGER (0..1023, ...)	SFN of the radio frame containing the first subframe when the <i>Enhanced RNTP</i> IE is valid.		
>>Start Subframe Number	M		INTEGER (0..9, ...)	Subframe number, within the radio frame indicated by the <i>Start SFN</i> IE, of the first subframe when the <i>Enhanced RNTP</i> IE is valid.		

9.2.20 GU Group Id

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PLMN Id	M		PLMN Identity 9.2.4		–	
MME Group Id	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, ...)		–	
Additional Location Information	O		ENUMERATED (Include PSCell, ...)		YES	ignore

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 <i>eNB ID</i>	M				–	
> <i>Macro eNB ID</i>	M		BIT STRING (20)	Equal to the 20 leftmost bits of the value of the <i>E-UTRAN Cell Identifier</i> IE contained in the <i>ECGI</i> IE (see section 9.2.14) identifying each cell controlled by the eNB	–	
> <i>Home eNB ID</i>	M		BIT STRING (28)	Equal to the value of the <i>E-UTRAN Cell Identifier</i> IE contained in the <i>ECGI</i> IE (see section 9.2.14) identifying the cell controlled by the eNB	–	
> <i>Short Macro eNB ID</i>	M		BIT STRING (SIZE(18))	Equal to the 18 leftmost bits of the value of the <i>E-UTRAN Cell Identifier</i> IE contained in the <i>ECGI</i> IE (see section 9.2.14) identifying each cell controlled by the eNB.	–	
> <i>Long Macro eNB ID</i>	M		BIT STRING (SIZE(21))	Equal to the 21 leftmost bits of the value of the <i>E-UTRAN Cell Identifier</i> IE contained in the <i>ECGI</i> IE (see section 9.2.14) identifying each cell controlled by the eNB.	–	

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)	

9.2.25a Additional RRM Policy Index

The *Additional RRM Policy Index* IE is used to provide additional information independent from the Subscriber Profile ID for RAT/Frequency priority as specified in TS 36.300 [15].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Additional RRM Policy Index	M		BIT STRING (32)	

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(sh all not trigger pre-emption, may trigger pre-emption)	Desc.: 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		<i>1..<maxnoofCells ></i>		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 <i>Last Visited Cell Information</i>	M				-	
> <i>E-UTRAN Cell</i>					-	
>>Last Visited E-UTRAN Cell Information	M		9.2.40		-	
> <i>UTRAN Cell</i>					-	
>>Last Visited UTRAN Cell Information	M		OCTET STRING	Defined in TS 25.413 [24]		
> <i>GERAN Cell</i>					-	
>>Last Visited GERAN Cell Information	M		9.2.41		-	
> <i>NG-RAN Cell</i>					-	
>>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		E CGI 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 <i>Last Visited GERAN Cell Information</i>	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 eNB₂ 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 <i>Subframe Allocation</i>	M			
> <i>Oneframe</i>	M		BITSTRING (SIZE(6))	
> <i>Fourframes</i>	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			
> <i>FDD</i>				
>>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.
> <i>TDD</i>				
>>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
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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..<maxno ofCellIDfor MDT>			–	
>>>ECGI	M		9.2.14		–	
>TA Based					–	
>>TA List for MDT		1..<maxno ofTAforMDT>			–	
>>>TAC	M		OCTET STRING (2)	Tracking Area Code. The TAI is derived using the current serving PLMN.	–	
>PLMN Wide			NULL		–	
>TAI based						
>>TAI List for MDT		1..<maxno ofTAforMDT>				
>>>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 <i>Measurements to Activate</i> 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 <i>Measurements to Activate</i> 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 <i>Measurements to Activate</i> IE has the first bit set to "1" and the <i>M1 Reporting Trigger</i> IE is set to "A2event-triggered" or to "A2event-triggered periodic".
ifperiodicMDT	This IE shall be present if the <i>M1 Reporting Trigger</i> IE is set to "periodic" or to "A2event-triggered periodic".
ifM3	This IE shall be present if the <i>Measurements to Activate</i> IE has the third bit set to "1".
ifM4	This IE shall be present if the <i>Measurements to Activate</i> IE has the fourth bit set to "1".
ifM5	This IE shall be present if the <i>Measurements to Activate</i> IE has the fifth bit set to "1".
ifM6	This IE shall be present if the <i>Measurements to Activate</i> IE has the seventh bit set to "1".
ifM7	This IE shall be present if the <i>Measurements to Activate</i> 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 <i>Usable ABS Pattern Info</i> 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 <i>Usable ABS Pattern Info</i> IE.
CHOICE <i>Usable ABS Information</i>	M		–	–
> <i>FDD</i>			–	–
>>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 <i>ABS Pattern Info</i> IE conveyed in the LOAD INFORMATION message from the eNB ₁ .
> <i>TDD</i>			–	–
>>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 <i>ABS Pattern Info</i> 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 <i>Expected Activity Period</i> IE and the <i>Expected Idle Period</i> IE, if present, is derived from subscription information. If "statistics" is indicated, the information contained in the <i>Expected Activity Period</i> IE and the <i>Expected Idle Period</i> 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 <i>CoMP Information</i> IE is valid.
>Start Subframe Number	M		INTEGER (0..9, ...)	Subframe number, within the radio frame indicated by the <i>Start SFN</i> IE, of the first subframe when the <i>CoMP Information</i> IE is valid.

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

9.2.75 CoMP Hypothesis Set

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CoMP Hypothesis Set Item		1..<maxnoofCoMPCells>		
>Cell ID	M		ECGI 9.2.14	ID of the cell for which the <i>CoMP Hypothesis</i> 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 $N_{RB}^{DL} \cdot N_{RB}^{DL}$ 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 eNB ₂ 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_{RB}^{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 <i>Wideband CQI Codeword 1</i>	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 <i>Subband CQI Codeword 0</i>	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 <i>Subband CQI Codeword 1</i>	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 [29].

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 associated signalling connection was initiated including the eNB UE X2AP ID Extension, the eNB UE X2AP ID Extension shall be used by both peers for the life-time of the respective UE-associated signalling connection.

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

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 <i>M6 Links to log</i> 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 <i>Resume ID</i>	M			
> <i>Resume ID not truncated</i>				
>>Resume ID not truncated	M		BIT STRING (SIZE (40))	40 bit 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.
> <i>Resume ID truncated</i>				
>>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,..., -8.5, -4.5, 3.5, 7.5)	

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 <i>WT ID Type</i>	M			
> <i>WT ID Type 1</i>				
>>PLMN ID	M		PLMN Identity 9.2.4	
>>Short WT ID	M		BIT STRING (24)	
> <i>WT ID Type 2</i>				
>>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 Item					–	
>>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 on 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	This IE is ignored for NR operating bands for which uplink range of N _{REF} is not defined in section 5.4.2.3 of TS 38.104 [37].	–	
>>>>>>>DL ARFCNFreqInfo	M		NR ARFCN Frequency Info 9.2.106		–	
>>>>>>>>TDD						
>>>>>>>>>TDD Info		1			–	
>>>>>>>>>>ARFCNNRF reqInfo	M		NR ARFCN Frequency Info 9.2.106		–	
>>>>>>>>>>>Intended TDD DL-UL Configuration NR	O		OCTET STRING	Contains the Intended TDD DL-UL Configuration NR IE as defined in TS 38.423 [49].	YES	ignore

>>CSI-RS Transmission Indication	O		ENUMERATED {activated, deactivated, ...}	This IE indicates the CSI-RS transmission status of the given cell.	YES	ignore
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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,...)	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
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	Criticality	Assigned Criticality
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 to 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		–	
Frequency Shift 7p5khz	O		ENUMERATED (false, true, ...)	Indicate whether the value of Δ_{shift} is 0kHz or 7.5kHz when calculating $F_{\text{REF,shift}}$ as defined in Section 5.4.2.1 of TS 38.104 [37].	YES	ignore

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 ED (present, not present)		–	
MCG resources	M		ENUMERATED ED (present, not present)		–	
SCG resources	M		ENUMERATED ED (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. If this IE is included, the receiving node may assume that the NR cell provides 5GS service and is eligible as inter-system HO target candidate.	–	
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		<i>1..<max noofBP LMNs></i>		Broadcast PLMNs in SIB1 associated to the NR Cell Identity in the <i>Cell ID</i> IE. If more than maxnoofBPLMNs are needed for NR, they are provided by the <i>Additional PLMNs</i> IE.	–	
>PLMN Identity	M		9.2.4		–	
CHOICE <i>NR-Mode-Info</i>	M				–	
> <i>FDD</i>						
>> FDD Info		1			–	
>>>UL FreqInfo	M		NR Frequency Info 9.2.106	This IE is ignored for NR operating bands for which uplink range of N _{REF} is not defined in section 5.4.2.3 of TS 38.104 [37].	–	
>>>DL FreqInfo	M		NR Frequency Info 9.2.106		–	
>>>UL Transmission Bandwidth	M		NR Transmission Bandwidth 9.2.114	This IE is ignored for NR operating bands for which uplink range of N _{REF} is not defined in section 5.4.2.3 of TS 38.104 [37].	–	
>>>DL Transmission Bandwidth	M		NR Transmission Bandwidth 9.2.114		–	
>>>UL Carrier List	O		NR Carrier List 9.2.168	If included, the <i>UL Transmission Bandwidth</i> IE shall be ignored.	YES	ignore
>>>DL Carrier List	O		NR Carrier List 9.2.168	If included, the <i>DL Transmission Bandwidth</i> IE shall be ignored.	YES	ignore
> <i>TDD</i>						
>> TDD Info		1			–	
>>>NRFreqInfo	M		NR Frequency Info 9.2.106		–	
>>>Transmission Bandwidth	M		NR Transmission Bandwidth 9.2.114		–	

>>>TDD UL-DL Configuration Common NR	O		OCTET STRING	The <i>tdd-UL-DL-ConfigurationCommon</i> IE in TS 38.331 [31]	YES	ignore
>>>Carrier List	O		NR Carrier List 9.2.168	If included, the <i>Transmission Bandwidth</i> IE shall be ignored.	YES	ignore
>>>Intended TDD DL-UL Configuration NR	O		OCTET STRING	Contains the <i>Intended TDD DL-UL Configuration NR</i> IE as defined in TS 38.423 [49].	YES	ignore
Measurement Timing Configuration	M		OCTET STRING	Contains the <i>MeasurementTimingConfiguration</i> inter-node message for the served cell, as defined in TS 38.331 [31].	–	
Additional PLMNs		<i>0..<max noofAdditionalPLMNs></i>		Additional PLMNs in addition to the Served PLMNs	YES	reject
>PLMN Identity	M		9.2.4		–	
Broadcast PLMN Identity Info List NR		<i>0..<max noofextBPLMNs></i>		This IE corresponds to the <i>PLMN-IdentityInfoList</i> IE in <i>SIB1</i> as specified in TS 38.331 [31]. All PLMN Identities and associated information contained in the <i>PLMN-IdentityInfoList</i> IE are included and provided in the same order as broadcast in <i>SIB1</i> .	YES	ignore
>Broadcast PLMNs		<i>1..<max noofextBPLMNs></i>		Broadcast PLMN IDs in <i>SIB1</i> associated to the <i>NR Cell Identity</i> IE	–	
>>PLMN Identity	M		9.2.4		–	
>5GS-TAC	O		OCTET STRING (3)		–	
>NR Cell Identity	M		BIT STRING (SIZE(36))		–	
SSB Positions In Burst	O		9.2.169		YES	ignore
NR Cell PRACH Configuration	O		OCTET STRING	Containing 9.3.1.139 NR Cell PRACH Configuration as of TS 38.473 [44].	YES	ignore
CSI-RS Transmission Indication	O		ENUMERATED {activated, deactivated, ...}	This IE indicates the CSI-RS transmission status of the given cell.	YES	ignore
SFN Offset	O		9.2.175		YES	ignore

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.

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 <i>NR Cell Identity</i> IE value correspond to the value of the <i>en-gNB ID</i> IE contained in the <i>Global en-gNB ID</i> 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 <i>en-gNB ID</i>	M			
> <i>en-gNB ID</i>				
>> <i>en-gNB ID</i>	M		BIT STRING (SIZE(22..32))	Equal to the leftmost bits of the <i>NR Cell Identity</i> IE contained in the <i>NR CGI</i> 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.
> <i>Limited List</i>				
>>List of Requested NR Cells		1 .. < <i>maxCel</i> <i>linengN</i> <i>B</i> >		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.
> <i>Full List</i>				
>>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 or sidelink 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, ...)	<p>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 or SL subframes for sidelink transmission. The bit string may span across multiple contiguous subframes (maximum 40). The first position of the <i>UL Coordination Information</i> corresponds to subframe 0 in a radio frame where $SFN=0$. The length of the bit string is an integer multiple of N_{RB}^{UL}.</p> <p>N_{RB}^{UL} is defined in TS 36.211 [10].</p> <p>The UL Coordination Information is continuously repeated.</p>	–	

DL Coordination Information	O		BIT STRING (6..4400, ...)	<p>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.</p> <p>The bit string may span across multiple contiguous subframes (maximum 40). The first position of the <i>DL Coordination Information</i> corresponds to the receiving node's subframe 0 in a receiving node's radio frame where $SFN = 0$.</p> <p>The length of the bit string is an integer multiple of N_{RB}^{DL}.</p> <p>N_{RB}^{DL} is defined in TS 36.211 [10].</p> <p>The DL Coordination Information is continuously repeated.</p>	–	
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, ...)	<p>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.</p> <p>The bit string may span across multiple contiguous subframes (maximum 40). The first position of the <i>UL Coordination Information</i> corresponds to the receiving node's subframe 0 in a receiving node's radio frame where $SFN = 0$.</p> <p>The length of the bit string is an integer multiple of N_{RB}^{UL}. N_{RB}^{UL} is defined in TS 36.211 [10]. The UL Coordination Information is continuously repeated.</p>	–	

DL Coordination Information	O		BIT STRING (6..4400, ...)	<p>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.</p> <p>The bit string may span across multiple contiguous subframes (maximum 40). The first position of the <i>DL Coordination Information</i> corresponds to the receiving node's subframe 0 in a receiving node's radio frame where $SFN = 0$.</p> <p>The length of the bit string is an integer multiple of N_{RB}^{DL}.</p> <p>N_{RB}^{DL} is defined in TS 36.211 [10].</p> <p>The DL Coordination Information is continuously repeated.</p>	–	
EUTRA Cell ID	O		ECGI 9.2.14	Reference cell for <i>UL Coordination Information IE</i> and <i>DL Coordination Information IE</i> .	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-Unidirectional-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 .. <maxno ofbearers >			EACH	reject
>E-RAB ID	M		9.2.23		-	
>Secondary RAT Type	M		ENUMERATED (nR, ..., nR-unlicensed)		-	
>E-RAB Usage Report List		1			-	
>>E-RAB Usage Report Item		1.. <maxno oftime periods >			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 <i>Usage Count UL</i> IE and <i>Usage Count DL</i> 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 <i>Usage Count UL</i> IE and <i>Usage Count DL</i> 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	Assignment Criticality
Container for application layer measurement configuration	M		Octet string (1..1000)	Indicates application layer measurement configuration, see Annex L in [36].	-	
CHOICE <i>Area Scope of QMC</i>	M				-	
> <i>Cell based</i>						
>> Cell ID List for QMC		1 .. <maxno of CellID for QMC>				
>>>E-CGI	M		9.2.1.38		-	
> <i>TA based</i>						
>> TA List for QMC		1 .. <maxno of TA for QMC>				
>>>TAC	M		9.2.3.7	The TAI is derived using the current serving PLMN.	-	
> <i>TAI based</i>					-	
>> TAI List for QMC		1 .. <maxno of TA for QMC>			-	
>>>TAI	M		9.2.3.16		-	
> <i>PLMN area based</i>						
>> PLMN List for QMC		1 .. <maxno of PLMN for QMC>				
>>>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	Criticality	Assigned Criticality
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		–	
Carrier List	O		NR Carrier List 9.2.168	If included, the SUL Transmission Bandwidth IE shall be ignored.	YES	ignore
Frequency Shift 7p5khz	O		ENUMERATED (false, true, ...)	Indicate whether the value of Δ_{shift} is 0kHz or 7.5kHz when calculating $F_{\text{REF,shift}}$ as defined in Section 5.4.2.1 of TS 38.104 [37].	YES	ignore

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.	-	

<p>>>Intra-PRB Protected Resource Footprint</p>	M		<p>BIT STRING (84, ...)</p>	<p>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.</p>		
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>>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 <i>Shared Resource Type</i>	M				-	
>UL <i>Only Sharing</i>						
>>UL Resource Bitmap	M		Data Traffic Resources 9.2.127		-	
>UL <i>and DL Sharing</i>						
>>CHOICE <i>UL Resources</i>	M					
>>> <i>Unchanged</i>			NULL			
>>> <i>Changed</i>						
>>>>UL Resource Bitmap	M		Data Traffic Resources 9.2.127			
>>CHOICE <i>DL Resources</i>	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 <i>Reserved Subframe Pattern</i> 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		This IE is present if the <i>Bluetooth Measurement Configuration</i> IE is set to "Setup".
>Bluetooth Measurement Configuration Name Item		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		This IE is present if the <i>WLAN Measurement Configuration</i> IE is set to "Setup".
>WLAN Measurement Configuration Name Item		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 <i>Time of Day Start</i> 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 <i>LogicalChannelIdentity</i> 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, ...)	

