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**LTE;  
Evolved Universal Terrestrial  
Radio Access Network (E-UTRAN);  
X2 Application Protocol (X2AP)  
(3GPP TS 36.423 version 14.4.0 Release 14)**



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Keywords

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## Contents

Intellectual Property Rights .....	2
Foreword.....	2
Modal verbs terminology.....	2
Foreword.....	9
1 Scope .....	10
2 References .....	10
3 Definitions, symbols and abbreviations .....	11
3.1 Definitions.....	11
3.2 Symbols.....	12
3.3 Abbreviations .....	12
4 General .....	13
4.1 Procedure specification principles.....	13
4.2 Forwards and backwards compatibility.....	13
4.3 Specification notations .....	13
5 X2AP services .....	13
5.1 X2AP procedure modules .....	14
5.2 Parallel transactions.....	14
6 Services expected from signalling transport.....	14
7 Functions of X2AP .....	14
8 X2AP procedures .....	15
8.1 Elementary procedures .....	15
8.2 Basic mobility procedures .....	17
8.2.1 Handover Preparation .....	17
8.2.1.1 General.....	17
8.2.1.2 Successful Operation.....	17
8.2.1.3 Unsuccessful Operation .....	19
8.2.1.4 Abnormal Conditions .....	20
8.2.2 SN Status Transfer .....	20
8.2.2.1 General.....	20
8.2.2.2 Successful Operation.....	21
8.2.2.3 Abnormal Conditions .....	21
8.2.3 UE Context Release .....	21
8.2.3.1 General.....	21
8.2.3.2 Successful Operation.....	22
8.2.3.3 Unsuccessful Operation .....	23
8.2.3.4 Abnormal Conditions .....	23
8.2.4 Handover Cancel .....	23
8.2.4.1 General.....	23
8.2.4.2 Successful Operation.....	23
8.2.4.3 Unsuccessful Operation .....	23
8.2.4.4 Abnormal Conditions .....	23
8.3 Global Procedures .....	24
8.3.1 Load Indication.....	24
8.3.1.1 General.....	24
8.3.1.2 Successful Operation.....	24
8.3.1.3 Unsuccessful Operation .....	25
8.3.1.4 Abnormal Conditions .....	25
8.3.2 Error Indication.....	25
8.3.2.1 General.....	25
8.3.2.2 Successful Operation.....	26
8.3.2.3 Unsuccessful Operation .....	26

8.3.2.4	Abnormal Conditions .....	26
8.3.3	X2 Setup .....	26
8.3.3.1	General .....	26
8.3.3.2	Successful Operation.....	26
8.3.3.3	Unsuccessful Operation .....	28
8.3.3.4	Abnormal Conditions .....	28
8.3.4	Reset .....	28
8.3.4.1	General.....	28
8.3.4.2	Successful Operation.....	29
8.3.4.3	Unsuccessful Operation .....	29
8.3.4.4	Abnormal Conditions .....	29
8.3.5	eNB Configuration Update .....	29
8.3.5.1	General .....	29
8.3.5.2	Successful Operation.....	29
8.3.5.3	Unsuccessful Operation .....	31
8.3.5.4	Abnormal Conditions .....	32
8.3.6	Resource Status Reporting Initiation .....	32
8.3.6.1	General .....	32
8.3.6.2	Successful Operation.....	32
8.3.6.3	Unsuccessful Operation .....	33
8.3.6.4	Abnormal Conditions .....	34
8.3.7	Resource Status Reporting.....	34
8.3.7.1	General .....	34
8.3.7.2	Successful Operation.....	35
8.3.7.3	Unsuccessful Operation .....	35
8.3.7.4	Abnormal Conditions .....	35
8.3.8	Mobility Settings Change .....	35
8.3.8.1	General .....	35
8.3.8.2	Successful Operation.....	36
8.3.8.3	Unsuccessful Operation .....	36
8.3.8.4	Abnormal Conditions .....	36
8.3.9	Radio Link Failure Indication.....	36
8.3.9.1	General .....	36
8.3.9.2	Successful Operation.....	37
8.3.9.3	Unsuccessful Operation .....	37
8.3.9.4	Abnormal Conditions .....	37
8.3.10	Handover Report.....	37
8.3.10.1	General .....	37
8.3.10.2	Successful Operation.....	38
8.3.10.3	Unsuccessful Operation .....	38
8.3.10.4	Abnormal Conditions .....	38
8.3.11	Cell Activation.....	38
8.3.11.1	General .....	38
8.3.11.2	Successful Operation.....	39
8.3.11.3	Unsuccessful Operation .....	39
8.3.11.4	Abnormal Conditions .....	39
8.3.12	X2 Removal.....	39
8.3.12.1	General .....	39
8.3.12.2	Successful Operation.....	40
8.3.12.3	Unsuccessful Operation .....	40
8.3.12.4	Abnormal Conditions .....	40
8.3.13	Retrieve UE Context.....	40
8.3.13.1	General .....	40
8.3.13.2	Successful Operation.....	41
8.3.13.3	Unsuccessful Operation .....	42
8.3.13.4	Abnormal Conditions .....	42
8.4	X2 Release.....	42
8.4.1	General.....	42
8.4.2	Successful Operation .....	42
8.4.3	Unsuccessful Operation .....	42
8.4.4	Abnormal Condition .....	42
8.5	X2AP Message Transfer .....	43