9.2.144 NB-IoT UL DL Alignment Offset

This IE is used to indicate the offset between the UL carrier frequency center with respect to DL carrier frequency center.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
NB-IoT UL DL Alignment Offset	M		ENUMERATED (-7.5, 0, 7.5, ...)	Unit: kHz

9.2.145 Lower Layer presence status change

This IE is used to indicate that lower layer resources' presence status shall be changed. If the presence status is set to "release lower layers" or "suspend lower layers", PDCP entities, X2-U bearer resources, S1-U bearer resources and UE context information shall be kept.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Lower Layer presence status change	M		ENUMERATED (release lower layers, re-establish lower layers, suspend lower layers, resume lower layers ...)	"re-establish lower layers" shall be only set after "release lower layers" has been indicated. "resume lower layers" shall restore SCG. "resume lower layers" shall be only set after "suspend lower layers" has been indicated.

9.2.146 Cell and Capacity Assistance Information

The *Cell and Capacity Assistance Information* IE is used by the eNB to request information about NR or E-UTRA cells and it includes information about cell list size capacity.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Maximum Cell List Size	O		9.2.147	
Cell Assistance Information	O		9.2.115	

9.2.147 Maximum Cell List Size

This IE indicates the maximum size the sending node can handle for a given list.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Maximum Cell List Size	M		INTEGER (0..16384, ...)	

9.2.148 Message Oversize Notification

This IE indicates the maximum number of cells that can be received in the *List of Served Cells NR* IE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Maximum Cell List Size	M		9.2.147			

9.2.149 TNL Transport Layer Address Info

This IE is used for signalling IP addresses of IP-Sec endpoints used for establishment of IP-Sec tunnels.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Transport UP Layer Addresses Info to Add List		0..1		
>Transport UP Layer Addresses Info to Add Item		1..<maxnoofTLAs>		
>>IP-Sec Transport Layer Address	M		BIT STRING(1..160, ...)	Transport Layer Addresses for IP-Sec endpoint.
>>GTP Transport Layer Addresses To Add List		0..1		
>>>GTP Transport Layer Addresses To Add Item		1..<maxnoofGTPTLAs>		
>>>>GTP Transport Layer Address Info	M		BIT STRING (1..160, ...)	GTP Transport Layer Addresses for GTP end-points.
Transport UP Layer Addresses Info to Remove List		0..1		
>Transport UP Layer Addresses Info to Remove Item		1..<maxnoofTLAs>		
>>IP-Sec Transport Layer Address	M		BIT STRING (1..160, ...)	Transport Layer Addresses for IP-Sec endpoint.
>>GTP Transport Layer Addresses To Remove List		0..1		
>>>GTP Transport Layer Addresses To Remove Item		1..<maxnoofGTPTLAs>		
>>>>GTP Transport Layer Address Info	M		BIT STRING (1..160, ...)	GTP Transport Layer Addresses for GTP end-points.

Range bound	Explanation
maxnoofTLAs	Maximum no. of Transport Layer Addresses in the message. Value is 16
maxnoofGTPTLAs	Maximum no. of GTP Transport Layer Addresses for a GTP end-point in the message. Value is 16.

9.2.150 CP Transport Layer Information

This element is used to provide the transport layer information associated with EN-DC X2 control plane transport.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>CP Transport Layer Information</i>				
> <i>Endpoint-IP-address</i>				
>>Endpoint IP Address	M		BIT STRING (1..160, ...)	
> <i>Endpoint-IP-address-and-port</i>				
>>Endpoint IP Address	M		BIT STRING (1..160, ...)	
>>Port Number	M		OCTET STRING (SIZE(2))	

9.2.151 TNL Association Usage

This IE indicates the usage of the TNL association.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TNL Association Usage	O		ENUMERATED (ue, non-ue, both, ...)	Indicates whether the TNL association is only used for UE-associated signalling, or non-UE-associated signalling, or both.

9.2.152 RAN UE NGAP ID

This IE uniquely identifies the UE association over the NG interface within the NG-RAN node, as specified in TS 38.413 [39].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RAN UE NGAP ID	M		INTEGER (0..2 ³² -1)	

9.2.153 EPC Handover Restriction List Container

This IE contains the *Handover Restriction List* IE specified in TS 36.413 [4] as received by the E-UTRAN from the EPC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
EPC Handover Restriction List Container	M		OCTET STRING	The octets of the OCTET STRING are encoded according to the specifications of the Handover Restriction List IE specified in TS 36.413 [4].

9.2.154 DAPS Request Information

The *DAPS Indicator* IE indicates that the source eNB requests a DAPS HO for the concerned E-RAB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DAPS Indicator	M		ENUMERATED (DAPS HO required, ...)	Indicates that DAPS HO is requested

9.2.155 DAPS Response Information

The *DAPS Response Indicator* IE indicates the response to a requested DAPS Handover for the concerned E-RAB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DAPS Response Indicator	M		ENUMERATED (DAPS HO accepted, DAPS HO not accepted, ...)	Indicates that DAPS Handover is accepted or not.

9.2.156 Maximum Number of CHO Preparations

This IE indicates the maximum number of concurrently prepared CHO candidate cells for a UE at a candidate target eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Maximum Number of CHO Preparations	M		INTEGER (1..8, ...)	

9.2.157 Ethernet Type

This IE is used to indicate that Ethernet data is expected.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Ethernet Type	M		ENUMERATED (True, ...)	

9.2.158 NR V2X Services Authorized

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description
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.

9.2.159 NR UE Sidelink Aggregate Maximum Bit Rate

This IE provides information on the Aggregate Maximum Bitrate of the UE's sidelink communication for NR V2X services.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NR UE Sidelink Aggregate Maximum Bit Rate	M		Bit Rate 9.2.97	Value 0 shall be considered as a logical error by the receiving eNB.

9.2.160 PC5 QoS Parameters

This IE provides information on the PC5 QoS parameters of the UE's sidelink communication for NR PC5.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PC5 QoS Flow List		1		
>PC5 QoS Flow Item		1..<maxno ofPC5QoS Flows>		
>>PQI	M		INTEGER (0..255, ...)	PQI is a special 5QI as specified in TS 23.501 [9].
>>PC5 Flow Bit Rates	O			Only applies for GBR QoS Flows.
>>>Guaranteed Flow Bit Rate	M		Bit Rate 9.2.11	Guaranteed Bit Rate for the PC5 QoS flow. Details in TS 23.501 [9].
>>>Maximum Flow Bit Rate	M		Bit Rate 9.2.11	Maximum Bit Rate for the PC5 QoS flow. Details in TS 23.501 [9].
>>Range	O		ENUMERATED (m50, m80, m180, m200, m350, m400, m500, m700, m1000, ...)	Only applies for groupcast.
PC5 Link Aggregated Bit Rates	O		Bit Rate 9.2.11	Only applies for non-GBR QoS Flows.

Range bound	Explanation
maxnoofPC5QoSFlows	Maximum no. of PC5 QoS flows allowed towards one UE. Value is 2048.

9.2.161 TNL Capacity Indicator

The *TNL Capacity Indicator* IE indicates the available capacity of the Transport Network experienced by the NR cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL TNL Maximum Offered Capacity	M		INTEGER (1.. 16777216,...)	Maximum capacity offered by the transport portion of the cell in kbps
DL TNL Available Capacity	M		INTEGER (0.. 100,...)	Available capacity over the transport portion serving the cell in percentage relative to the <i>DL TNL Maximum Offered Capacity</i> . Value 100 corresponds to the Maximum offered capacity.
UL TNL Maximum Offered Capacity	M		INTEGER (1.. 16777216,...)	Maximum capacity offered by the transport portion of the cell in kbps
UL TNL Available Capacity	M		INTEGER (0.. 100,...)	Available capacity over the transport portion serving the cell in percentage relative to the <i>DL TNL Maximum Offered Capacity</i> . Value 100 corresponds to the Maximum offered capacity.

9.2.162 NR Radio Resource Status

The *NR Radio Resource Status* IE indicates the usage of the PRBs per cell and per SSB area for all traffic in Downlink and Uplink and the usage of PDCCH CCEs for Downlink and Uplink scheduling.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
SSB Area Radio Resource Status List		1		
>SSB Area Radio Resource Status Item		1..<maxnoofSSBAreas		
>>SSB Index	M		9.2.167	
>>SSB Area DL GBR PRB usage	M		INTEGER (0..100)	Per SSB area DL GBR PRB usage
>>SSB Area UL GBR PRB usage	M		INTEGER (0..100)	Per SSB area UL GBR PRB usage
>>SSB Area DL non-GBR PRB usage	M		INTEGER (0..100)	Per SSB area DL non-GBR PRB usage
>>SSB Area UL non-GBR PRB usage	M		INTEGER (0..100)	Per SSB area UL non-GBR PRB usage
>>SSB Area DL Total PRB usage	M		INTEGER (0..100)	Per SSB area DL Total PRB usage
>>SSB Area UL Total PRB usage	M		INTEGER (0..100)	Per SSB area UL Total PRB usage
>>DL scheduling PDCCH CCE usage	O		INTEGER (0..100)	
>>UL scheduling PDCCH CCE usage	O		INTEGER (0..100)	

Range bound	Explanation
maxnoofSSBAreas	Maximum no. SSB Areas that can be served by a NG-RAN node cell. Value is 64.

9.2.163 NR Composite Available Capacity Group

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Composite Available Capacity Downlink	M		NR Composite Available Capacity 9.2.164	For the Downlink
Composite Available Capacity Uplink	M		NR Composite Available Capacity 9.2.164	For the Uplink

9.2.164 NR Composite Available Capacity

The *NR 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
Cell Capacity Class Value	O		NR Cell Capacity Class Value 9.2.165	
Capacity Value	M		NR Capacity Value 9.2.166	

9.2.165 NR Cell Capacity Class Value

The *NR Cell Capacity Class Value* IE indicates the value that classifies the cell capacity with regards to the other cells. The *NR 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
NR 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.

9.2.166 NR Capacity Value

The *NR Capacity Value* IE indicates the amount of resources per cell and per SSB area that are available relative to the total en-gNB resources. The capacity value should be measured and reported so that the minimum en-gNB resource usage of existing services is reserved according to implementation. The *NR 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
Capacity Value	M		INTEGER (0..100)	Value 0 shall indicate no available capacity, and 100 shall indicate maximum available capacity with respect to the whole cell. Capacity Value should be measured on a linear scale.
SSB Area Capacity Value List		0..1		
>SSB Area Capacity Value Item		1..<max noofSS BAreas >		
>>SSB Index	M		9.2.167	
>>SSB Area Capacity Value	M		INTEGER (0..100)	Value 0 shall indicate no available capacity, and 100 shall indicate maximum available capacity . SSB Area Capacity Value should be measured on a linear scale.

Range bound	Explanation
-------------	-------------

<i>maxnoofSSBAreas</i>	Maximum no. SSB Areas that can be served by a NG-RAN node cell. Value is 64.
------------------------	--

9.2.167 SSB Index

The *SSB Index* IE identify an SSB area of an NR cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
SSB Index	M		INTEGER (0..63)	

9.2.168 NR Carrier List

This IE indicates the SCS-specific carriers per TDD, per DL, per UL or per SUL of an NR cell.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
NR Carrier Item		<i>1..<maxnoofNRSCSs></i>		
>NR SCS	M		ENUMERATED (scs15, scs30, scs60, scs120, ...)	SCS for the corresponding carrier.
>Offset to Carrier	M		INTEGER (0..2199, ...)	Offset in frequency domain between Point A (lowest subcarrier of common RB 0) and the lowest usable subcarrier on this carrier in number of PRBs (using the <i>NR SCS</i> IE defined for this carrier). The maximum value corresponds to $275 \times 8 - 1$. See TS 38.211 [42], clause 4.4.2.
>Carrier Bandwidth	M		INTEGER (1..maxnoofNRPhysicalResourceBlocks, ...)	Width of this carrier in number of PRBs (using the <i>NR SCS</i> IE defined for this carrier). See TS 38.211 [42], clause 4.4.2.

Range bound	Explanation
maxnoofNRSCSs	Maximum no. of SCS-specific carriers per TDD, per DL, per UL or per SUL of an NR cell. Value is 5.
maxnoofNRPhysicalResourceBlocks	Maximum no. of Physical Resource Blocks of an NR Cell. Value is 275.

9.2.169 SSB Positions In Burst

Indicates the time domain positions of the transmitted SS-blocks in a half frame with SS/PBCH blocks as defined in TS 38.213 [43], clause 4.1.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>ssb-PositionsInBurst</i>	M			The first/ leftmost bit corresponds to SS/PBCH block index 0, the second bit corresponds to SS/PBCH block index 1, and so on. Value 0 in the bitmap indicates that the corresponding SS/PBCH block is not transmitted while value 1 indicates that the corresponding SS/PBCH block is transmitted.
> <i>ShortBitmap</i>				
>>ShortBitmap	M		BIT STRING (SIZE(4))	
> <i>MediumBitmap</i>				
>>MediumBitmap	M		BIT STRING (SIZE(8))	
> <i>LongBitmap</i>				
>>LongBitmap	M		BIT STRING (SIZE(64))	

9.2.170 NPRACH Configuration

This IE indicates the NPRACH Configuration.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>FDDorTDD</i>	M			
> <i>FDD</i>				
>>NPRACH-CP-Length	M	ENUMERATED {us66dot7, us266dot7, ...}		
>>Anchor Carrier NPRACH Configuration	M		OCTET STRING	Includes the <i>NPRACH-ParametersList-NB-r13</i> IE as defined in 6.7.3.2 of TS 36.331 [9].
>>Anchor Carrier EDT NPRACH Configuration	O		OCTET STRING	Includes the <i>NPRACH-ParametersList-NB-r14</i> IE as defined in 6.7.3.2 of TS 36.331 [9].
>>Anchor Carrier Format 2 NPRACH Configuration	O		OCTET STRING	Includes the <i>NPRACH-ParametersListFmt2-NB-r15</i> IE as defined in 6.7.3.2 of TS 36.331 [9].
>>Anchor Carrier Format 2 EDT NPRACH Configuration	O		OCTET STRING	Includes the <i>NPRACH-ParametersListFmt2-NB-r15</i> IE as defined in 6.7.3.2 of TS 36.331 [9].
>>Non Anchor Carrier NPRACH Configuration	O		OCTET STRING	Includes the <i>UL-ConfigCommonList-NB-r14</i> IE as defined in 6.7.3.1 of TS 36.331 [9].
>>Non Anchor Carrier Format 2 NPRACH Configuration	O		OCTET STRING	Includes the <i>UL-ConfigCommonList-NB-v1530</i> IE as defined in 6.7.3.1 of TS 36.331 [9].
> <i>TDD</i>				
>>nprach-PreambleFormat	M	ENUMERATED {fmt0, fmt1, fmt2, fmt0-a, fmt1-a, ...}		
>>Anchor Carrier NPRACH Configuration TDD	M		OCTET STRING	Includes the <i>NPRACH-ParametersListTDD-NB-r15</i> IE as defined in 6.7.3.2 of TS 36.331 [9].
>>Non Anchor Carrier Frequency Configuration list		<i>0..< maxnoofNonAnchorCarrierFreqConfig></i>		
>>> Non Anchor Carrier Frequency	M		OCTET STRING	Includes the <i>DL-CarrierConfigCommon-NB-r14</i> IE as defined in 6.7.3.2 of TS 36.331 [9].
>>Non Anchor Carrier NPRACH Configuration TDD	O		OCTET STRING	Includes the <i>UL-ConfigCommonListTDD-NB-r15</i> IE as defined in 6.7.3.1 of TS 36.331 [9].