8.5.1	General.....	43
8.5.2	Successful Operation.....	43
8.5.3	Unsuccessful Operation .....	43
8.5.4	Abnormal Condition .....	43
8.6	Procedures for Dual Connectivity .....	43
8.6.1	SeNB Addition Preparation .....	43
8.6.1.1	General .....	43
8.6.1.2	Successful Operation.....	44
8.6.1.3	Unsuccessful Operation .....	45
8.6.1.4	Abnormal Conditions .....	45
8.6.2	SeNB Reconfiguration Completion .....	46
8.6.2.1	General .....	46
8.6.2.2	Successful Operation.....	46
8.6.2.3	Abnormal Conditions .....	46
8.6.3	MeNB initiated SeNB Modification Preparation.....	47
8.6.3.1	General .....	47
8.6.3.2	Successful Operation.....	47
8.6.3.3	Unsuccessful Operation .....	49
8.6.3.4	Abnormal Conditions .....	49
8.6.4	SeNB initiated SeNB Modification .....	50
8.6.4.1	General .....	50
8.6.4.2	Successful Operation.....	50
8.6.4.3	Unsuccessful Operation .....	51
8.6.4.4	Abnormal Conditions .....	51
8.6.5	MeNB initiated SeNB Release.....	52
8.6.5.1	General .....	52
8.6.5.2	Successful Operation.....	52
8.6.5.3	Unsuccessful Operation .....	52
8.6.5.4	Abnormal Conditions .....	52
8.6.6	SeNB initiated SeNB Release.....	53
8.6.6.1	General .....	53
8.6.6.2	Successful Operation.....	53
8.6.6.3	Unsuccessful Operation .....	53
8.6.6.4	Abnormal Conditions .....	53
8.6.7	SeNB Counter Check.....	53
8.6.7.1	General .....	53
8.6.7.2	Successful Operation.....	54
8.6.7.3	Unsuccessful Operation .....	54
8.6.7.4	Abnormal Conditions .....	54
9	Elements for X2AP Communication.....	54
9.0	General .....	54
9.1	Message Functional Definition and Content .....	54
9.1.1	Messages for Basic Mobility Procedures.....	54
9.1.1.1	HANDOVER REQUEST .....	54
9.1.1.2	HANDOVER REQUEST ACKNOWLEDGE.....	56
9.1.1.3	HANDOVER PREPARATION FAILURE .....	58
9.1.1.4	SN STATUS TRANSFER .....	58
9.1.1.5	UE CONTEXT RELEASE .....	60
9.1.1.6	HANDOVER CANCEL .....	61
9.1.2	Messages for global procedures.....	61
9.1.2.1	LOAD INFORMATION.....	61
9.1.2.2	ERROR INDICATION.....	62
9.1.2.3	X2 SETUP REQUEST.....	63
9.1.2.4	X2 SETUP RESPONSE.....	64
9.1.2.5	X2 SETUP FAILURE.....	65
9.1.2.6	RESET REQUEST .....	66
9.1.2.7	RESET RESPONSE .....	66
9.1.2.8	ENB CONFIGURATION UPDATE .....	66
9.1.2.9	ENB CONFIGURATION UPDATE ACKNOWLEDGE .....	69
9.1.2.10	ENB CONFIGURATION UPDATE FAILURE.....	69
9.1.2.11	RESOURCE STATUS REQUEST .....	69

9.1.2.12	RESOURCE STATUS RESPONSE .....	71
9.1.2.13	RESOURCE STATUS FAILURE .....	73
9.1.2.14	RESOURCE STATUS UPDATE .....	74
9.1.2.15	MOBILITY CHANGE REQUEST .....	74
9.1.2.16	MOBILITY CHANGE ACKNOWLEDGE .....	75
9.1.2.17	MOBILITY CHANGE FAILURE .....	75
9.1.2.18	RLF INDICATION .....	75
9.1.2.19	HANDOVER REPORT .....	76
9.1.2.20	CELL ACTIVATION REQUEST .....	77
9.1.2.21	CELL ACTIVATION RESPONSE .....	78
9.1.2.22	CELL ACTIVATION FAILURE .....	78
9.1.2.23	X2 RELEASE .....	78
9.1.2.24	X2AP MESSAGE TRANSFER .....	78
9.1.2.25	X2 REMOVAL REQUEST .....	79
9.1.2.26	X2 REMOVAL RESPONSE .....	79
9.1.2.27	X2 REMOVAL FAILURE .....	79
9.1.2.28	RETRIEVE UE CONTEXT REQUEST .....	79
9.1.2.29	RETRIEVE UE CONTEXT RESPONSE .....	80
9.1.2.30	RETRIEVE UE CONTEXT FAILURE .....	82
9.1.3	Messages for Dual Connectivity Procedures .....	82
9.1.3.1	SENB ADDITION REQUEST .....	82
9.1.3.2	SENB ADDITION REQUEST ACKNOWLEDGE .....	84
9.1.3.3	SENB ADDITION REQUEST REJECT .....	86
9.1.3.4	SENB RECONFIGURATION COMPLETE .....	86
9.1.3.5	SENB MODIFICATION REQUEST .....	87
9.1.3.6	SENB MODIFICATION REQUEST ACKNOWLEDGE .....	89
9.1.3.7	SENB MODIFICATION REQUEST REJECT .....	91
9.1.3.8	SENB MODIFICATION REQUIRED .....	92
9.1.3.9	SENB MODIFICATION CONFIRM .....	92
9.1.3.10	SENB MODIFICATION REFUSE .....	93
9.1.3.11	SENB RELEASE REQUEST .....	94
9.1.3.12	SENB RELEASE REQUIRED .....	94
9.1.3.13	SENB RELEASE CONFIRM .....	95
9.1.3.14	SENB COUNTER CHECK REQUEST .....	96
9.2	Information Element definitions .....	97
9.2.0	General .....	97
9.2.1	GTP Tunnel Endpoint .....	97
9.2.2	Trace Activation .....	98
9.2.3	Handover Restriction List .....	98
9.2.4	PLMN Identity .....	99
9.2.5	DL Forwarding .....	100
9.2.6	Cause .....	100
9.2.7	Criticality Diagnostics .....	105
9.2.8	Served Cell Information .....	106
9.2.9	E-RAB Level QoS Parameters .....	109
9.2.10	GBR QoS Information .....	110
9.2.11	Bit Rate .....	110
9.2.12	UE Aggregate Maximum Bit Rate .....	111
9.2.13	Message Type .....	111
9.2.14	ECGI .....	111
9.2.15	COUNT Value .....	111
9.2.16	GUMMEI .....	112
9.2.17	UL Interference Overload Indication .....	112
9.2.18	UL High Interference Indication .....	112
9.2.19	Relative Narrowband Tx Power (RNTP) .....	112
9.2.20	GU Group Id .....	115
9.2.21	Location Reporting Information .....	115
9.2.22	Global eNB ID .....	115
9.2.23	E-RAB ID .....	115
9.2.24	eNB UE X2AP ID .....	116
9.2.25	Subscriber Profile ID for RAT/Frequency priority .....	116
9.2.26	EARFCN .....	116

9.2.27	Transmission Bandwidth .....	116
9.2.28	E-RAB List .....	116
9.2.29	UE Security Capabilities.....	117
9.2.30	AS Security Information.....	117
9.2.31	Allocation and Retention Priority .....	118
9.2.32	Time To Wait.....	118
9.2.33	SRVCC Operation Possible .....	119
9.2.34	Hardware Load Indicator .....	119
9.2.35	S1 TNL Load Indicator .....	119
9.2.36	Load Indicator.....	119
9.2.37	Radio Resource Status .....	119
9.2.38	UE History Information .....	119
9.2.39	Last Visited Cell Information .....	120
9.2.40	Last Visited E-UTRAN Cell Information.....	120
9.2.41	Last Visited GERAN Cell Information.....	120
9.2.42	Cell Type .....	121
9.2.43	Number of Antenna Ports .....	121
9.2.44	Composite Available Capacity Group .....	121
9.2.45	Composite Available Capacity .....	121
9.2.46	Cell Capacity Class Value .....	122
9.2.47	Capacity Value.....	122
9.2.48	Mobility Parameters Information.....	122
9.2.49	Mobility Parameters Modification Range.....	122
9.2.50	PRACH Configuration.....	123
9.2.51	Subframe Allocation .....	123
9.2.52	CSG Membership Status.....	123
9.2.53	CSG ID .....	123
9.2.54	ABS Information .....	123
9.2.55	Invoke Indication .....	125
9.2.56	MDT Configuration .....	125
9.2.57	Void .....	128
9.2.58	ABS Status.....	128
9.2.59	Management Based MDT Allowed .....	129
9.2.60	MultibandInfoList.....	129
9.2.61	M3 Configuration .....	129
9.2.62	M4 Configuration .....	129
9.2.63	M5 Configuration .....	129
9.2.64	MDT PLMN List .....	130
9.2.65	EARFCN Extension.....	130
9.2.66	COUNT Value Extended .....	130
9.2.67	Extended UL Interference Overload Info .....	130
9.2.68	RNL Header.....	131
9.2.69	Masked IMEISV .....	131
9.2.70	Expected UE Behaviour.....	132
9.2.71	Expected UE Activity Behaviour.....	132
9.2.72	SeNB Security Key .....	132
9.2.73	SCG Change Indication .....	133
9.2.74	CoMP Information .....	133
9.2.75	CoMP Hypothesis Set.....	133
9.2.76	RSRP Measurement Report List.....	134
9.2.77	Dynamic DL transmission information.....	135
9.2.78	ProSe Authorized.....	135
9.2.79	CSI Report .....	135
9.2.80	Wideband CQI.....	136
9.2.81	Subband CQI .....	136
9.2.82	COUNT Value for PDCP SN Length 18 .....	137
9.2.83	LHN ID .....	137
9.2.84	Correlation ID .....	137
9.2.85	UE Context Kept Indicator .....	137
9.2.86	eNB UE X2AP ID Extension.....	138
9.2.87	M6 Configuration .....	138
9.2.88	M7 Configuration .....	138

9.2.89	Tunnel Information .....	138
9.2.90	X2 Benefit Value .....	139
9.2.91	Resume ID .....	139
9.2.92	Bearer Type .....	139
9.2.93	V2X Services Authorized .....	140
9.2.94	Offset of NB-IoT Channel Number to EARFCN .....	140
9.2.95	WT ID .....	140
9.2.96	WT UE XwAP ID .....	140
9.2.97	UE Sidelink Aggregate Maximum Bit Rate .....	140
9.3	Message and Information Element Abstract Syntax (with ASN.1) .....	141
9.3.1	General .....	141
9.3.2	Usage of Private Message Mechanism for Non-standard Use .....	141
9.3.3	Elementary Procedure Definitions .....	141
9.3.4	PDU Definitions .....	149
9.3.5	Information Element definitions .....	189
9.3.6	Common definitions .....	226
9.3.7	Constant definitions .....	227
9.3.8	Container definitions .....	232
9.4	Message transfer syntax .....	236
9.5	Timers .....	236
10	Handling of unknown, unforeseen and erroneous protocol data .....	236
<b>Annex A (informative):</b>	<b>Change history .....</b>	<b>237</b>
History .....	242	

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## Foreword

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## 1 Scope

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

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## 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 signalling transport".
- [22] 3GPP TS 36.314: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Layer 2 - Measurements".
- [23] Void.
- [24] 3GPP TS 25.413: "UTRAN Iu interface RANAP signalling"
- [25] 3GPP TS 37.320: "Universal Terrestrial Radio Access (UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRA); Radio measurement collection for Minimization of Drive Tests (MDT);Overall description; Stage 2".
- [26] 3GPP TS 29.281: "General Packet Radio Service (GPRS); Tunnelling Protocol User Plane (GTPv1-U)".
- [27] ITU-T Recommendation X.680 (2002-07): "Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation".
- [28] ITU-T Recommendation X.681 (2002-07): "Information technology – Abstract Syntax Notation One (ASN.1): Information object specification".
- [29] 3GPP TS 23.003: "Technical Specification Group Core Network and Terminals; Numbering, addressing and identification".
- [30] 3GPP TR 25.921 (version.7.0.0): "Guidelines and principles for protocol description and error handling".

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

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

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

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

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

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

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

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

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

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

## 3.2 Symbols

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

<symbol>      <Explanation>

## 3.3 Abbreviations

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

ABS	Almost Blank Subframe
BBF	Broadband Forum
BL	Bandwidth reduced Low complexity
CCO	Cell Change Order
CE	Coverage Enhancement
CoMP	Coordinated Multi Point
DC	Dual Connectivity
DL	Downlink
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
E-CID	Enhanced Cell-ID (positioning method)
eNB	E-UTRAN NodeB
EP	Elementary Procedure
EPC	Evolved Packet Core
E-RAB	E-UTRAN Radio Access Bearer
E-UTRAN	Evolved UTRAN
GNSS	Global Navigation Satellite System
GUMMEI	Globally Unique MME Identifier
HFN	Hyper Frame Number
IE	Information Element
L-GW	Local GateWay
LWA	LTE-WLAN Aggregation
MCG	Master Cell Group
MDT	Minimization of Drive Tests
MeNB	Master eNB
MME	Mobility Management Entity
NAICS	Network-Assisted Interference Cancellation and Suppression
PDCP	Packet Data Convergence Protocol
PLMN	Public Land Mobile Network
ProSe	Proximity Service
SCG	Secondary Cell Group
S-GW	Serving Gateway
SeNB	Secondary eNB
SIPTO	Selected IP Traffic Offload
SIPTO@LN	Selected IP Traffic Offload at the Local Network
SN	Sequence Number
TAC	Tracking Area Code
UE	User Equipment
UL	Uplink
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. HANOVER 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.
- Load Management. This function is used by eNBs to indicate resource status, overload and traffic load to each other.
- Reporting of General Error Situations. This function allows reporting of general error situations, for which function specific error messages have not been defined.
- Resetting the X2. This function is used to reset the X2 interface.
- Setting up the X2. This function is used to exchange necessary data for the eNB for setup the X2 interface and implicitly perform an X2 Reset.
- eNB Configuration Update. This function allows updating of application level data needed for two eNBs to interoperate correctly over the X2 interface.
- Mobility Parameters Management. This function allows the eNB to coordinate adaptation of mobility parameter settings with a peer eNB.
- Mobility Robustness Optimisation. This function allows reporting of information related to mobility failure events.
- Energy Saving. This function allows decreasing energy consumption by enabling indication of cell activation/deactivation over the X2 interface.
- X2 Release. This function allows an eNB to be aware that the signalling connection to a peer eNB is unavailable.