Range bound	Explanation
maxnoofNonAnchorCarrierFreqConfig	Maximum no. of non-Anchor Carrier Frequency Configurations. Value is 15.

9.2.171 UE Radio Capability ID

This IE contains the UE Capability ID as defined in TS 23.003[29].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Radio Capability ID	M		OCTET STRING	

9.2.172 QoS Mapping Information

This IE indicates the DSCP and/or IPv6 Flow Label field(s) of IP packets sent in the corresponding GTP-U tunnel for IAB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DSCP	O		BIT STRING (SIZE(6))	
Flow label	O		BIT STRING (SIZE(20))	

9.2.173 UE Radio Capability

This IE contains UE Radio Capability information.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UE Radio Capability	M		OCTET STRING	Includes the <i>UERadioAccessCapabilityInformation</i> message as defined in 10.2.2 of TS 36.331 [9].

9.2.174 URI

This IE is a URI.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
URI	M		VisibleString	String representing URI (Uniform Resource Identifier)

9.2.175 SFN Offset

This IE contains the time offset between an absolute time reference and the SFN0 start. The IE is calculated assuming that the SFN transmission started at the absolute time reference. The absolute time reference chosen is 1980-01-06 T00:00:19 International Atomic Time (TAI).

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
SFN Time Offset	M		BIT STRING (SIZE(24))	Time offset in microseconds between the absolute time reference "1980-01-06 T00:00:19 International Atomic Time (TAI)" and the SFN0 start. The maximum usable value is $(1024 \cdot 10^4 - 1)$. Values higher than the maximum are discarded.		

9.2.176 Global RAN Node ID

This IE is used to globally identify an NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>NG-RAN node</i>	M			
> <i>gNB</i>				
>>Global gNB ID	M		Global en-gNB ID 9.2.112	

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,
HandoverSuccess,
EarlyStatusTransfer,
ConditionalHandoverCancel,
ENDCResourceStatusRequest,
ENDCResourceStatusResponse,
ENDCResourceStatusFailure,
ENDCResourceStatusUpdate,
CellTrafficTrace,
FlCTrafficTransfer,
UERadioCapabilityIDMappingRequest,
UERadioCapabilityIDMappingResponse

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,
id-handoverSuccess,
id-earlyStatusTransfer,
id-conditionalHandoverCancel,
id-endcresourceStatusReporting,
id-endcresourceStatusReportingInitiation,
id-cellTrafficTrace,
id-flCTrafficTransfer,
id-UERadioCapabilityIDMapping

```

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
endcresourceStatusReportingInitiation
uERadioCapabilityIDMapping
...
}

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
handoverSuccess
earlyStatusTransfer

```

```

conditionalHandoverCancel      |
endcresourceStatusReporting    |
cellTrafficTrace               |
flCTrafficTransfer             |
...                             |
}
-- *****
--
-- 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
}

handoverSuccess X2AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE    HandoverSuccess
  PROCEDURE CODE        id-handoverSuccess
  CRITICALITY           ignore
}

earlyStatusTransfer X2AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE    EarlyStatusTransfer
  PROCEDURE CODE        id-earlyStatusTransfer
  CRITICALITY           ignore
}

conditionalHandoverCancel X2AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE    ConditionalHandoverCancel
  PROCEDURE CODE        id-conditionalHandoverCancel
  CRITICALITY           ignore
}

endcresourceStatusReportingInitiation X2AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE    ENDCResourceStatusRequest
  SUCCESSFUL OUTCOME    ENDCResourceStatusResponse
}
```

```

    UNSUCCESSFUL OUTCOME      ENDCResourceStatusFailure
    PROCEDURE CODE             id-endcresourceStatusReportingInitiation
    CRITICALITY                reject
}

endcresourceStatusReporting  X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE        ENDCResourceStatusUpdate
    PROCEDURE CODE            id-endcresourceStatusReporting
    CRITICALITY               ignore
}

cellTrafficTrace X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE        CellTrafficTrace
    PROCEDURE CODE            id-cellTrafficTrace
    CRITICALITY               ignore
}

flcTrafficTransfer          X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE        FlcTrafficTransfer
    PROCEDURE CODE            id-flcTrafficTransfer
    CRITICALITY               ignore
}

uERadioCapabilityIDMapping X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE        UERadioCapabilityIDMappingRequest
    SUCCESSFUL OUTCOME        UERadioCapabilityIDMappingResponse
    PROCEDURE CODE            id-UERadioCapabilityIDMapping
    CRITICALITY               reject
}

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,  
E-RABsSubjectToDLDiscarding-List,  
E-RABsSubjectToEarlyStatusTransfer-List,  
ECGI,  
E-RAB-ID,  
E-RAB-Level-QoS-Parameters,  
E-RAB-List,  
EUTRANTraceID,  
GlobalENB-ID,  
GTPtunnelEndpoint,  
GUGroupIDList,  
GUMMEI,  
HandoverReportType,  
HandoverRestrictionList,  
Masked-IMEISV,  
InvokeIndication,  
LocationReportingInformation,  
LowerLayerPresenceStatusChange,  
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,
CSIRReportList,
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,
SNtriggered,
EPCHandoverRestrictionListContainer,
AdditionalRRMPriorityIndex,
RequestedFastMCGRecoveryViaSRB3,
AvailableFastMCGRecoveryViaSRB3,
RequestedFastMCGRecoveryViaSRB3Release,
ReleaseFastMCGRecoveryViaSRB3,
FastMCGRecovery,
PartialListIndicator,
MaximumCellListSize,
MessageOversizeNotification,
TNLConfigurationInfo,
TNLA-To-Add-List,
TNLA-To-Update-List,
TNLA-To-Remove-List,
TNLA-Setup-List,
TNLA-Failed-To-Setup-List,
RAN-UE-NGAP-ID,
CHOinformation-REQ,
CHOinformation-ACK,
DAPSRequestInfo,
DAPSResponseInfo,
CandidateCellsToBeCancelledList,
CHO-DC-EarlyDataForwarding,
CHO-DC-Indicator,
Ethernet-Type,
NRV2XServicesAuthorized,
NRUESidelinkAggregateMaximumBitRate,
PC5QoSParameters,
TargetCellInNGRAN,
Measurement-ID-ENDC,
Registration-Request-ENDC,
ReportCharacteristics-ENDC,
NRRadioResourceStatus,
TNLCapacityIndicator,
NRCompositeAvailableCapacityGroup,
SSBIndex,
TDDULDLConfigurationCommonNR,
NRCarrierList,
SSB-PositionsInBurst,
NRCellPRACHConfig,
NBioT-RLF-Report-Container,
PrivacyIndicator,
UERadioCapabilityID,
CSI-RSTransmissionIndication,
IABNodeIndication,
FLCTrafficContainer,
IntendedTDD-DL-ULConfiguration-NR,
UERadioCapability,
SFN-Offset,

IMSvoiceEPSfallbackfrom5G,
Global-RAN-NODE-ID,
DirectForwardingPathAvailability,
TraceCollectionEntityIPAddress

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-NR-ENDC,
id-CellMeasurementResult-Item,
id-CellMeasurementResult-NR-ENDC-Item,
id-CellMeasurementResult-E-UTRA-ENDC,
id-CellMeasurementResult-E-UTRA-ENDC-Item,
id-CellToReport,
id-CellToReport-E-UTRA-ENDC,
id-CellToReport-NR-ENDC,
id-CellToReport-Item,
id-CellToReport-E-UTRA-ENDC-Item,
id-CellToReport-NR-ENDC-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-IMSvoiceEPSfallbackfrom5G,
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-RRConnSetupIndicator,
id-RRConnReestabIndicator,

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-RSRPMLList,
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-ServedEUTRAcellsToModifyListENDCCConfUpd,
id-ServedEUTRAcellsToDeleteListENDCCConfUpd,
id-ServedNRcellsToModifyListENDCCConfUpd,
id-ServedNRcellsToDeleteListENDCCConfUpd,
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-secondarysgNBDLGTPEIDatPDCP,
id-secondarymeNBULGTPEIDatPDCP,
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,
id-SNtriggered,
id-EPCHandoverRestrictionListContainer,
id-ERABs-transferred-to-MeNB,
id-AdditionalRRMPriorityIndex,
id-LowerLayerPresenceStatusChange,
id-FastMCGRecovery-SN-to-MN,
id-FastMCGRecovery-MN-to-SN,
id-RequestedFastMCGRecoveryViaSRB3,
id-AvailableFastMCGRecoveryViaSRB3,
id-RequestedFastMCGRecoveryViaSRB3Release,
id-ReleaseFastMCGRecoveryViaSRB3,
id-PartialListIndicator,
id-MaximumCellListSize,
id-MessageOversizeNotification,
id-CellandCapacityAssistInfo,
id-TNLConfigurationInfo,
id-TNLA-To-Add-List,
id-TNLA-To-Update-List,
id-TNLA-To-Remove-List,
id-TNLA-Setup-List,
id-TNLA-Failed-To-Setup-List,

id-UEContextReferenceatSourceNGRAN,
id-CHOinformation-REQ,
id-CHOinformation-ACK,
id-DAPSRequestInfo,
id-RequestedTargetCellID,
id-CandidateCellsToBeCancelledList,
id-DAPSResponseInfo,
id-ProcedureStage,
id-CHO-DC-EarlyDataForwarding,
id-CHO-DC-Indicator,
id-Ethernet-Type,
id-NRV2XServicesAuthorized,
id-NRUESidelinkAggregateMaximumBitRate,
id-PC5QoSParameters,
id-TargetCellInNGRAN,
id-E-UTRAN-Node1-Measurement-ID,
id-E-UTRAN-Node2-Measurement-ID,
id-TDDULDLConfigurationCommonNR,
id-CarrierList,
id-ULCarrierList,
id-SSB-PositionsInBurst,
id-NRCellPRACHConfig,
id-NBIoT-RLF-Report-Container,
id-MDTConfigurationNR,
id-PrivacyIndicator,
id-TraceCollectionEntityIPAddress,
id-UERadioCapabilityID,
id-CSI-RSTransmissionIndication,
id-DLCarrierList,
id-IABNodeIndication,
id-F1CTrafficContainer,
id-IntendedTDD-DL-ULConfiguration-NR,
id-UERadioCapability,
id-SFN-Offset,
id-DirectForwardingPathAvailability,
id-sourceNG-RAN-node-id,
id-SourceDLForwardingIPAddress,
id-SourceNodeDLForwardingIPAddress,
maxCellineNB,
maxnoofBearers,
maxnoofPDCP-SN,
maxFailedMeasObjects,
maxnoofCellIDforMDT,
maxnoofTAforMDT,
maxCellineNB,
maxnoofCellIDforQMC,
maxnoofTAforQMC,
maxnoofPLMNforQMC,
maxnoofProtectedResourcePatterns,
maxnoNRcellsSpectrumSharingWithE-UTRA,
maxnoofNrCellBands,
maxnoofSSBAreas

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} |
  { ID id-CHOinformation-REQ           CRITICALITY ignore TYPE CHOinformation-REQ      PRESENCE optional} |
  { ID id-NRV2XServicesAuthorized      CRITICALITY ignore TYPE NRV2XServicesAuthorized    PRESENCE optional} |
  { ID id-PC5QoSParameters             CRITICALITY ignore TYPE PC5QoSParameters        PRESENCE optional} |
  { ID id-IABNodeIndication            CRITICALITY reject TYPE IABNodeIndication        PRESENCE optional} |
  ...
}
```

```
UE-ContextInformation ::= SEQUENCE {
  mME-UE-SLAP-ID          UE-SLAP-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 }|
{ ID id-EPCHandoverRestrictionListContainer CRITICALITY ignore  EXTENSION EPCHandoverRestrictionListContainer PRESENCE optional }|
{ ID id-AdditionalRRMPriorityIndex         CRITICALITY ignore  EXTENSION AdditionalRRMPriorityIndex         PRESENCE optional }|
{ ID id-NRUESidelinkAggregateMaximumBitRate CRITICALITY ignore  EXTENSION NRUESidelinkAggregateMaximumBitRate PRESENCE optional }|
{ ID id-UERadioCapabilityID                CRITICALITY reject  EXTENSION UERadioCapabilityID                PRESENCE optional }|
{ ID id-IMSvoiceEPSfallbackfrom5G          CRITICALITY ignore  EXTENSION IMSvoiceEPSfallbackfrom5G          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 }|
{ ID id-DAPSRequestInfo    CRITICALITY ignore  EXTENSION DAPSRequestInfo    PRESENCE optional }|
{ ID id-Ethernet-Type      CRITICALITY ignore  EXTENSION Ethernet-Type      PRESENCE optional }|
{ ID id-SourceDLForwardingIPAddress  CRITICALITY ignore  EXTENSION TransportLayerAddress  PRESENCE optional},
...
}

MobilityInformation ::= BIT STRING (SIZE(32))

SourceDLForwardingIPAddress ::= BIT STRING (SIZE(1..160, ...))

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      GlobalSgNB-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}--
The id-SeNB-UE-X2AP-ID-Extension shall not be sent and shall be ignored, if received.--|
    { 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}|
    { ID id-ERABs-transferred-to-MeNB    CRITICALITY ignore TYPE E-RAB-List      PRESENCE optional}|
    { ID id-CHOinformation-ACK           CRITICALITY ignore TYPE CHOinformation-ACK 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 ::= {
  { ID id-DAPSResponseInfo          CRITICALITY reject  EXTENSION DAPSResponseInfo          PRESENCE optional},
  ...
}

-- *****
--
-- 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}|
  { ID id-RequestedTargetCellID       CRITICALITY reject  TYPE ECGI                 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}}|
    { ID id-TargetCellInNGRAN                CRITICALITY ignore  TYPE TargetCellInNGRAN  PRESENCE conditional} -
- The IE shall be present if the Handover Report Type IE is set to "interSystemPingpong" --,
    ...
}

-- *****
--
-- EARLY STATUS TRANSFER
--
-- *****

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

EarlyStatusTransfer-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-ProcedureStage               CRITICALITY reject  TYPE ProcedureStageChoice PRESENCE mandatory}}|
    { ID id-SgNB-UE-X2AP-ID              CRITICALITY ignore  TYPE SgNB-UE-X2AP-ID     PRESENCE optional},
    ...
}

ProcedureStageChoice ::= CHOICE {
    first-dl-count          FirstDLCount,
    dl-discarding           DLDiscarding,
    choice-extension        ProtocolIE-Single-Container { {ProcedureStageChoice-ExtIEs} }
}

ProcedureStageChoice-ExtIEs X2AP-PROTOCOL-IES ::= {
    ...
}

FirstDLCount ::= SEQUENCE {
    e-RABsSubjectToEarlyStatusTransfer E-RABsSubjectToEarlyStatusTransfer-List,
    IE-Extension                        ProtocolExtensionContainer { {FirstDLCount-ExtIEs} } OPTIONAL,
    ...
}

FirstDLCount-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

DLDiscarding ::= SEQUENCE {
    e-RABsSubjectToDLDiscarding-List          E-RABsSubjectToDLDiscarding-List,
    iE-Extension                               ProtocolExtensionContainer { {DLDiscarding-ExtIEs} } OPTIONAL,
    ...
}

DLDiscarding-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}
-- *****
--
-- 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}|
    { ID id-CandidateCellsToBeCancelledList CRITICALITY reject  TYPE CandidateCellsToBeCancelledList PRESENCE optional},
    ...
}

-- *****
--
-- HANDOVER SUCCESS
--
-- *****

HandoverSuccess ::= SEQUENCE {