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

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

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

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

## 8 X2AP procedures

### 8.1 Elementary procedures

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

**Table 8.1-1: Class 1 Elementary Procedures**

<b>Elementary Procedure</b>	<b>Initiating Message</b>	<b>Successful Outcome</b>	<b>Unsuccessful Outcome</b>
		<b>Response message</b>	<b>Response message</b>
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

**Table 8.1-2: Class 2 Elementary Procedures**

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

## 8.2 Basic mobility procedures

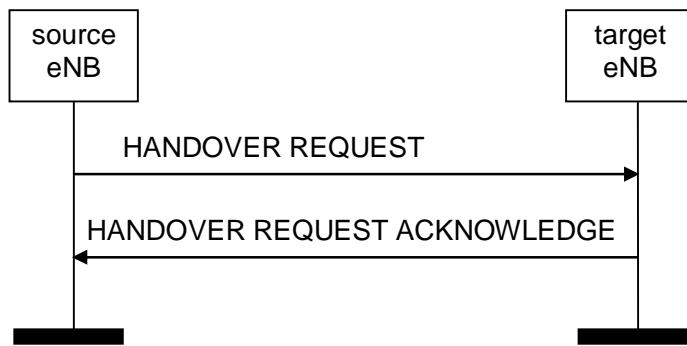
### 8.2.1 Handover Preparation

#### 8.2.1.1 General

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

The procedure uses UE-associated signalling.

#### 8.2.1.2 Successful Operation



**Figure 8.2.1.2-1: Handover Preparation, successful operation**

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

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

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

If at least one of the requested non-GBR E-RABs is admitted to the cell indicated by the *Target Cell ID IE*, the target eNB shall reserve necessary resources, and send the 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. 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 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  $T_{RELOCprep}$ , start the timer  $T_{X2RELOCoverall}$  and terminate the Handover Preparation procedure. The source eNB is then defined to have a Prepared Handover for that X2 UE-associated signalling.

If the *Trace Activation* IE is included in the 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 *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].

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).

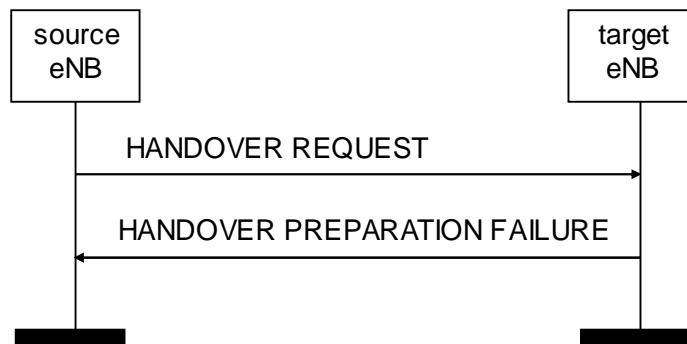
If the *V2X Services Authorized* IE is contained in the HANOVER REQUEST message and it contains one or more IEs set to "authorized", the eNB shall, if supported, consider that the UE is authorized for the relevant service(s).

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

If the *UE Sidelink Aggregate Maximum Bit Rate* IE is contained in the 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.

### 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.

#### Interactions with Handover Cancel procedure:

If there is no response from the target eNB to the HANOVER REQUEST message before timer T<sub>RELOCprep</sub> 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 HANOVER 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 HANOVER PREPARATION FAILURE message.

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

## 8.2.2 SN Status Transfer

### 8.2.2.1 General

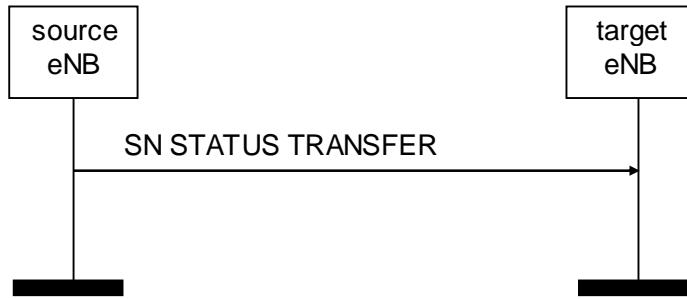
The purpose of the SN Status Transfer procedure is to transfer the uplink PDCP SN and HFN receiver status and the downlink PDCP SN and HFN transmitter status either, from the source to the target eNB during an X2 handover, or between the eNBs involved in dual connectivity and/or LWA, for each respective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

If the SN Status Transfer procedure is applied in the course of dual connectivity and/or LWA, 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 and/or LWA 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 and/or LWA to which data is forwarded, is specified by the behaviour of the "target eNB".

The procedure uses UE-associated signalling.

### 8.2.2.2 Successful Operation



**Figure 8.2.2.2-1: SN Status Transfer, successful operation**

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

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

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

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

### 8.2.2.3 Abnormal Conditions

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

## 8.2.3 UE Context Release

### 8.2.3.1 General

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

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

The procedure uses UE-associated signalling.

### 8.2.3.2 Successful Operation



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



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

#### Handover

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

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

#### Dual Connectivity

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

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

#### Interaction with the MeNB initiated SeNB Release procedure:

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

### 8.2.3.3 Unsuccessful Operation

Not applicable.

### 8.2.3.4 Abnormal Conditions

If the UE Context Release procedure is not initiated towards the source eNB from any prepared eNB before the expiry of the timer  $\text{TX2}_{\text{RELOCoverall}}$ , 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  $\text{TX2}_{\text{RELOCoverall}}$ , the source eNB shall stop the  $\text{TX2}_{\text{RELOCoverall}}$  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.

### 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.

## 8.3 Global Procedures

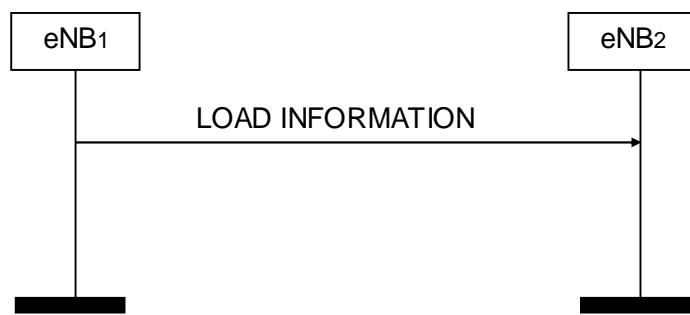
### 8.3.1 Load Indication

#### 8.3.1.1 General

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

The procedure uses non UE-associated signalling.

#### 8.3.1.2 Successful Operation



**Figure 8.3.1.2-1: Load Indication, successful operation**

An eNB<sub>1</sub> initiates the procedure by sending LOAD INFORMATION message to a peer eNB<sub>2</sub>.

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

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

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

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

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

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

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

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

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

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

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

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

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

### 8.3.1.3 Unsuccessful Operation

Not applicable.