```

```

    protocolIEs      ProtocolIE-Container    {{HandoverSuccess-IEs}},
    ...
}

HandoverSuccess-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 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-TargetCell-ID                CRITICALITY reject TYPE ECGI                PRESENCE mandatory}|
    ...
}

-- *****
--
-- CONDITIONAL HANDOVER CANCEL
--
-- *****

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

ConditionalHandoverCancel-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}|
    { ID id-CandidateCellsToBeCancelledList CRITICALITY reject TYPE CandidateCellsToBeCancelledList 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..maxCellInfoNB)) 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..maxCelllineNB)) 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..maxCelllineNB)) 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..maxCellLineNB)) 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..maxCellLineNB)) 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-RSRPMList                       CRITICALITY ignore EXTENSION RSRPMList 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-RRCCConnSetupIndicator  CRITICALITY reject TYPE RRCCConnSetupIndicator PRESENCE optional} |
    { ID id-RRCCConnReestabIndicator CRITICALITY ignore TYPE RRCCConnReestabIndicator PRESENCE optional} |
    { ID id-UE-RLF-Report-Container-for-extended-bands CRITICALITY ignore TYPE UE-RLF-Report-Container-for-extended-bands PRESENCE optional} |
    { ID id-NBIoT-RLF-Report-Container CRITICALITY ignore TYPE NBIoT-RLF-Report-Container 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} |
    { ID id-BearerType              CRITICALITY ignore EXTENSION BearerType              PRESENCE optional} |
    { ID id-Ethernet-Type           CRITICALITY ignore EXTENSION Ethernet-Type           PRESENCE optional} |
    { ID id-SourceDLForwardingIPAddress  CRITICALITY ignore EXTENSION TransportLayerAddress  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 ::= {
    { ID id-SourceDLForwardingIPAddress  CRITICALITY ignore EXTENSION TransportLayerAddress  PRESENCE optional},
    ...
}

-- *****

```

```

--
-- 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 ::= {
    { ID id-SourceDLForwardingIPAddress CRITICALITY ignore EXTENSION TransportLayerAddress PRESENCE optional},
    ...
}

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 ::= {
    { ID id-SourceDLForwardingIPAddress          CRITICALITY ignore EXTENSION TransportLayerAddress PRESENCE optional},
    ...
}

-- *****
--
-- 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}|
    { ID id-BearerType              CRITICALITY ignore EXTENSION BearerType            PRESENCE optional}|
    { ID id-Ethernet-Type           CRITICALITY ignore EXTENSION Ethernet-Type        PRESENCE optional}|
    { ID id-SourceDLForwardingIPAddress CRITICALITY ignore EXTENSION TransportLayerAddress 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 ::= {
    { ID id-SourceDLForwardingIPAddress          CRITICALITY ignore EXTENSION TransportLayerAddress PRESENCE optional},
    ...
}

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     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 ::= {
    { ID id-SourceDLForwardingIPAddress    CRITICALITY ignore  EXTENSION TransportLayerAddress    PRESENCE optional},
    ...
}

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 ::= {
    { ID id-SourceDLForwardingIPAddress    CRITICALITY ignore  EXTENSION TransportLayerAddress    PRESENCE optional},
    ...
}

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}|
-- Allocated at the new eNB.
-- This IE contains an Extended eNB UE X2AP ID, which, together with the New eNB UE X2AP ID IE
-- represents the eNB UE X2AP ID allocated at the new eNB.
    { 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}|
    { ID id-NRV2XServicesAuthorized      CRITICALITY ignore  TYPE NRV2XServicesAuthorized PRESENCE optional}|
    { ID id-PC5QoSParameters            CRITICALITY ignore  TYPE PC5QoSParameters    PRESENCE optional}|
    ...
}

```

```

UE-ContextInformationRetrieve ::= SEQUENCE {
    mME-UE-SlAP-ID                UE-SlAP-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 } |
    { ID id-AdditionalRRMPriorityIndex          CRITICALITY ignore EXTENSION AdditionalRRMPriorityIndex          PRESENCE optional } |
    { ID id-EPCHandoverRestrictionListContainer CRITICALITY ignore EXTENSION EPCHandoverRestrictionListContainer PRESENCE optional } |
    { ID id-NRUESidelinkAggregateMaximumBitRate CRITICALITY ignore EXTENSION NRUESidelinkAggregateMaximumBitRate PRESENCE optional } |
    { ID id-UERadioCapabilityID                 CRITICALITY reject  EXTENSION UERadioCapabilityID                 PRESENCE optional } |
    { ID id-IMSvoiceEPSfallbackfrom5G          CRITICALITY ignore  EXTENSION IMSvoiceEPSfallbackfrom5G          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} |
    { ID id-Ethernet-Type           CRITICALITY ignore EXTENSION Ethernet-Type           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}|
  { ID id-AdditionalRRMPriorityIndex CRITICALITY ignore TYPE AdditionalRRMPriorityIndex PRESENCE optional}|
  { ID id-RequestedFastMCGRecoveryViaSRB3 CRITICALITY ignore TYPE RequestedFastMCGRecoveryViaSRB3 PRESENCE optional}|
  { ID id-UEContextReferenceatSourceNGRAN CRITICALITY ignore TYPE RAN-UE-NGAP-ID          PRESENCE optional}|
  { ID id-ManagementBasedMDTallowed CRITICALITY ignore TYPE ManagementBasedMDTallowed PRESENCE optional}|
  { ID id-ManagementBasedMDTPLMNList CRITICALITY ignore TYPE MDTPLMNList              PRESENCE optional}|
  { ID id-UERadioCapabilityID       CRITICALITY reject TYPE UERadioCapabilityID       PRESENCE optional}|
  { ID id-IABNodeIndication         CRITICALITY reject TYPE IABNodeIndication         PRESENCE optional}|
  { ID id-sourceNG-RAN-node-id      CRITICALITY ignore TYPE Global-RAN-NODE-ID      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}|
  { ID id-BearerType                   CRITICALITY ignore   EXTENSION BearerType      PRESENCE optional}|
  { ID id-Ethernet-Type                 CRITICALITY ignore   EXTENSION Ethernet-Type   PRESENCE optional}|
  { ID id-SourceDLForwardingIPAddress   CRITICALITY ignore   EXTENSION TransportLayerAddress PRESENCE optional}|
  { ID id-SourceNodeDLForwardingIPAddress CRITICALITY ignore   EXTENSION TransportLayerAddress 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-SgNBPDPCnotpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeAdded-SgNBAddReq-Item-SgNBPDPCnotpresentExtIEs 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 SplitsSRBs                PRESENCE optional } |
    { ID id-SgNBResourceCoordinationInformation CRITICALITY ignore TYPE SgNBResourceCoordinationInformation PRESENCE optional } |
    { ID id-RRConfigIndication         CRITICALITY reject TYPE RRC-Config-Ind          PRESENCE optional } |
    { ID id-LocationInformationSgNB    CRITICALITY ignore TYPE LocationInformationSgNB    PRESENCE optional } |
    { ID id-AvailableFastMCGRecoveryViaSRB3 CRITICALITY ignore TYPE AvailableFastMCGRecoveryViaSRB3 PRESENCE optional } |
    { ID id-DirectForwardingPathAvailability CRITICALITY ignore TYPE DirectForwardingPathAvailability 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 {
        sgNBPDPCpresent      E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDPCpresent,

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```

        sgNBPDPCNotpresent          E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDPCNotpresent,
        ...
    },
    iE-Extensions                    ProtocolExtensionContainer { {E-RABs-ToBeAdded-SgNBAddReqAck-ItemExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeAdded-SgNBAddReqAck-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDPCPresent ::= 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-SgNBPDPCPresentExtIEs} }
    OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDPCPresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-uLpDCPSnLength            CRITICALITY ignore EXTENSION PDCPSnLength          PRESENCE optional}|
    { ID id-dLPDCPSnLength            CRITICALITY ignore EXTENSION PDCPSnLength          PRESENCE optional}|
    { ID id-SourceDLForwardingIPAddress CRITICALITY ignore EXTENSION TransportLayerAddress PRESENCE optional},
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDPCNotpresent ::= SEQUENCE {
    sgNB-DL-GTP-TEIDatSCG             GTPTunnelEndpoint,
    secondary-sgNB-DL-GTP-TEIDatSCG   GTPTunnelEndpoint                                OPTIONAL,
    iE-Extensions                    ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDPCNotpresentExtIEs} }
    OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBAddReqAck-Item-SgNBPDPCNotpresentExtIEs 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} |
    { ID id-RequestedFastMCGRecoveryViaSRB3 CRITICALITY ignore    TYPE RequestedFastMCGRecoveryViaSRB3 PRESENCE optional} |
    { ID id-RequestedFastMCGRecoveryViaSRB3Release CRITICALITY ignore    TYPE RequestedFastMCGRecoveryViaSRB3Release PRESENCE optional} |
    { ID id-SNtriggered                     CRITICALITY ignore    TYPE SNtriggered               PRESENCE optional} |
    { ID id-IABNodeIndication              CRITICALITY reject    TYPE IABNodeIndication        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} |
  { ID id-AdditionalRRMPriorityIndex          CRITICALITY ignore  EXTENSION AdditionalRRMPriorityIndex          PRESENCE optional} |
  { ID id-LowerLayerPresenceStatusChange      CRITICALITY ignore  EXTENSION LowerLayerPresenceStatusChange      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 {
    sgNBPDCCpresent      E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDCCpresent,
    sgNBPDCCnotpresent   E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDCCnotpresent,
    ...
  },
  iE-Extensions          ProtocolExtensionContainer { {E-RABs-ToBeAdded-SgNBModReq-ItemExtIEs} } OPTIONAL,
  ...
}

E-RABs-ToBeAdded-SgNBModReq-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDCCpresent ::= 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-SgNBPDCCpresentExtIEs} } OPTIONAL,
  ...
}

E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDCCpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  { ID id-RLCMode-transferred          CRITICALITY ignore  EXTENSION RLCMode          PRESENCE optional} |
  { ID id-BearerType                   CRITICALITY ignore  EXTENSION BearerType       PRESENCE optional} |
  { ID id-Ethernet-Type                CRITICALITY ignore  EXTENSION Ethernet-Type    PRESENCE optional} |
  { ID id-SourceDLForwardingIPAddress  CRITICALITY ignore  EXTENSION TransportLayerAddress PRESENCE optional},
  ...
}

```

```

E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDPCnotpresent ::= 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-SgNBPDPCnotpresentExtIEs} }  OPTIONAL,
    ...
}

E-RABs-ToBeAdded-SgNBModReq-Item-SgNBPDPCnotpresentExtIEs 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 {
        sgNBPDPCpresent                         E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDPCpresent,
        sgNBPDPCnotpresent                     E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDPCnotpresent,
        ...
    },
    iE-Extensions                               ProtocolExtensionContainer { {E-RABs-ToBeModified-SgNBModReq-ItemExtIEs} }  OPTIONAL,
    ...
}

E-RABs-ToBeModified-SgNBModReq-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDPCpresent ::= 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-SgNBPDPCpresentExtIEs} }  OPTIONAL,
    ...
}

E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDPCpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {

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    { ID id-RLC-Status          CRITICALITY ignore          EXTENSION RLC-Status          PRESENCE optional },
    ...
}

E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDCCnotpresent ::= 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-SgNBPDCCnotpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeModified-SgNBModReq-Item-SgNBPDCCnotpresentExtIEs 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 {
        sgNBPDCCpresent          E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCCpresent,
        sgNBPDCCnotpresent          E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCCnotpresent,
        ...
    },
    iE-Extensions          ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBModReq-ItemExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBModReq-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCCpresent ::= SEQUENCE {
    dL-GTPtunnelEndpoint          GTPtunnelEndpoint          OPTIONAL,
    uL-GTPtunnelEndpoint          GTPtunnelEndpoint          OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCCpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCCpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

```



```

E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCCnotpresent ::= SEQUENCE {
    iE-Extensions          ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCCnotpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBModReq-Item-SgNBPDCCnotpresentExtIEs 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} |
    { ID id-AvailableFastMCGRecoveryViaSRB3          CRITICALITY ignore  TYPE AvailableFastMCGRecoveryViaSRB3          PRESENCE optional} |
    { ID id-ReleaseFastMCGRecoveryViaSRB3          CRITICALITY ignore  TYPE ReleaseFastMCGRecoveryViaSRB3          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,

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en-DC-ResourceConfiguration      EN-DC-ResourceConfiguration,
resource-configuration           CHOICE {
    sgNBPDCCpresent              E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCCpresent,
    sgNBPDCCnotpresent           E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCCnotpresent,
    ...
},
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-SgNBPDCCpresent ::= 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-SgNBPDCCpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCCpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-uLPDCPSnLength          CRITICALITY ignore EXTENSION PDCPSnLength          PRESENCE optional}|
    { ID id-dLPDCPSnLength          CRITICALITY ignore EXTENSION PDCPSnLength          PRESENCE optional}|
    { ID id-SourceDLForwardingIPAddress CRITICALITY ignore EXTENSION TransportLayerAddress PRESENCE optional},
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCCnotpresent ::= SEQUENCE {
    sgNB-DL-GTP-TEIDatSCG          GTPTunnelEndpoint,
    secondary-sgNB-DL-GTP-TEIDatSCG GTPTunnelEndpoint                                OPTIONAL,
    iE-Extensions                  ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCCnotpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeAdded-SgNBModAck-Item-SgNBPDCCnotpresentExtIEs 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
mandatory}
    CRITICALITY ignore TYPE E-RABs-Admitted-ToReleased-SgNBModAck-Item PRESENCE
}

```

```

E-RABs-Admitted-ToReleased-SgNBModAck-Item ::= SEQUENCE {
    e-RAB-ID E-RAB-ID,
    en-DC-ResourceConfiguration EN-DC-ResourceConfiguration,
    resource-configuration CHOICE {
        sgNBPDCCpresent E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCCpresent,
        sgNBPDCCnotpresent E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCCnotpresent,
        ...
    },
    iE-Extensions ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBModAck-ItemExtIEs} } OPTIONAL,
    ...
}

```

```

E-RABs-ToBeReleased-SgNBModAck-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCCpresent ::= SEQUENCE {
    iE-Extensions ProtocolExtensionContainer { {E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCCpresentExtIEs} } OPTIONAL,
    ...
}

```

```

E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCCpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCCnotpresent ::= SEQUENCE {
    iE-Extensions ProtocolExtensionContainer { {E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCCnotpresentExtIEs} } OPTIONAL,
    ...
}