### 8.3.1.4 Abnormal Conditions

Void.

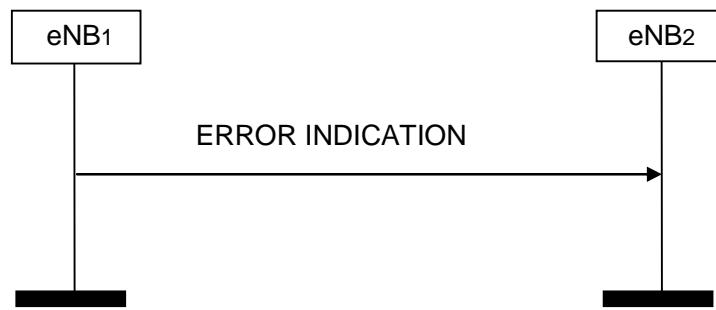
## 8.3.2 Error Indication

### 8.3.2.1 General

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

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

### 8.3.2.2 Successful Operation



**Figure 8.3.2.2-1: Error Indication, successful operation.**

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

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

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

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

### 8.3.2.3 Unsuccessful Operation

Not applicable.

### 8.3.2.4 Abnormal Conditions

Not applicable.

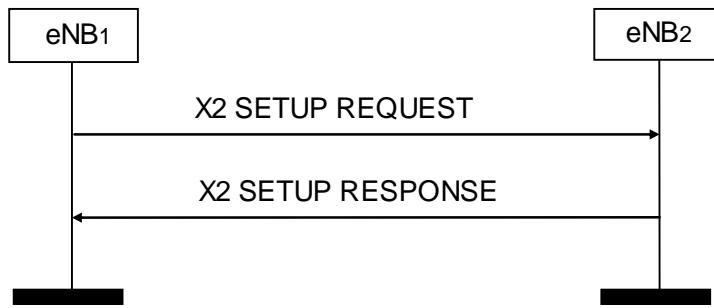
## 8.3.3 X2 Setup

### 8.3.3.1 General

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

The procedure uses non UE-associated signalling.

### 8.3.3.2 Successful Operation



**Figure 8.3.3.2-1: X2 Setup, successful operation**

An eNB<sub>1</sub> initiates the procedure by sending the X2 SETUP REQUEST message to a candidate eNB<sub>2</sub>. The candidate eNB<sub>2</sub> replies with the X2 SETUP RESPONSE message. The initiating eNB<sub>1</sub> shall transfer the complete list of its served cells and, if available, a list of supported GU Group Ids to the candidate eNB<sub>2</sub>. The candidate eNB<sub>2</sub> shall reply with the complete list of its served cells and shall include, if available, a list of supported GU Group Ids in the reply.

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

The initiating eNB<sub>1</sub> may include the *Neighbour Information IE* in the X2 SETUP REQUEST message. The candidate eNB<sub>2</sub> may also include the *Neighbour Information IE* in the X2 SETUP RESPONSE message. The *Neighbour Information IE* shall only include E-UTRAN cells that are direct neighbours of cells in the reporting eNB. A direct neighbour of one cell of a given eNB may be any cell belonging to an eNB that is a neighbour of that given eNB cell e.g. even if the cell has not been reported by a UE. The initiating eNB<sub>1</sub> may include the *TAC IE* with the *Neighbour Information IE* in the X2 SETUP REQUEST message. The candidate eNB<sub>2</sub> may also include the *TAC IE* with the *Neighbour Information IE* in the X2 SETUP RESPONSE message. The eNB receiving the IE may use it according to TS 36.300 [15].

The initiating eNB<sub>1</sub> may include the *Number of Antenna Ports IE* in the X2 SETUP REQUEST message. The candidate eNB<sub>2</sub> may also include the *Number of Antenna Ports IE* in the X2 SETUP RESPONSE message. The eNB receiving the IE may use it according to TS 36.331 [9].

The initiating eNB<sub>1</sub> may include the *PRACH Configuration IE* in the X2 SETUP REQUEST message. The candidate eNB<sub>2</sub> may also include the *PRACH Configuration IE* in the X2 SETUP RESPONSE message. The eNB receiving the IE may use this information for RACH optimisation.

The initiating eNB<sub>1</sub> may include the *MBSFN Subframe Info IE* in the X2 SETUP REQUEST message. The candidate eNB<sub>2</sub> may also include the *MBSFN Subframe Info IE* in the X2 SETUP RESPONSE message. The eNB receiving the IE may use it according to TS 36.331 [9].

For each CSG cell or hybrid cell served by the initiating eNB<sub>1</sub> the X2 SETUP REQUEST message shall contain the *CSG ID IE*. For each CSG cell or hybrid cell served by the candidate eNB<sub>2</sub> the X2 SETUP RESPONSE message shall contain the *CSG ID IE*. The eNB receiving the IE shall take this information into account when further deciding whether X2 handover between the source cell and the target cell may be performed.

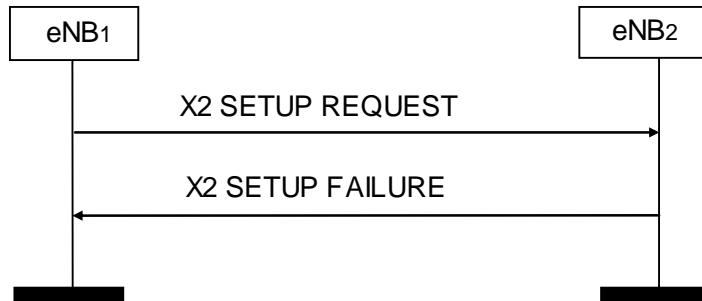
The initiating eNB<sub>1</sub> may include the *MBMS Service Area Identity List IE* in the X2 SETUP REQUEST message. The candidate eNB<sub>2</sub> may also include the *MBMS Service Area Identity List IE* in the X2 SETUP RESPONSE message. The eNB receiving the IE may use it according to TS 36.300 [15].

For each cell served by the initiating eNB<sub>1</sub> the X2 SETUP REQUEST message may contain the *MultibandInfoList IE* and may also contain the *FreqBandIndicatorPriority IE*. For each cell served by the candidate eNB<sub>2</sub> the X2 SETUP RESPONSE message may contain the *MultibandInfoList IE* and may also contain the *FreqBandIndicatorPriority IE*. The eNB receiving the *MultibandInfoList IE* shall, if supported, take this information into account when further deciding whether subsequent mobility actions between the source cell and the target cell may be performed, and use this IE and the *FreqBandIndicatorPriority IE*, if received, as specified in TS 36.331 [9].