```

```

E-RABs-Admitted-ToBeReleased-SgNBModAck-Item-SgNBPDCCnotpresentExtIEs 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 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-RRCCongfigIndication      CRITICALITY reject TYPE RRC-Config-Ind      CRITICALITY reject TYPE RRC-Config-Ind PRESENCE optional}|
    { ID id-LocationInformationSgNB   CRITICALITY ignore TYPE 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 {
        sgNBPDCCppresent      E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCCppresent,
        sgNBPDCCnotpresent    E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCCnotpresent,
        ...
    },
    iE-Extensions          ProtocolExtensionContainer { {E-RABs-AdmittedToBeModified-SgNBModConf-ItemExtIEs} } OPTIONAL,
    ...
}

E-RABs-AdmittedToBeModified-SgNBModConf-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCCppresent ::= SEQUENCE {
    iE-Extensions          ProtocolExtensionContainer { {E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCCppresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCCppresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {

```

```

}
...
E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCCnotpresent ::= SEQUENCE {
    secondary-meNB-UL-GTP-TEIDatPDCP          GTPtunnelEndpoint          OPTIONAL,
    iE-Extensions                             ProtocolExtensionContainer { {E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCCnotpresentExtIEs} }
    OPTIONAL,
    ...
}

E-RABs-AdmittedToBeModified-SgNBModConf-Item-SgNBPDCCnotpresentExtIEs 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}|
    { ID id-ERABs-transferred-to-MeNB         CRITICALITY ignore  TYPE E-RAB-List 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 {
        sgNBPDCCpresent E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCCpresent,
        sgNBPDCCnotpresent E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCCnotpresent,
        ...
    },
    iE-Extensions ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBRelReq-ItemExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBRelReq-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCCpresent ::= SEQUENCE {
    uL-GTPTunnelEndpoint GTPTunnelEndpoint OPTIONAL,
    dL-GTPTunnelEndpoint GTPTunnelEndpoint OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCCpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCCpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCCnotpresent ::= SEQUENCE {
    iE-Extensions ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCCnotpresentExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBRelReq-Item-SgNBPDCCnotpresentExtIEs 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 }|
    { ID id-SgNBtoMeNBContainer      CRITICALITY ignore   TYPE SgNBtoMeNBContainer 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 {
    sgNBPDCCpresent          E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCCpresent,
    sgNBPDCCnotpresent       E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCCnotpresent,
    ...
  },
  iE-Extensions           ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBRelConf-ItemExtIEs} } OPTIONAL,
  ...
}

E-RABs-ToBeReleased-SgNBRelConf-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCCpresent ::= SEQUENCE {
  uL-GTPTunnelEndpoint      GTPtunnelEndpoint                OPTIONAL,
  dL-GTPTunnelEndpoint      GTPtunnelEndpoint                OPTIONAL,
  iE-Extensions             ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCCpresentExtIEs} } OPTIONAL,
  ...
}

E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCCpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCCnotpresent ::= SEQUENCE {
  iE-Extensions             ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCCnotpresentExtIEs} } OPTIONAL,
  ...
}

E-RABs-ToBeReleased-SgNBRelConf-Item-SgNBPDCCnotpresentExtIEs 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 {
        sgNBPDCCpresent E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCCpresent,
        sgNBPDCCnotpresent E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCCnotpresent,
        ...
    },
    iE-Extensions ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBChaConf-ItemExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-SgNBChaConf-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCCpresent ::= SEQUENCE {
    uL-GTPtunnelEndpoint GTPtunnelEndpoint OPTIONAL,
    dL-GTPtunnelEndpoint GTPtunnelEndpoint OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCCpresentExtIEs} } OPTIONAL,

```

```

}
...
E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCCpresentExtIEs X2AP-PROTOCOL-EXTENSION ::= {
}
...
E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCCnotpresent ::= SEQUENCE {
  iE-Extensions          ProtocolExtensionContainer { {E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCCnotpresentExtIEs} } OPTIONAL,
}
...
E-RABs-ToBeReleased-SgNBChaConf-Item-SgNBPDCCnotpresentExtIEs 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}|
  { ID id-FastMCGRecovery-SN-to-MN   CRITICALITY ignore  TYPE FastMCGRecovery         PRESENCE optional}|
  { ID id-FastMCGRecovery-MN-to-SN   CRITICALITY ignore  TYPE FastMCGRecovery         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}|
    { ID id-InterfaceInstanceIndication        CRITICALITY reject  TYPE InterfaceInstanceIndication      PRESENCE optional}|
    { ID id-TNLConfigurationInfo                CRITICALITY ignore  TYPE TNLConfigurationInfo              PRESENCE optional},
    ...
}

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 }|
-- NOTE: In the current version of this specification the Interface Instance Indication IE is not included in the Initiating NodeType IE --
    { ID id-CellandCapacityAssistInfo          CRITICALITY ignore  TYPE CellandCapacityAssistInfo        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}|
    { ID id-PartialListIndicator                CRITICALITY ignore  TYPE PartialListIndicator              PRESENCE optional },
    ...
}

```



```

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 }|
    { ID id-SSB-PositionsInBurst         CRITICALITY ignore EXTENSION SSB-PositionsInBurst         PRESENCE optional }|
    { ID id-NRCellPRACHConfig            CRITICALITY ignore EXTENSION NRCellPRACHConfig            PRESENCE optional }|
    { ID id-CSI-RSTransmissionIndication CRITICALITY ignore EXTENSION CSI-RSTransmissionIndication PRESENCE optional }|
    { ID id-SFN-Offset                   CRITICALITY ignore EXTENSION SFN-Offset                   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 ::= {
    { ID id-ULCarrierList              CRITICALITY ignore EXTENSION NRCarrierList              PRESENCE optional }|
    { ID id-DLCarrierList              CRITICALITY ignore EXTENSION NRCarrierList              PRESENCE optional },
    ...
}

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 ::= {
  { ID id-TDDULDLConfigurationCommonNR    CRITICALITY ignore EXTENSION TDDULDLConfigurationCommonNR PRESENCE optional}|
  { ID id-CarrierList                     CRITICALITY ignore EXTENSION NRCarrierList PRESENCE optional}|
  { ID id-IntendedTDD-DL-ULConfiguration-NR CRITICALITY ignore EXTENSION IntendedTDD-DL-ULConfiguration-NR PRESENCE optional},
  ...
}

CellandCapacityAssistInfo ::= SEQUENCE {
  maximumCellListSize           MaximumCellListSize           OPTIONAL,
  cellAssistanceInformation     CellAssistanceInformation     OPTIONAL,
  iE-Extensions                 ProtocolExtensionContainer { {CellandCapacityAssistInfo-ExtIEs} } OPTIONAL,
  ...
}

CellandCapacityAssistInfo-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}|

```

```

    { ID id-InterfaceInstanceIndication      CRITICALITY reject  TYPE InterfaceInstanceIndication      PRESENCE optional }|
    { ID id-TNLConfigurationInfo             CRITICALITY ignore  TYPE TNLConfigurationInfo             PRESENCE optional },
    ...
}

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 }|
-- NOTE: In the current version of this specification the Interface Instance Indication IE is not included in the Responding NodeType IE --
    { ID id-CellandCapacityAssistInfo    CRITICALITY ignore  TYPE CellandCapacityAssistInfo    PRESENCE optional },
    ...
}

En-gNB-ENDCX2SetupReqAckIEs X2AP-PROTOCOL-IES ::= {
    { ID id-Globalen-gNB-ID              CRITICALITY reject  TYPE Globalen-gNB-ID              PRESENCE mandatory}|
    { ID id-ServedNRcellsENDCX2ManagementList  CRITICALITY reject  TYPE ServedNRcellsENDCX2ManagementList  PRESENCE mandatory}|
    { ID id-PartialListIndicator          CRITICALITY ignore  TYPE PartialListIndicator          PRESENCE optional },
    ...
}

-- *****
--
-- 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 }|
    { ID id-MessageOversizeNotification  CRITICALITY ignore  TYPE MessageOversizeNotification  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 }|
    { ID id-TNLConfigurationInfo                     CRITICALITY ignore  TYPE TNLConfigurationInfo                    PRESENCE optional }|
    { ID id-TNLA-To-Add-List                          CRITICALITY ignore  TYPE TNLA-To-Add-List                        PRESENCE optional }|
    { ID id-TNLA-To-Update-List                      CRITICALITY ignore  TYPE TNLA-To-Update-List                    PRESENCE optional }|
    { ID id-TNLA-To-Remove-List                     CRITICALITY ignore  TYPE TNLA-To-Remove-List                    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-ServedNRcellsToModifyListENDCConfUpdList CRITICALITY reject  TYPE ServedNRcellsToModifyENDCConfUpdList      PRESENCE optional }|
    { ID id-ServedNRcellsToDeleteListENDCConfUpdList 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 }|
  { ID id-CriticalityDiagnostics                    CRITICALITY ignore  TYPE CriticalityDiagnostics                    PRESENCE optional }|
  { ID id-TNLConfigurationInfo                      CRITICALITY ignore  TYPE TNLConfigurationInfo                      PRESENCE optional }|
  { ID id-TNLA-Setup-List                           CRITICALITY ignore  TYPE TNLA-Setup-List                           PRESENCE optional }|
  { ID id-TNLA-Failed-To-Setup-List                  CRITICALITY ignore  TYPE TNLA-Failed-To-Setup-List                  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 },
    ...
}

-- *****
--
-- EN-DC RESOURCE STATUS REQUEST
--
-- *****

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

```

```

}

ENDCResourceStatusRequest-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-E-UTRAN-Node1-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID-ENDC          PRESENCE mandatory }|
  { ID id-E-UTRAN-Node2-Measurement-ID          CRITICALITY ignore   TYPE Measurement-ID-ENDC          PRESENCE conditional}| -- The IE
shall be present if the Registration Request EN-DC IE is set to "Stop" or to "Add"
  { ID id-Registration-Request                  CRITICALITY reject  TYPE Registration-Request-ENDC   PRESENCE mandatory }|
  { ID id-ReportingPeriodicity                  CRITICALITY ignore  TYPE ReportingPeriodicity-ENDC   PRESENCE optional }|
  { ID id-ReportCharacteristics                  CRITICALITY ignore  TYPE ReportCharacteristics-ENDC   PRESENCE conditional}| -- The IE shall be present
if the Registration Request EN-DC IE is set to "Start"
  { ID id-CellToReport-NR-ENDC                  CRITICALITY ignore  TYPE CellToReport-NR-ENDC-List    PRESENCE optional } |
  { ID id-InterfaceInstanceIndication           CRITICALITY reject  TYPE InterfaceInstanceIndication  PRESENCE optional }|
  { ID id-CellToReport-E-UTRA-ENDC              CRITICALITY ignore  TYPE CellToReport-E-UTRA-ENDC-List PRESENCE optional},
  ...
}

ReportingPeriodicity-ENDC ::= ENUMERATED {ms500, ms1000, ms2000, ms5000, ms10000, ...}

CellToReport-NR-ENDC-List ::= SEQUENCE (SIZE (1..maxCellInengNB)) OF ProtocolIE-Single-Container { {CellToReport-NR-ENDC-ItemIEs} }

CellToReport-NR-ENDC-ItemIEs X2AP-PROTOCOL-IES ::= {
  { ID id-CellToReport-NR-ENDC-Item              CRITICALITY ignore  TYPE CellToReport-NR-ENDC-Item    PRESENCE mandatory}
}

CellToReport-NR-ENDC-Item ::= SEQUENCE {
  nr-cell-ID                                     NRCGI,
  ssbToReport-List                               SSBToReport-List                                     OPTIONAL,
  iE-Extensions                                  ProtocolExtensionContainer { {CellToReport-NR-ENDC-Item-ExtIEs} } OPTIONAL,
  ...
}

CellToReport-NR-ENDC-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

CellToReport-E-UTRA-ENDC-List ::= SEQUENCE (SIZE (1..maxCellInengNB)) OF ProtocolIE-Single-Container { {CellToReport-E-UTRA-ENDC-Item-IEs} }

CellToReport-E-UTRA-ENDC-Item-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-CellToReport-E-UTRA-ENDC-Item          CRITICALITY ignore  TYPE CellToReport-E-UTRA-ENDC-Item PRESENCE mandatory}
}

CellToReport-E-UTRA-ENDC-Item ::= SEQUENCE {
  e-utra-cell-ID                                 ECGI,
  iE-Extensions                                  ProtocolExtensionContainer { {CellToReport-E-UTRA-ENDC-Item-ExtIEs} } OPTIONAL,
  ...
}

CellToReport-E-UTRA-ENDC-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

SSBToReport-List ::= SEQUENCE (SIZE (1.. maxnoofSSBAreas)) OF SSBToReport-Item

SSBToReport-Item ::= SEQUENCE {

```



```

    ssbIndex          SSBIndex,
    iE-Extensions     ProtocolExtensionContainer { {SSBToReport-Item-ExtIEs} } OPTIONAL,
    ...
}

SSBToReport-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- EN-DC RESOURCE STATUS RESPONSE
--
-- *****

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

ENDCResourceStatusResponse-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-UTRAN-Node1-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID-ENDC          PRESENCE mandatory}|
    { ID id-E-UTRAN-Node2-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID-ENDC          PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics                CRITICALITY ignore   TYPE CriticalityDiagnostics        PRESENCE optional }|
    { ID id-InterfaceInstanceIndication          CRITICALITY reject   TYPE InterfaceInstanceIndication   PRESENCE optional },
    ...
}

-- *****
--
-- EN-DC RESOURCE STATUS FAILURE
--
-- *****

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

ENDCResourceStatusFailure-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-UTRAN-Node1-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID-ENDC          PRESENCE mandatory}|
    { ID id-E-UTRAN-Node2-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID-ENDC          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 },
    ...
}

-- *****
--
-- EN-DC RESOURCE STATUS UPDATE
--
-- *****

```

```

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

ENDCResourceStatusUpdate-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-E-UTRAN-Node1-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID-ENDC          PRESENCE mandatory}|
  { ID id-E-UTRAN-Node2-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID-ENDC          PRESENCE mandatory}|
  { ID id-CellMeasurementResult-NR-ENDC        CRITICALITY ignore  TYPE CellMeasurementResult-NR-ENDC-List  PRESENCE optional }|
  { ID id-InterfaceInstanceIndication         CRITICALITY reject  TYPE InterfaceInstanceIndication        PRESENCE optional }|
  { ID id-CellMeasurementResult-E-UTRA-ENDC    CRITICALITY ignore  TYPE CellMeasurementResult-E-UTRA-ENDC-List  PRESENCE optional},
  ...
}

CellMeasurementResult-NR-ENDC-List ::= SEQUENCE (SIZE (1..maxCellInengNB)) OF ProtocolIE-Single-Container { {CellMeasurementResult-NR-ENDC-ItemIEs}
}

CellMeasurementResult-NR-ENDC-ItemIEs X2AP-PROTOCOL-IES ::= {
  { ID id-CellMeasurementResult-NR-ENDC-Item  CRITICALITY ignore  TYPE CellMeasurementResult-NR-ENDC-Item  PRESENCE mandatory}
}

CellMeasurementResult-NR-ENDC-Item ::= SEQUENCE {
  nr-cell-ID                NRCGI,
  nr-radioResourceStatus    NRRadioResourceStatus          OPTIONAL,
  tnlCapacityIndicator      TNLCapacityIndicator          OPTIONAL,
  nr-compositeAvailableCapacityGroup  NRCompositeAvailableCapacityGroup  OPTIONAL,
  numberOfActiveUEs        INTEGER (0..16777215, ...)      OPTIONAL,
  iE-Extensions            ProtocolExtensionContainer { {CellMeasurementResult-NR-ENDC-Item-ExtIEs} } OPTIONAL,
  ...
}

CellMeasurementResult-NR-ENDC-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

CellMeasurementResult-E-UTRA-ENDC-List ::= SEQUENCE (SIZE (1..maxCellInengNB))
  OF ProtocolIE-Single-Container { {CellMeasurementResult-E-UTRA-ENDC-ItemIEs} }

CellMeasurementResult-E-UTRA-ENDC-ItemIEs X2AP-PROTOCOL-IES ::= {
  { ID id-CellMeasurementResult-E-UTRA-ENDC-Item  CRITICALITY ignore  TYPE CellMeasurementResult-E-UTRA-ENDC-Item  PRESENCE mandatory}
}

CellMeasurementResult-E-UTRA-ENDC-Item ::= SEQUENCE {
  e-utra-cell-ID           ECGI,
  hWLoadIndicator          HWLoadIndicator          OPTIONAL,
  s1TnNLLoadIndicator      S1TnNLLoadIndicator  OPTIONAL,
  radioResourceStatus      RadioResourceStatus  OPTIONAL,
  compositeAvailableCapacityGroup  CompositeAvailableCapacityGroup  OPTIONAL,
  iE-Extensions            ProtocolExtensionContainer { {CellMeasurementResult-E-UTRA-ENDC-Item-ExtIEs} } OPTIONAL,
  ...
}

CellMeasurementResult-E-UTRA-ENDC-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