The initiating eNB<sub>1</sub> may include the *LHN ID IE* in the X2 SETUP REQUEST message. The candidate eNB<sub>2</sub> may also include *LHN ID IE* in the X2 SETUP RESPONSE message. The eNB receiving the IE may use it according to TS 36.300 [15].

The initiating eNB<sub>1</sub> may include the *BandwidthReducedSI* IE in the X2 SETUP REQUEST message. The candidate eNB<sub>2</sub> may also include *BandwidthReducedSI* IE in the X2 SETUP RESPONSE message. The eNB receiving the IE may use it to determine a suitable target in case of subsequent outgoing mobility involving BL UEs or UEs requiring CE.

### 8.3.3.3 Unsuccessful Operation



**Figure 8.3.3.3-1: X2 Setup, unsuccessful operation**

If the candidate eNB<sub>2</sub> cannot accept the setup it shall respond with an X2 SETUP FAILURE message with appropriate cause value.

If the X2 SETUP FAILURE message includes the *Time To Wait* IE the initiating eNB<sub>1</sub> shall wait at least for the indicated time before reinitiating the X2 Setup procedure towards the same eNB<sub>2</sub>.

### 8.3.3.4 Abnormal Conditions

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

If the initiating eNB<sub>1</sub> does not receive either X2 SETUP RESPONSE message or X2 SETUP FAILURE message, the eNB<sub>1</sub> may reinitiate the X2 Setup procedure towards the same eNB, provided that the content of the new X2 SETUP REQUEST message is identical to the content of the previously unacknowledged X2 SETUP REQUEST message.

If the initiating eNB<sub>1</sub> receives an X2 SETUP REQUEST message from the peer entity on the same X2 interface:

- In case the eNB<sub>1</sub> answers with an X2 SETUP RESPONSE message and receives a subsequent X2 SETUP FAILURE message, the eNB<sub>1</sub> shall consider the X2 interface as non operational and the procedure as unsuccessfully terminated according to sub clause 8.3.3.3.
- In case the eNB<sub>1</sub> answers with an X2 SETUP FAILURE message and receives a subsequent X2 SETUP RESPONSE message, the eNB<sub>1</sub> shall ignore the X2 SETUP RESPONSE message and consider the X2 interface as non operational.

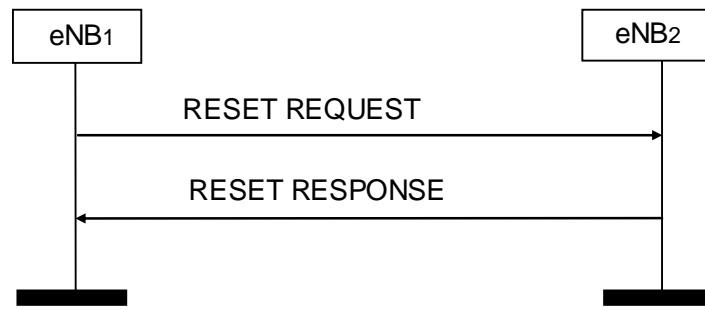
## 8.3.4 Reset

### 8.3.4.1 General

The purpose of the Reset procedure is to align the resources in eNB<sub>1</sub> and eNB<sub>2</sub> in the event of an abnormal failure. The procedure resets the X2 interface. This procedure doesn't affect the application level configuration data exchanged during, e.g., the X2 Setup procedure.

The procedure uses non UE-associated signalling.

### 8.3.4.2 Successful Operation



**Figure 8.3.4.2-1: Reset, successful operation**

The procedure is initiated with a RESET REQUEST message sent from the eNB<sub>1</sub> to the eNB<sub>2</sub>. Upon receipt of this message, eNB<sub>2</sub> shall abort any other ongoing procedures over X2 between eNB<sub>1</sub> and eNB<sub>2</sub>. The eNB<sub>2</sub> shall delete all the context information related to the eNB<sub>1</sub>, except the application level configuration data exchanged during the X2 Setup or eNB Configuration Update procedures, and release the corresponding resources. After completion of release of the resources, the eNB<sub>2</sub> shall respond with a RESET RESPONSE message.

### 8.3.4.3 Unsuccessful Operation

Void.

### 8.3.4.4 Abnormal Conditions

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

If Reset procedure is ongoing and the eNB<sub>2</sub> receives the RESET REQUEST message from the peer entity on the same X2 interface, the eNB<sub>2</sub> shall respond with the RESET RESPONSE message as described in 8.3.4.2.

If the initiating eNB does not receive RESET RESPONSE message, the eNB<sub>1</sub> may reinitiate the Reset procedure towards the same eNB, provided that the content of the new RESET REQUEST message is identical to the content of the previously unacknowledged RESET REQUEST message.

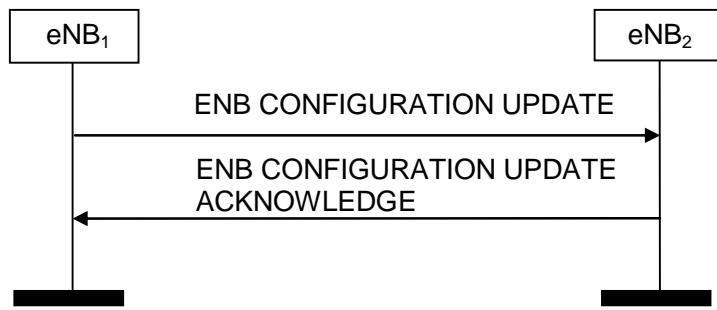
## 8.3.5 eNB Configuration Update

### 8.3.5.1 General

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

The procedure uses non UE-associated signalling.

### 8.3.5.2 Successful Operation



**Figure 8.3.5.2-1: eNB Configuration Update, successful operation**

An eNB<sub>1</sub> initiates the procedure by sending an ENB CONFIGURATION UPDATE message to a peer eNB<sub>2</sub>. Such message shall include an appropriate set of up-to-date configuration data, including, but not limited to, the complete lists of added, modified and deleted served cells, that eNB<sub>1</sub> has just taken into operational use.

Upon reception of an ENB CONFIGURATION UPDATE message, eNB<sub>2</sub> shall update the information for eNB<sub>1</sub> as follows:

#### Update of Served Cell Information:

- If *Served Cells To Add* IE is contained in the ENB CONFIGURATION UPDATE message, eNB<sub>2</sub> shall add cell information according to the information in the *Served Cell Information* IE.
- If *Number of Antenna Ports* IE is contained in the *Served Cell Information* IE in the ENB CONFIGURATION UPDATE message, eNB<sub>2</sub> may use this information according to TS 36.331 [9].
- If the *PRACH Configuration* IE is contained in the *Served Cell Information* IE in the ENB CONFIGURATION UPDATE message, the eNB receiving the IE may use this information for RACH optimisation.
- If *Served Cells To Modify* IE is contained in the ENB CONFIGURATION UPDATE message, eNB<sub>2</sub> shall modify information of cell indicated by *Old ECGI* IE according to the information in the *Served Cell Information* IE.
- If *MBSFN Subframe Info* IE is contained in the *Served Cell Information* IE in the ENB CONFIGURATION UPDATE message, eNB<sub>2</sub> may use this information according to TS 36.331 [9]. If a MBSFN subframe indicated in the *MBSFN Subframe Info* IE coincides with an ABS, the eNB<sub>2</sub> shall consider that the subframe is designated as ABS by the sending eNB.
- If *BandwidthReducedSI* IE is contained in the *Served Cell Information* IE in the ENB CONFIGURATION UPDATE message, eNB<sub>2</sub> may use this information to determine a suitable target in case of subsequent outgoing mobility involving BL UEs or UEs requiring CE.

When either served cell information or neighbour information of an existing served cell in eNB<sub>1</sub> need to be updated, the whole list of neighbouring cells, if any, shall be contained in the *Neighbour Information* IE.

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

The eNB<sub>2</sub> shall overwrite the served cell information and the whole list of neighbour cell information for the affected served cell.

- If *Served Cells To Delete* IE is contained in the ENB CONFIGURATION UPDATE message, eNB<sub>2</sub> shall delete information of cell indicated by *Old ECGI* IE.
- If *MBMS Service Area Identity List* IE is contained in the *Served Cell Information* IE in the ENB CONFIGURATION UPDATE message, the eNB receiving the IE may use it according to TS 36.300 [15].

When the MBMS Service Area Identities of a cell in eNB<sub>1</sub> need to be updated, the whole list of MBMS Service Area Identities of the affected cell shall be contained in the *Served Cell Information* IE.

#### Update of GU Group Id List:

- If *GU Group Id To Add List* IE is contained in the ENB CONFIGURATION UPDATE message, eNB<sub>2</sub> shall add the GU Group Id to its GU Group Id List.

- If *GU Group Id To Delete List IE* is contained in the ENB CONFIGURATION UPDATE message, eNB<sub>2</sub> shall remove the GU Group Id from its GU Group Id List.

If *Neighbour Information IE* is contained in the ENB CONFIGURATION UPDATE message, eNB<sub>2</sub> may use this information to update its neighbour cell relations, or use it for other functions, like PCI selection. The *Neighbour Information IE* shall only include E-UTRAN cells that are direct neighbours of cells in the reporting eNB. A direct neighbour of one cell of a given eNB may be any cell belonging to an eNB that is a neighbour of that given eNB cell e.g. even if that cell has not been reported by a UE. The *Neighbour Information IE* may contain the *TAC IE* of the included cells. The receiving eNB may use *TAC IE*, as described in TS 36.300 [15].

After successful update of requested information, eNB<sub>2</sub> shall reply with the ENB CONFIGURATION UPDATE ACKNOWLEDGE message to inform the initiating eNB<sub>1</sub> that the requested update of application data was performed successfully. In case the peer eNB<sub>2</sub> receives an ENB CONFIGURATION UPDATE without any IE except for *Message Type IE* it shall reply with ENB CONFIGURATION UPDATE ACKNOWLEDGE message without performing any updates to the existing configuration.

The eNB<sub>1</sub> may initiate a further eNB Configuration Update procedure only after a previous eNB Configuration Update procedure has been completed.

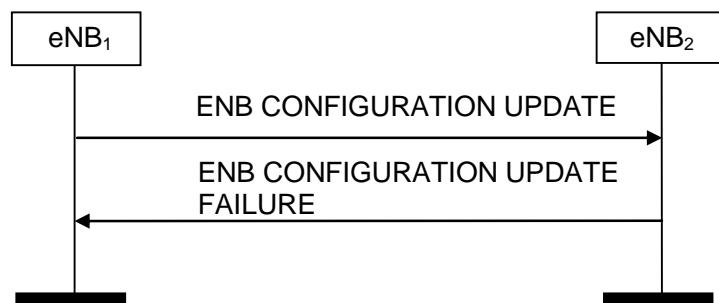
For each cell served by the initiating eNB<sub>1</sub> the ENB CONFIGURATION UPDATE message may contain the *MultibandInfoList IE* and may also contain the *FreqBandIndicatorPriority IE*. The eNB receiving the *MultibandInfoList IE* shall, if supported, take this information into account when further deciding whether subsequent mobility actions between the source cell and the target cell may be performed, and use this IE and the *FreqBandIndicatorPriority IE*, if received, as specified in TS 36.331 [9].

If the *Coverage Modification List IE* is present, eNB<sub>2</sub> may use the information in the *Cell Coverage State IE* to identify the cell deployment configuration enabled by eNB<sub>1</sub> and for configuring the mobility towards the cell(s) indicated by the *ECGI IE*, as described in TS 36.300 [15]. If the *Cell Deployment Status Indicator IE* is present in the *Coverage Modification List IE*, the eNB<sub>2</sub> shall consider the cell deployment configuration of the cell to be modified as the next planned configuration and shall remove any planned configuration stored for this cell. If the *Cell Deployment Status Indicator IE* is present and the *Cell Replacing Info IE* contains non-empty cell list, the eNB<sub>2</sub> may use this list to avoid connection or re-establishment failures during the reconfiguration, e.g. consider the cells in the list as possible alternative handover targets. If the *Cell Deployment Status Indicator IE* is not present, the eNB<sub>2</sub> shall consider the cell deployment configuration of cell to be modified as activated and replace any previous configuration for the cells indicated in the *Coverage Modification List IE*.

#### Interaction with the eNB Configuration Update procedure:

If an eNB<sub>2</sub> which has not stored a *FreqBandIndicatorPriority IE* received from eNB<sub>1</sub>, but has signaled a *FreqBandIndicatorPriority IE* to eNB<sub>1</sub> after the TNL association has become available, receives an ENB CONFIGURATION UPDATE message from eNB<sub>1</sub> containing the *FreqBandIndicatorPriority IE*, the eNB<sub>2</sub> shall initiate the eNB Configuration Update procedure towards eNB<sub>1</sub> including the *FreqBandIndicatorPriority IE*.

#### 8.3.5.3 Unsuccessful Operation



**Figure 8.3.5.3-1: eNB Configuration Update, unsuccessful operation**

If the eNB<sub>2</sub> can not accept the update it shall respond with an ENB CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the ENB CONFIGURATION UPDATE FAILURE message includes the *Time To Wait* IE the eNB<sub>1</sub> shall wait at least for the indicated time before reinitiating the eNB Configuration Update procedure towards the same eNB<sub>2</sub>. Both nodes shall continue to operate the X2 with their existing configuration data.