```

```

}
-- *****
--
-- 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..maxCellLineNB)) OF ECGI
ListofEUTRACellsInNRCoordinationReq ::= SEQUENCE (SIZE (1..maxCellLineNB)) 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          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-E-RABs-DataForwardingAddress-List  CRITICALITY ignore  TYPE E-RABs-DataForwardingAddress-List  PRESENCE mandatory} |
    { ID id-CHO-DC-Indicator            CRITICALITY reject  TYPE CHO-DC-Indicator      PRESENCE optional} |

```

```

    { ID id-CHO-DC-EarlyDataForwarding          CRITICALITY ignore TYPE CHO-DC-EarlyDataForwarding          PRESENCE optional}|
    { ID id-SgNB-UE-X2AP-ID                    CRITICALITY ignore TYPE SgNB-UE-X2AP-ID                    PRESENCE optional},
    ...
}

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 }|
    { ID id-MeNB-UE-X2AP-ID-Extension  CRITICALITY reject  TYPE UE-X2AP-ID-Extension  PRESENCE optional},
    ...
}

-- *****
--
-- 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 }|
    { ID id-MeNB-UE-X2AP-ID-Extension  CRITICALITY reject  TYPE UE-X2AP-ID-Extension  PRESENCE optional},
    ...
}

-- *****
--
-- CELL TRAFFIC TRACE
--
-- *****

CellTrafficTrace ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {CellTrafficTraceIEs} },
    ...
}

CellTrafficTraceIEs 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 }|
    { ID id-TraceCollectionEntityIPAddress CRITICALITY ignore  TYPE TraceCollectionEntityIPAddress PRESENCE mandatory }|
    { ID id-PrivacyIndicator          CRITICALITY ignore  TYPE PrivacyIndicator    PRESENCE optional }|
    { ID id-MeNB-UE-X2AP-ID-Extension CRITICALITY reject  TYPE UE-X2AP-ID-Extension PRESENCE optional},
    ...
}

-- *****
--
-- F1-C TRAFFIC TRANSFER
--
-- *****

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

FlCTrafficTransfer-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-FlCTrafficContainer      CRITICALITY reject  TYPE FlCTrafficContainer PRESENCE mandatory }|
    { ID id-MeNB-UE-X2AP-ID-Extension CRITICALITY reject  TYPE UE-X2AP-ID-Extension PRESENCE optional},
    ...
}

-- *****
--
-- UE RADIO CAPABILITY ID MAPPING REQUEST
--
-- *****

UERadioCapabilityIDMappingRequest ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { { UERadioCapabilityIDMappingRequestIEs } },
    ...
}

UERadioCapabilityIDMappingRequestIEs X2AP-PROTOCOL-IES ::= {
    { ID id-UERadioCapabilityID      CRITICALITY reject  TYPE UERadioCapabilityID PRESENCE mandatory },
    ...
}

-- *****
--
-- UE RADIO CAPABILITY ID MAPPING RESPONSE
--
-- *****

UERadioCapabilityIDMappingResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { { UERadioCapabilityIDMappingResponseIEs } },
    ...
}

```

```

UERadioCapabilityIDMappingResponseIEs X2AP-PROTOCOL-IES ::= {
  { ID id-UERadioCapabilityID          CRITICALITY reject TYPE UERadioCapabilityID          PRESENCE mandatory } |
  { ID id-UERadioCapability            CRITICALITY ignore TYPE UERadioCapability            PRESENCE mandatory } |
  { ID id-CriticalityDiagnostics        CRITICALITY ignore TYPE CriticalityDiagnostics        PRESENCE optional  },
  ...
}

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-enhancedRNTTP,
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-CNTTypeRestrictions,
id-BluetoothMeasurementConfiguration,
id-WLANMeasurementConfiguration,
id-ECGI,
id-NRCGI,
id-MeNBCoordinationAssistanceInformation,
id-SgNBCoordinationAssistanceInformation,
id-NRNeighbourInfoToAdd,
id-LastNG-RANPLMNIdentity,
id-BPLMN-ID-Info-EUTRA,
id-NBiot-UL-DL-AlignmentOffset,
id-UnlicensedSpectrumRestriction,
id-CarrierList,
id-FrequencyShift7p5khz,
id-NPRACHConfiguration,
id-MDTConfigurationNR,
id-CSI-RSTransmissionIndication,
id-QoS-Mapping-Information,
id-IntendedTDD-DL-ULConfiguration-NR,
id-TraceCollectionEntityURI,
id-SFN-Offset,
id-AdditionLocationInformation,

maxnoofBearers,
maxCelllineNB,
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,  
maxnoofTLAs,  
maxnoofGTPTLAs,  
maxnoofTNLAssociations,  
maxnoofCellsinCHO, maxnoofPC5QoSFlows,  
maxnoofSSBAreas,  
maxnoofNRSCSs,  
maxnoofNRPhysicalResourceBlocks,  
maxnoofNonAnchorCarrierFreqConfig
```

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)

AdditionLocationInformation ::= ENUMERATED {
    includePSCell,
    ...
}

AdditionalRRMPriorityIndex ::= BIT STRING (SIZE(32))

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,
    ...
}

AvailableFastMCGRecoveryViaSRB3 ::= ENUMERATED {true,...}

```

```

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..maxnoofBPLMNs)) 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..maxnoofextBPLMNs)) OF BPLMN-ID-Info-NR-Item

BPLMN-ID-Info-NR-Item ::= SEQUENCE {
    broadcastPLMNs          BroadcasttextPLMNs,
    fiveGS-TAC             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 ::= {

```

```
    ...
}

BroadcasttextPLMNs ::= 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,
cho-cpc-resources-tobechanged,
ue-power-saving,
insufficient-ue-capabilities,
normal-release,
unknown-E-UTRAN-Node-Measurement-ID
}

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 ::= {
    ...
}
CHO-DC-EarlyDataForwarding ::= ENUMERATED {stop, ...}
CHO-DC-Indicator ::= ENUMERATED {true, ...}

```

```

CTypeRestrictions ::= SEQUENCE (SIZE(1.. maxnoofEPLMNsPlusOne)) OF CTypeRestrictionsItem

CTypeRestrictionsItem ::= SEQUENCE {
    plmn-Id          PLMN-Identity,
    cn-type          ENUMERATED {fiveGC-forbidden, ... , epc-forbidden},
    iE-Extensions    ProtocolExtensionContainer { {CTypeRestrictionsItem-ExtIEs} } OPTIONAL,
    ...
}

CTypeRestrictionsItem-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
    ...
}

CPTransportLayerInformation ::= CHOICE {
    endpointIPAddress          TransportLayerAddress,
    endpointIPAddressAndPort   TransportLayerAddressAndPort,
    ...
}

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,
    ...
}

CHOtrigger ::= ENUMERATED {
    cho-initiation,
    cho-replace,
    ...
}

CHOinformation-REQ ::= SEQUENCE {
    cho-trigger                CHOtrigger,
    new-eNB-UE-X2AP-ID        UE-X2AP-ID                OPTIONAL,
    -- This IE shall be present if the cho-trigger IE is present and set to "CHO-replace" --,
    new-eNB-UE-X2AP-ID-Extension UE-X2AP-ID-Extension    OPTIONAL,
    CHO-EstimatedArrivalProbability CHO-Probability      OPTIONAL,
    iE-Extensions             ProtocolExtensionContainer { { CHOinformation-REQ-ExtIEs } } OPTIONAL,
    ...
}

CHOinformation-REQ-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CHOinformation-ACK ::= SEQUENCE {
    requestedTargetCellID      ECGI,
    maxCHOpreparations         MaxCHOpreparations                OPTIONAL,
    iE-Extensions             ProtocolExtensionContainer { { CHOinformation-ACK-ExtIEs } } OPTIONAL,
    ...
}

CHOinformation-ACK-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CandidateCellsToBeCancelledList ::= SEQUENCE (SIZE (1..maxnoofCellsinCHO)) OF ECGI

CHO-Probability ::= INTEGER (1..100)

CSI-RSTransmissionIndication ::= ENUMERATED {
    activated,
    deactivated,
    ...
}

-- 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 ::= {
    ...
}

DAPSRequestInfo ::= SEQUENCE {
    dAPSIndicator               ENUMERATED {daps-HO-required, ...},
    iE-Extensions               ProtocolExtensionContainer { {DAPSRequestInfo-ExtIEs} } OPTIONAL,
    ...
}

DAPSRequestInfo-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

DAPSResponseInfo ::= SEQUENCE {
    dAPSResponseIndicator       ENUMERATED { daps-HO-accepted, daps-HO-not-accepted, ...},
    iE-Extensions               ProtocolExtensionContainer { { DAPSResponseInfo-ExtIEs} } OPTIONAL,
    ...
}

DAPSResponseInfo-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, ...}

DirectForwardingPathAvailability ::= ENUMERATED {direct-path-available, ...}

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 ::= {
    ...
}

EPCHandoverRestrictionListContainer ::= OCTET STRING
-- This octets of the OCTET STRING contain the Handover Restriction List IE as specified in TS 36.413 [4]. --

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-RABsSubjectToEarlyStatusTransfer-List ::= SEQUENCE (SIZE (1.. maxnoofBearers)) OF E-RABsSubjectToEarlyStatusTransfer-Item

E-RABsSubjectToEarlyStatusTransfer-Item ::= SEQUENCE {
    e-RAB-ID                E-RAB-ID,
    fIRST-DL-COUNTValue     COUNTvalue,
    fIRST-DL-COUNTValueExtended COUNTvalueExtended OPTIONAL,
}

```

```

    FIRST-DL-COUNTValueforPDCPSNlength18          COUNTvaluePDCP-SNlength18          OPTIONAL,
    iE-Extension          ProtocolExtensionContainer { { E-RABsSubjectToEarlyStatusTransfer-Item-ExtIEs } } OPTIONAL,
    ...
}

E-RABsSubjectToEarlyStatusTransfer-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABsSubjectToDLDiscarding-List ::= SEQUENCE (SIZE (1.. maxnoofBearers)) OF E-RABsSubjectToDLDiscarding-Item

E-RABsSubjectToDLDiscarding-Item ::= SEQUENCE {
    e-RAB-ID          E-RAB-ID,
    DISCARD-DL-COUNTValue          COUNTvalue,
    DISCARD-DL-COUNTValueExtended          COUNTValueExtended          OPTIONAL,
    DISCARD-DL-COUNTValueforPDCPSNlength18          COUNTvaluePDCP-SNlength18          OPTIONAL,
    iE-Extension          ProtocolExtensionContainer { { E-RABsSubjectToDLDiscarding-Item-ExtIEs } } OPTIONAL,
    ...
}

E-RABsSubjectToDLDiscarding-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 ::= {
    ...
}

Ethernet-Type ::= ENUMERATED {
    true,
    ...
}

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

FlCTrafficContainer ::= OCTET STRING

FastMCGRecovery ::= SEQUENCE {
    rrcContainer          RRCContainer          OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { {FastMCGRecovery-ExtIEs} } OPTIONAL,
    ...
}

FastMCGRecovery-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

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 ::= {
    ...
}

FiveQI ::= INTEGER (0..255, ...)

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 ::= {

```

```

    ...
}

FrequencyShift7p5khz ::= ENUMERATED {false, true, ...}

-- 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 ::= {
    ...
}

Global-RAN-NODE-ID ::= CHOICE {
    gNB                GlobalGNB-ID,
    choice-extension   ProtocolIE-Single-Container { { Global-RAN-NODE-ID-ExtIEs} }
}

Global-RAN-NODE-ID-ExtIEs X2AP-PROTOCOL-IES ::= {

```

```

}
...
}
GNBOverloadInformation ::= ENUMERATED {overloaded, not-overloaded, ...}
GTPTLAs ::= SEQUENCE (SIZE(1.. maxnoofGTPTLAs)) OF GTPTLA-Item

GTPTLA-Item ::= SEQUENCE {
    gTPTransportLayerAddresses      TransportLayerAddress,
    iE-Extensions                    ProtocolExtensionContainer { { GTPTLA-Item-ExtIEs } } OPTIONAL,
    ...
}

GTPTLA-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

GTPtunnelEndpoint ::= SEQUENCE {
    transportLayerAddress            TransportLayerAddress,
    gTP-TEID                          GTP-TEI,
    iE-Extensions                    ProtocolExtensionContainer { {GTPtunnelEndpoint-ExtIEs} } OPTIONAL,
    ...
}

GTPtunnelEndpoint-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    {ID id-QoS-Mapping-Information CRITICALITY reject EXTENSION QoS-Mapping-Information PRESENCE optional},
    ...
}

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,
    interSystemPingpong
}

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-CNTTypeRestrictions                     CRITICALITY ignore EXTENSION CNTTypeRestrictions                     PRESENCE optional}|
    { ID id-NRrestrictionin5GS                       CRITICALITY ignore EXTENSION NRrestrictionin5GS                       PRESENCE optional}|
    { ID id-LastNG-RANPLMNIdentity                  CRITICALITY ignore EXTENSION PLMN-Identity                             PRESENCE optional}|
    { ID id-UnlicensedSpectrumRestriction            CRITICALITY ignore EXTENSION UnlicensedSpectrumRestriction            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

IABNodeIndication ::= ENUMERATED {true,...}

IMSvoiceEPSfallbackfrom5G ::= ENUMERATED {
    true,
    ...
}

IntegrityProtectionAlgorithms ::= BIT STRING (SIZE (16, ...))

IntendedTDD-DL-ULConfiguration-NR ::= OCTET STRING

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 ::= {
  { ID id-AdditionLocationInformation CRITICALITY ignore EXTENSION AdditionLocationInformation PRESENCE optional},

```

```

}
...
}
LowerLayerPresenceStatusChange ::= ENUMERATED {
    release-lower-layers,
    re-establish-lower-layers,
    suspend-lower-layers,
    resume-lower-layers,
    ...
}
-- 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))

MaxCHOPreparations ::= INTEGER(1..8, ...)

MDT-Activation ::= ENUMERATED {
    immediate-MDT-only,
    immediate-MDT-and-Trace,
    ...
}

MDT-Configuration ::= SEQUENCE {
    mdt-Activation MDT-Activation,
    areaScopeOfMDT AreaScopeOfMDT,
    measurementsToActivate MeasurementsToActivate,
    mlreportingTrigger MlReportingTrigger,
    mlthresholdeventA2 MlThresholdEventA2 OPTIONAL,
    -- Included in case of event-triggered, or event-triggered periodic reporting for measurement M1
    mlperiodicReporting MlPeriodicReporting OPTIONAL,
    -- Included in case of periodic, or event-triggered periodic reporting for measurement M1
    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, ...)

Measurement-ID-ENDC ::= 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 ::= {
    ...
}

MDT-ConfigurationNR ::= OCTET STRING

MobilityParametersModificationRange ::= SEQUENCE {
    handoverTriggerChangeLowerLimit INTEGER (-20..20),
    handoverTriggerChangeUpperLimit INTEGER (-20..20),
    ...
}

```

```

}
MobilityParametersInformation ::= SEQUENCE {
    handoverTriggerChange      INTEGER (-20..20),
    ...
}
MultibandInfoList ::= SEQUENCE (SIZE(1..maxnoofBands)) OF BandInfo
MessageOversizeNotification ::= SEQUENCE {
    maximumCellListSize      MaximumCellListSize,
    iE-Extensions            ProtocolExtensionContainer { {MessageOversizeNotification-ExtIEs} } OPTIONAL,
    ...
}
MessageOversizeNotification-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}
MaximumCellListSize ::= INTEGER(1..16384, ...)
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
NBIoT-UL-DL-AlignmentOffset ::= ENUMERATED {
    khz-7dot5,
    khz0,
    khz7dot5,
    ...
}

```

```

}

NBIOt-RLF-Report-Container ::= OCTET STRING

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,
    ...
}

NRCapacityValue ::= SEQUENCE {
    capacityValue          INTEGER (0..100),
    ssbAreaCapacityValue-List  SSBAreaCapacityValue-List          OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { { NRCapacityValue-ExtIEs} } OPTIONAL,
    ...
}

NRCapacityValue-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

NRCarrierList ::= SEQUENCE (SIZE(1..maxnoofNRSCSs)) OF NRCarrierItem

NRCarrierItem ::= SEQUENCE {
    carrierSCS            NRSCS,
    offsetToCarrier       INTEGER (0..2199, ...),
    carrierBandwidth      INTEGER (0..maxnoofNRPhysicalResourceBlocks, ...),
    iE-Extension          ProtocolExtensionContainer { {NRCarrierItem-ExtIEs} }          OPTIONAL,
    ...
}

NRCarrierItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

NRCellCapacityClassValue ::= INTEGER (1..100, ...)

NRCellPRACHConfig ::= OCTET STRING

NRCompositeAvailableCapacityGroup ::= SEQUENCE {
    compositeAvailableCapacityDL    NRCompositeAvailableCapacity,
    compositeAvailableCapacityUL    NRCompositeAvailableCapacity,
    iE-Extensions                    ProtocolExtensionContainer { {NRCompositeAvailableCapacityGroup-ExtIEs} } OPTIONAL,
    ...
}

NRCompositeAvailableCapacityGroup-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

NRCompositeAvailableCapacity ::= SEQUENCE {
    cellCapacityClassValue          NRCellCapacityClassValue          OPTIONAL,
    capacityValue                   NRCapacityValue,
    iE-Extensions                    ProtocolExtensionContainer { {NRCompositeAvailableCapacity-ExtIEs} } OPTIONAL,
    ...
}

NRCompositeAvailableCapacity-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

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 ::= {
    { ID id-FrequencyShift7p5khz    CRITICALITY ignore EXTENSION FrequencyShift7p5khz PRESENCE optional},
    ...
}

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 ::= {
    {ID id-CSI-RSTransmissionIndication CRITICALITY ignore EXTENSION CSI-RSTransmissionIndication PRESENCE optional},
    ...
}

NPRACHConfiguration ::= SEQUENCE {
    fdd-or-tdd        CHOICE {
        fdd           NPRACHConfiguration-FDD,
        tdd           NPRACHConfiguration-TDD,
        ...
    },
    iE-Extensions    ProtocolExtensionContainer { { NPRACHConfiguration-ExtIEs} } OPTIONAL,
    ...
}

NPRACHConfiguration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

NPRACHConfiguration-FDD ::= SEQUENCE {
    nprach-CP-length          NPRACH-CP-Length,
    anchorCarrier-NPRACHConfig OCTET STRING,
    anchorCarrier-EDT-NPRACHConfig OCTET STRING OPTIONAL,
    anchorCarrier-Format2-NPRACHConfig OCTET STRING OPTIONAL,
    anchorCarrier-Format2-EDT-NPRACHConfig OCTET STRING OPTIONAL,
    non-anchorCarrier-NPRACHConfig OCTET STRING OPTIONAL,
    non-anchorCarrier-Format2-NPRACHConfig OCTET STRING OPTIONAL,
    iE-Extensions            ProtocolExtensionContainer { { NPRACHConfiguration-FDD-ExtIEs} } OPTIONAL,
    ...
}

NPRACHConfiguration-FDD-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

NPRACHConfiguration-TDD ::= SEQUENCE {
    nprach-preambleFormat          NPRACH-preambleFormat,
    anchorCarrier-NPRACHConfigTDD  OCTET STRING,
    non-anchorCarrierFrequencyConfiglist Non-AnchorCarrierFrequencylist OPTIONAL,
    non-anchorCarrier-NPRACHConfigTDD OCTET STRING OPTIONAL,
    ...
}

```

```

    iE-Extensions    ProtocolExtensionContainer { { NPRACHConfiguration-TDD-ExtIEs } }    OPTIONAL,
  ...
}
NPRACHConfiguration-TDD-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}
NPRACH-CP-Length ::=      ENUMERATED {
  us66dot7,
  us266dot7,
  ...
}
NPRACH-preambleFormat ::=      ENUMERATED {fmt0,fmt1,fmt2,fmt0a,fmt1a,...}
Non-AnchorCarrierFrequencylist ::= SEQUENCE (SIZE(1..maxnoofNonAnchorCarrierFreqConfig)) OF
  SEQUENCE {
    non-anchorCarrioerFrquency      OCTET STRING,
    iE-Extensions                    ProtocolExtensionContainer { { Non-AnchorCarrierFrequencylist-ExtIEs } } OPTIONAL,
    ...
  }
Non-AnchorCarrierFrequencylist-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}
NRPCI ::= INTEGER (0..1007)
NRrestrictioninEPSasSecondaryRAT ::= ENUMERATED {
  nRestrictedinEPSasSecondaryRAT,
  ...
}
NRRadioResourceStatus ::= SEQUENCE {
  ssbAreaRadioResourceStatus-List  SSBAreaRadioResourceStatus-List,
  iE-Extensions                      ProtocolExtensionContainer { {NRRadioResourceStatus-ExtIEs} } OPTIONAL,
  ...
}
NRRadioResourceStatus-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}
NRrestrictionin5GS ::= ENUMERATED {
  nRestrictedin5GS,
  ...
}
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      RRContainer,
    iE-Extensions
                ProtocolExtensionContainer { { NRUeReport-ExtIEs} } OPTIONAL,
    ...
}

NRUeReport-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

NRUESidelinkAggregateMaximumBitRate ::= SEQUENCE {
    uESidelinkAggregateMaximumBitRate      BitRate,
    iE-Extensions
                ProtocolExtensionContainer { { NRUESidelinkAggregateMaximumBitRate-ExtIEs} } OPTIONAL,
    ...
}

NRUESidelinkAggregateMaximumBitRate-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, ...}
```



```
NRV2XServicesAuthorized ::= SEQUENCE {
    vehicleUE          VehicleUE                               OPTIONAL,
    pedestrianUE      PedestrianUE                             OPTIONAL,
    iE-Extensions     ProtocolExtensionContainer { {NRV2XServicesAuthorized-ExtIEs} } OPTIONAL,
    ...
}

NRV2XServicesAuthorized-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- O

OffsetOfNbiotChannelNumberToEARFCN ::= ENUMERATED {
    minusTen,
    minusNine,
    minusEight,
    minusSeven,
    minusSix,
    minusFive,
    minusFour,
    minusThree,
    minusTwo,
    minusOne,
    minusZeroDotFive,
    zero,
    one,
    two,
    three,
    four,
    five,
    six,
    seven,
    eight,
    nine,
    ...,
    minusEightDotFive,
    minusFourDotFive,
    threeDotFive,
    sevenDotFive
}

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,
    ...
}

PC5QoSParameters ::= SEQUENCE {
    pc5QoSFlowList          PC5QoSFlowList,
    pc5LinkAggregatedBitRates BitRate OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { { PC5QoSParameters-ExtIEs} } OPTIONAL,
    ...
}

PC5QoSParameters-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

PC5QoSFlowList ::= SEQUENCE (SIZE(1..maxnoofPC5QoSFlows)) OF PC5QoSFlowItem

PC5QoSFlowItem ::= SEQUENCE {
    pQI                    FiveQI,
    pc5FlowBitRates        PC5FlowBitRates OPTIONAL,
    range                   Range OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { { PC5QoSFlowItem-ExtIEs} } OPTIONAL,
    ...
}

PC5QoSFlowItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

PC5FlowBitRates ::= SEQUENCE {
    guaranteedFlowBitRate BitRate,
    maximumFlowBitRate    BitRate,
    iE-Extensions          ProtocolExtensionContainer { { PC5FlowBitRates-ExtIEs} } OPTIONAL,
    ...
}

PC5FlowBitRates-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

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 ::= {
    ...
}

PartialListIndicator ::= ENUMERATED {partial, ...}

PrivacyIndicator ::= ENUMERATED {
    immediate-MDT,
    logged-MDT,
    ...
}

-- Q

QCI ::= INTEGER (0..255)

QoS-Mapping-Information ::= SEQUENCE {
    dscp                BIT STRING (SIZE(6))                OPTIONAL,
    flow-label          BIT STRING (SIZE(20))                OPTIONAL,
    iE-Extensions       ProtocolExtensionContainer { {QoS-Mapping-Information-ExtIEs} } OPTIONAL,
    ...
}

QoS-Mapping-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- 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},
  ...
}

Range ::= ENUMERATED {m50, m80, m180, m200, m350, m400, m500, m700, m1000, ...}

RAN-UE-NGAP-ID ::= INTEGER (0..4294967295)

ReceiveStatusOfULPDCPSDUs ::= BIT STRING (SIZE(4096))

ReceiveStatusOfULPDCPSDUsExtended ::= BIT STRING (SIZE(1..16384))

ReceiveStatusOfULPDCPSDUsPDCP-SNlength18 ::= BIT STRING (SIZE(1..131072))

ReleaseFastMCGRecoveryViaSRB3 ::= ENUMERATED {true,...}

Reestablishment-Indication ::= ENUMERATED {
  reestablished,
  ...
}

Registration-Request ::= ENUMERATED {
  start,
  stop,
  ...,
  partial-stop,
  add
}

Registration-Request-ENDC ::= ENUMERATED {
  start,
  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,
    ...
}

ReportCharacteristics-ENDC ::= BIT STRING (SIZE (32))

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}

RequestedFastMCGRecoveryViaSRB3 ::= ENUMERATED {true,...}

RequestedFastMCGRecoveryViaSRB3Release ::= ENUMERATED {true,...}

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 ::= {
    ...
}

RSRPMRLList ::= SEQUENCE (SIZE(1..maxUEReport)) OF
    SEQUENCE {
        rSRPMeasurementResult      RSRPMeasurementResult,
        iE-Extensions              ProtocolExtensionContainer { {RSRPMRLList-ExtIEs} } OPTIONAL,
        ...
    }

RSRPMRLList-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-UEID    CRITICALITY ignore  EXTENSION UEID    PRESENCE optional},
    ...
}

RRCContainer ::= OCTET STRING

-- S

S1TNNLLoadIndicator ::= SEQUENCE {
    dLS1TNNLLoadIndicator          LoadIndicator,
    uLS1TNNLLoadIndicator          LoadIndicator,
    iE-Extensions                  ProtocolExtensionContainer { {S1TNNLLoadIndicator-ExtIEs} } OPTIONAL,
    ...
}

S1TNNLLoadIndicator-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, ..., nR-unlicensed },
  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.. maxCelllineNB)) 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} |
    { ID id-NPRACHConfiguration            CRITICALITY ignore EXTENSION NPRACHConfiguration PRESENCE optional} |
    { ID id-SFN-Offset                     CRITICALITY ignore EXTENSION SFN-Offset PRESENCE optional},
    ...
}

ServiceType ::= ENUMERATED{
    qMC-for-streaming-service,
    qMC-for-MTSI-service,
    ...
}

SgNBCoordinationAssistanceInformation ::= ENUMERATED{
    coordination-not-required,
    ...
}

SgNBResourceCoordinationInformation ::= SEQUENCE {
    nR-CGI                NR CGI,
    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,
    ...
}

SNtriggered ::=ENUMERATED{
    true,
    ...
}

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..maxCelllineNB)

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,
  ...
}

SSBAreaCapacityValue-List ::= SEQUENCE (SIZE (1.. maxnoofSSBAreas)) OF SSBAreaCapacityValue-Item

SSBAreaCapacityValue-Item ::= SEQUENCE {
  ssbIndex                SSBIndex,
  ssbAreaCapacityValue    INTEGER (0..100),
  iE-Extensions           ProtocolExtensionContainer { {SSBAreaCapacityValue-ExtIEs} } OPTIONAL,
  ...
}

SSBAreaCapacityValue-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
...
}

SSBAreaRadioResourceStatus-List ::= SEQUENCE (SIZE (1.. maxnoofSSBAreas)) OF SSBAreaRadioResourceStatus-Item

SSBAreaRadioResourceStatus-Item ::= SEQUENCE {
  ssbIndex                SSBIndex,
  ssbAreaDLGBRPRBUsage    INTEGER (0..100),
  ssbAreaULGBRPRBUsage    INTEGER (0..100),
  ssbAreaDLNonGBRPRBUsage INTEGER (0..100),
  ssbAreaULNonGBRPRBUsage INTEGER (0..100),
  ssbAreaDLTotalPRBUsage  INTEGER (0..100),
  ssbAreaULTotalPRBUsage  INTEGER (0..100),
  ssbAreaDLSchedulingPDCCHCCEUsage INTEGER (0..100)          OPTIONAL,
  ssbAreaULSchedulingPDCCHCCEUsage INTEGER (0..100)          OPTIONAL,
}

```

```

    iE-Extensions          ProtocolExtensionContainer { {SSBAreaRadioResourceStatus-ExtIEs} } OPTIONAL,
    ...
}

SSBAreaRadioResourceStatus-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

SSBIndex ::= INTEGER (0..63)

SSB-PositionsInBurst ::= CHOICE {
    shortBitmap            BIT STRING (SIZE (4)),
    mediumBitmap           BIT STRING (SIZE (8)),
    longBitmap             BIT STRING (SIZE (64)),
    choice-extension      ProtocolIE-Single-Container { {SSB-PositionsInBurst-ExtIEs} }
}

SSB-PositionsInBurst-ExtIEs X2AP-PROTOCOL-IES ::= {
    ...
}

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 ::= {
  { ID id-CarrierList          CRITICALITY ignore  EXTENSION NRCarrierList          PRESENCE optional }|
  { ID id-FrequencyShift7p5khz CRITICALITY ignore  EXTENSION FrequencyShift7p5khz  PRESENCE optional },
  ...
}

SFN-Offset ::= SEQUENCE {
  sFN-Time-Offset          BIT STRING (SIZE(24)),
  iE-Extensions           ProtocolExtensionContainer { {SFN-Offset-ExtIEs} } OPTIONAL,
  ...
}

SFN-Offset-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

TargetCellInNGRAN ::= OCTET STRING

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} |
    { ID id-OffsetOfNbiotChannelNumberToDL-EARFCN  CRITICALITY reject   EXTENSION OffsetOfNbiotChannelNumberToEARFCN  PRESENCE optional} |
    { ID id-NBIoT-UL-DL-AlignmentOffset            CRITICALITY reject   EXTENSION NBIoT-UL-DL-AlignmentOffset            PRESENCE optional} |
    ...
}

TDD-InfoNeighbourServedNRCell-Information ::= SEQUENCE {
    nRFreqInfo           NRFreqInfo,
    iE-Extensions        ProtocolExtensionContainer { {TDD-InfoNeighbourServedNRCell-Information-ExtIEs} } OPTIONAL,
    ...
}

```

```
}
TDD-InfoNeighbourServedNRCell-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  {ID id-IntendedTDD-DL-ULConfiguration-NR    CRITICALITY ignore  EXTENSION IntendedTDD-DL-ULConfiguration-NR  PRESENCE optional},
  ...
}
TDDULDLConfigurationCommonNR ::= OCTET STRING

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)
TNLA-To-Add-List ::= SEQUENCE (SIZE(1..maxnoofTNLAAssociations)) OF TNLA-To-Add-Item

TNLA-To-Add-Item ::= SEQUENCE {
  tNLAssociationTransportLayerAddress    CPTransportLayerInformation,
  tNLAssociationUsage                    TNLAAssociationUsage,
  iE-Extensions                          ProtocolExtensionContainer { { TNLA-To-Add-Item-ExtIEs} } OPTIONAL
}

TNLA-To-Add-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

TNLA-To-Update-List ::= SEQUENCE (SIZE(1..maxnoofTNLAAssociations)) OF TNLA-To-Update-Item

TNLA-To-Update-Item ::= SEQUENCE {
  tNLAssociationTransportLayerAddress    CPTransportLayerInformation,
  tNLAssociationUsage                    TNLAAssociationUsage OPTIONAL,
  iE-Extensions                          ProtocolExtensionContainer { { TNLA-To-Update-Item-ExtIEs} } OPTIONAL
}

TNLA-To-Update-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

TNLA-To-Remove-List ::= SEQUENCE (SIZE(1..maxnoofTNLAAssociations)) OF TNLA-To-Remove-Item
```

```

TNLA-To-Remove-Item ::= SEQUENCE {
    tNLAssociationTransportLayerAddress    CPTransportLayerInformation,
    iE-Extensions                          ProtocolExtensionContainer { { TNLA-To-Remove-Item-ExtIEs } } OPTIONAL
}

TNLA-To-Remove-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

TNLA-Setup-List ::= SEQUENCE (SIZE(1..maxnoofTNLAAssociations)) OF TNLA-Setup-Item

TNLA-Setup-Item ::= SEQUENCE {
    tNLAssociationTransportLayerAddress    CPTransportLayerInformation,
    iE-Extensions                          ProtocolExtensionContainer { { TNLA-Setup-Item-ExtIEs } } OPTIONAL,
    ...
}

TNLA-Setup-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

TNLA-Failed-To-Setup-List ::= SEQUENCE (SIZE(1..maxnoofTNLAAssociations)) OF TNLA-Failed-To-Setup-Item

TNLA-Failed-To-Setup-Item ::= SEQUENCE {
    tNLAssociationTransportLayerAddress    CPTransportLayerInformation,
    cause                                  Cause,
    iE-Extensions                          ProtocolExtensionContainer { { TNLA-Failed-To-Setup-Item-ExtIEs } } OPTIONAL
}

TNLA-Failed-To-Setup-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

TNLAAssociationUsage ::= ENUMERATED {
    ue,
    non-ue,
    both,
    ...
}

TNLCapacityIndicator ::= SEQUENCE {
    dlTNLMaximumOfferedCapacity           INTEGER (1..16777216, ...),
    dlTNLAvailableCapacity                 INTEGER (0..100, ...),
    ulTNLMaximumOfferedCapacity           INTEGER (1..16777216, ...),
    ulTNLAvailableCapacity                 INTEGER (0..100, ...),
    iE-Extensions                          ProtocolExtensionContainer { { TNLCapacityIndicator-ExtIEs } } OPTIONAL,
    ...
}

TNLCapacityIndicator-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

Transport-UP-Layer-Addresses-Info-To-Add-List ::= SEQUENCE (SIZE(1.. maxnoofTLAs)) OF Transport-UP-Layer-Addresses-Info-To-Add-Item

Transport-UP-Layer-Addresses-Info-To-Add-Item ::= SEQUENCE {
    iP-SecTransportLayerAddress      TransportLayerAddress,
    gTPTransportLayerAddressesToAdd  GTPTLAs                               OPTIONAL,
    iE-Extensions                    ProtocolExtensionContainer { { Transport-UP-Layer-Addresses-Info-To-Add-ItemExtIEs } }  OPTIONAL,
    ...
}

Transport-UP-Layer-Addresses-Info-To-Add-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

Transport-UP-Layer-Addresses-Info-To-Remove-List ::= SEQUENCE (SIZE(1.. maxnoofTLAs)) OF Transport-UP-Layer-Addresses-Info-To-Remove-Item

Transport-UP-Layer-Addresses-Info-To-Remove-Item ::= SEQUENCE {
    iP-SecTransportLayerAddress      TransportLayerAddress,
    gTPTransportLayerAddressesToRemove GTPTLAs                               OPTIONAL,
    iE-Extensions                    ProtocolExtensionContainer { { Transport-UP-Layer-Addresses-Info-To-Remove-ItemExtIEs } }  OPTIONAL,
    ...
}

Transport-UP-Layer-Addresses-Info-To-Remove-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

TNLConfigurationInfo ::= SEQUENCE {
    transport-UP-Layer-Addresses-Info-To-Add-List      Transport-UP-Layer-Addresses-Info-To-Add-List      OPTIONAL,
    transport-UP-Layer-Addresses-Info-To-Remove-List  Transport-UP-Layer-Addresses-Info-To-Remove-List  OPTIONAL,
    iE-Extensions  ProtocolExtensionContainer { { TNLConfigurationInfo-ExtIEs } }  OPTIONAL,
    ...
}

TNLConfigurationInfo-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

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} |
    { ID id-MDTConfigurationNR        CRITICALITY ignore EXTENSION MDT-ConfigurationNR        PRESENCE optional} |
    { ID id-TraceCollectionEntityURI  CRITICALITY ignore EXTENSION URI-Address          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, ...))

TransportLayerAddressAndPort ::= SEQUENCE {
    endpointIPAddress TransportLayerAddress,
    portnumber Port-Number
}

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-SlAP-ID ::= INTEGER (0.. 4294967295)

UE-X2AP-ID ::= INTEGER (0..4095)

UE-X2AP-ID-Extension ::= INTEGER (0..4095, ...)

UERadioCapability ::= OCTET STRING

UERadioCapabilityID ::= OCTET STRING

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,
    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)

```



```
UnlicensedSpectrumRestriction ::= ENUMERATED {
    unlicensed-restricted,
    ...
}

URI-Address ::= VisibleString

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 {
    usable-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
id-handoverSuccess	ProcedureCode ::= 49
id-conditionalHandoverCancel	ProcedureCode ::= 50
id-earlyStatusTransfer	ProcedureCode ::= 51
id-cellTrafficTrace	ProcedureCode ::= 52
id-endcresourceStatusReporting	ProcedureCode ::= 53
id-endcresourceStatusReportingInitiation	ProcedureCode ::= 54
id-f1CTrafficTransfer	ProcedureCode ::= 55
id-UERadioCapabilityIDMapping	ProcedureCode ::= 56

-- *****

--

-- Lists

```

--
-- *****
maxEARFCN                INTEGER ::= 65535
maxEARFCNPlusOne        INTEGER ::= 65536
newmaxEARFCN            INTEGER ::= 262143
maxInterfaces            INTEGER ::= 16
maxCelllineNB           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
maxnoofTLAs             INTEGER ::= 16
maxnoofGTPTLAs          INTEGER ::= 16
maxnoofTNLAssociations  INTEGER ::= 32
maxnoofCellsInCHO       INTEGER ::= 8

```

```

maxnoofPC5QoSFlows          INTEGER ::= 2048
maxnoofSSBAreas             INTEGER ::= 64
maxnoofNRSCSs               INTEGER ::= 5
maxnoofNRPhysicalResourceBlocks  INTEGER ::= 275
maxnoofNonAnchorCarrierFreqConfig  INTEGER ::= 15

-- *****
--
-- 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-RSRPMList	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-CSIRreportList	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-uAggregateMaximumBitRateDownlink	ProtocolIE-ID ::= 200
id-extended-uAggregateMaximumBitRateUplink	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-ServedEUTRAcellsToModifyListENDCCConfUpd	ProtocolIE-ID ::= 259
id-ServedEUTRAcellsToDeleteListENDCCConfUpd	ProtocolIE-ID ::= 260
id-ServedNRcellsToModifyListENDCCConfUpd	ProtocolIE-ID ::= 261
id-ServedNRcellsToDeleteListENDCCConfUpd	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-secondarysgNBDLGTPEIDatPDCP	ProtocolIE-ID ::= 312
id-secondarymeNBULGTPEIDatPDCP	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
id-NBIoT-UL-DL-AlignmentOffset	ProtocolIE-ID ::= 338
id-ERABs-transferred-to-MeNB	ProtocolIE-ID ::= 339
id-AdditionalRRMPriorityIndex	ProtocolIE-ID ::= 340
id-LowerLayerPresenceStatusChange	ProtocolIE-ID ::= 341
id-FastMCGRecovery-SN-to-MN	ProtocolIE-ID ::= 342
id-RequestedFastMCGRecoveryViaSRB3	ProtocolIE-ID ::= 343
id-AvailableFastMCGRecoveryViaSRB3	ProtocolIE-ID ::= 344
id-RequestedFastMCGRecoveryViaSRB3Release	ProtocolIE-ID ::= 345
id-ReleaseFastMCGRecoveryViaSRB3	ProtocolIE-ID ::= 346
id-FastMCGRecovery-MN-to-SN	ProtocolIE-ID ::= 347
id-PartialListIndicator	ProtocolIE-ID ::= 348
id-MaximumCellListSize	ProtocolIE-ID ::= 349
id-MessageOversizeNotification	ProtocolIE-ID ::= 350
id-CellandCapacityAssistInfo	ProtocolIE-ID ::= 351
id-TNLConfigurationInfo	ProtocolIE-ID ::= 352
id-TNLA-To-Add-List	ProtocolIE-ID ::= 353
id-TNLA-To-Update-List	ProtocolIE-ID ::= 354
id-TNLA-To-Remove-List	ProtocolIE-ID ::= 355
id-TNLA-Setup-List	ProtocolIE-ID ::= 356
id-TNLA-Failed-To-Setup-List	ProtocolIE-ID ::= 357
id-UnlicensedSpectrumRestriction	ProtocolIE-ID ::= 358
id-UEContextReferenceatSourceNGRAN	ProtocolIE-ID ::= 359
id-EPCHandoverRestrictionListContainer	ProtocolIE-ID ::= 360
id-CHOinformation-REQ	ProtocolIE-ID ::= 361
id-CHOinformation-ACK	ProtocolIE-ID ::= 362
id-DAPSRequestInfo	ProtocolIE-ID ::= 363
id-RequestedTargetCellID	ProtocolIE-ID ::= 364
id-CandidateCellsToBeCancelledList	ProtocolIE-ID ::= 365
id-DAPSResponseInfo	ProtocolIE-ID ::= 366
id-ProcedureStage	ProtocolIE-ID ::= 367
id-CHO-DC-Indicator	ProtocolIE-ID ::= 368
id-Ethernet-Type	ProtocolIE-ID ::= 369
id-NRV2XServicesAuthorized	ProtocolIE-ID ::= 370
id-NRUESidelinkAggregateMaximumBitRate	ProtocolIE-ID ::= 371
id-PC5QoSParameters	ProtocolIE-ID ::= 372
id-NPRACHConfiguration	ProtocolIE-ID ::= 373
id-NBIoT-RLF-Report-Container	ProtocolIE-ID ::= 374
id-MDTConfigurationNR	ProtocolIE-ID ::= 375

id-PrivacyIndicator	ProtocolIE-ID ::= 376
id-TraceCollectionEntityIPAddress	ProtocolIE-ID ::= 377
id-UERadioCapabilityID	ProtocolIE-ID ::= 378
id-SNtriggered	ProtocolIE-ID ::= 379
id-CSI-RSTransmissionIndication	ProtocolIE-ID ::= 380
id-DLCarrierList	ProtocolIE-ID ::= 381
id-TargetCellInNCRAN	ProtocolIE-ID ::= 382
id-E-UTRAN-Node1-Measurement-ID	ProtocolIE-ID ::= 383
id-E-UTRAN-Node2-Measurement-ID	ProtocolIE-ID ::= 384
id-TDDULDLConfigurationCommonNR	ProtocolIE-ID ::= 385
id-CarrierList	ProtocolIE-ID ::= 386
id-ULCarrierList	ProtocolIE-ID ::= 387
id-FrequencyShift7p5khz	ProtocolIE-ID ::= 388
id-SSB-PositionsInBurst	ProtocolIE-ID ::= 389
id-NRCellPRACHConfig	ProtocolIE-ID ::= 390
id-CellToReport-NR-ENDC	ProtocolIE-ID ::= 391
id-CellToReport-NR-ENDC-Item	ProtocolIE-ID ::= 392
id-CellMeasurementResult-NR-ENDC	ProtocolIE-ID ::= 393
id-CellMeasurementResult-NR-ENDC-Item	ProtocolIE-ID ::= 394
id-IABNodeIndication	ProtocolIE-ID ::= 395
id-QoS-Mapping-Information	ProtocolIE-ID ::= 396
id-FlCTrafficContainer	ProtocolIE-ID ::= 397
id-IntendedTDD-DL-ULConfiguration-NR	ProtocolIE-ID ::= 399
id-UERadioCapability	ProtocolIE-ID ::= 400
id-CellMeasurementResult-E-UTRA-ENDC	ProtocolIE-ID ::= 401
id-CellMeasurementResult-E-UTRA-ENDC-Item	ProtocolIE-ID ::= 402
id-CellToReport-E-UTRA-ENDC	ProtocolIE-ID ::= 403
id-CellToReport-E-UTRA-ENDC-Item	ProtocolIE-ID ::= 404
id-TraceCollectionEntityURI	ProtocolIE-ID ::= 405
id-SFN-Offset	ProtocolIE-ID ::= 406
id-CHO-DC-EarlyDataForwarding	ProtocolIE-ID ::= 407
id-IMSvoiceEPSfallbackfrom5G	ProtocolIE-ID ::= 408
id-AdditionLocationInformation	ProtocolIE-ID ::= 409
id-DirectForwardingPathAvailability	ProtocolIE-ID ::= 410
id-sourceNG-RAN-node-id	ProtocolIE-ID ::= 411
id-SourceDLForwardingIPAddress	ProtocolIE-ID ::= 412
id-SourceNodeDLForwardingIPAddress	ProtocolIE-ID ::= 413

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

$T_{\text{RELOCprep}}$

- Specifies the maximum time for the Handover Preparation procedure in the source eNB.

$T_{\text{X2RELOCoverall}}$

- 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.

$T_{\text{DCoverall}}$

- 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 ClOT 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
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06/2018	RP-80	RP-181410	1107	4	F	Addition of the full config indicator	15.2.0
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06/2018	RP-80	RP-181239	1117	2	F	Correction of abnormal conditions for EN-DC security algorithm selection	15.2.0
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12/2018	RP-82	RP-182447	1253	3	F	Corrections of MeNB/SgNB resource coordination	15.4.0
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2021-03	RP-91-e	RP-210239	1580	1	F	Cause value on X2 for normal release CR 38.423	16.5.0
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2021-06	RP-92-e	RP-211333	1600	2	F	Correction on SN initiated SN Modification procedure for EN-DC	16.6.0
2021-06	RP-92-e	RP-211328	1603	1	F	Addition of MeNB to SN sidelink resource coordination	16.6.0
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2022-03	RP-95-e	RP-220279	1639	3	F	Dynamic ACL over X2 CR 36.423	16.9.0
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History

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