### 8.3.5.4 Abnormal Conditions

If the eNB<sub>1</sub> after initiating eNB Configuration Update procedure receives neither ENB CONFIGURATION UPDATE ACKNOWLEDGE message nor ENB CONFIGURATION UPDATE FAILURE message, the eNB<sub>1</sub> may reinitiate the eNB Configuration Update procedure towards the same eNB<sub>2</sub>, provided that the content of the new ENB CONFIGURATION UPDATE message is identical to the content of the previously unacknowledged ENB CONFIGURATION UPDATE message.

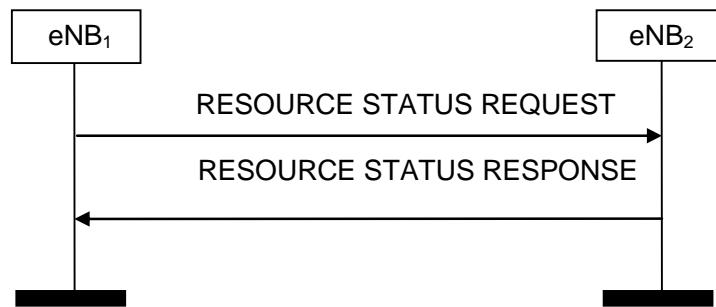
## 8.3.6 Resource Status Reporting Initiation

### 8.3.6.1 General

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

The procedure uses non UE-associated signalling.

### 8.3.6.2 Successful Operation



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

The procedure is initiated with a RESOURCE STATUS REQUEST message sent from eNB<sub>1</sub> to eNB<sub>2</sub>. Upon receipt, eNB<sub>2</sub>:

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

If the eNB<sub>2</sub> received a RESOURCE STATUS REQUEST message, which includes the *Registration Request* IE set to "stop", the *Cell To Report* IE list shall be ignored.

If the *Registration Request* IE is set to "start" then the *Report Characteristics* IE shall be included in RESOURCE STATUS REQUEST message. The eNB<sub>2</sub> shall ignore the *Report Characteristics* IE, if the *Registration Request* IE is not set to "start".

The *Report Characteristics* IE indicates the type of objects eNB<sub>2</sub> shall perform measurements on. For each cell, the eNB<sub>2</sub> shall include in the RESOURCE STATUS UPDATE message:

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

- the *S1 TNL Load Indicator IE*, if the second bit, "TNL Load Ind Periodic" of the *Report Characteristics IE* included in the RESOURCE STATUS REQUEST message is set to 1;
- the *Hardware Load Indicator IE*, if the third bit, "HW Load Ind Periodic" of the *Report Characteristics IE* included in the RESOURCE STATUS REQUEST message is set to 1;
- the *Composite Available Capacity Group IE*, if the fourth bit, "Composite Available Capacity Periodic" of the *Report Characteristics IE* included in the RESOURCE STATUS REQUEST message is set to 1. If *Cell Capacity Class Value IE* is included within the *Composite Available Capacity Group IE*, this IE is used to assign weights to the available capacity indicated in the *Capacity Value IE*;
- the *ABS Status IE*, if the fifth bit, "ABS Status Periodic" of the *Report Characteristics IE* included in the RESOURCE STATUS REQUEST message is set to 1 and eNB<sub>1</sub> had indicated the ABS pattern to eNB<sub>2</sub>;
- the *RSRP Measurement Report List IE*, if the sixth bit, "RSRP Measurement Report Periodic" of the *Report Characteristics IE* included in the RESOURCE STATUS REQUEST message is set to 1;
- the *CSI Report IE*, if the seventh bit, "CSI Report Periodic" of the *Report Characteristics IE* included in the RESOURCE STATUS REQUEST message is set to 1.

If the *Reporting Periodicity IE* is included in the RESOURCE STATUS REQUEST message, eNB<sub>2</sub> shall use its value as the time interval between two subsequent RESOURCE STATUS UPDATE messages that include the *Radio Resource Status IE*, *SI TNL Load Indicator IE*, *Hardware Load Indicator IE*, *Composite Available Capacity Group IE*, or *ABS Status IE*.

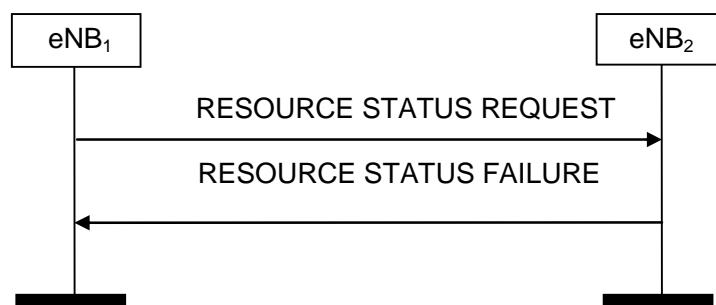
If the *Reporting Periodicity of RSRP Measurement Report IE* is included in the RESOURCE STATUS REQUEST message, eNB<sub>2</sub> shall use its value as the minimum time interval between two subsequent RESOURCE STATUS UPDATE messages that include the *RSRP Measurement Report List IE*.

If the *Reporting Periodicity of CSI Report IE* is included in the RESOURCE STATUS REQUEST message, eNB<sub>2</sub> shall use its value as the minimum time interval between two subsequent RESOURCE STATUS UPDATE messages that include the *CSI Report IE*.

If eNB<sub>2</sub> is capable to provide all requested resource status information, it shall initiate the measurement as requested by eNB<sub>1</sub>, and respond with the RESOURCE STATUS RESPONSE message.

If eNB<sub>2</sub> is capable to provide some but not all of the requested resource status information and the *Partial Success Indicator IE* is present in the RESOURCE STATUS REQUEST message, it shall initiate the measurement for the admitted measurement objects and include the *Measurement Initiation Result IE* in the RESOURCE STATUS RESPONSE message.

### 8.3.6.3 Unsuccessful Operation



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

If none of the requested measurements can be initiated, eNB<sub>2</sub> shall send a RESOURCE STATUS FAILURE message. The *Cause IE* shall be set to an appropriate value e.g. "Measurement Temporarily not Available" or "Measurement not Supported For The Object" for each requested measurement object. The eNB may use the *Complete Failure Cause Information IE* to enhance the failure cause information per measurement in the RESOURCE STATUS FAILURE message.

### 8.3.6.4 Abnormal Conditions

If the initiating eNB<sub>1</sub> does not receive either RESOURCE STATUS RESPONSE message or RESOURCE STATUS FAILURE message, the eNB<sub>1</sub> may reinitiate the Resource Status Reporting Initiation procedure towards the same eNB, provided that the content of the new RESOURCE STATUS REQUEST message is identical to the content of the previously unacknowledged RESOURCE STATUS REQUEST message.

If the initiating eNB<sub>1</sub> receives the RESOURCE STATUS RESPONSE message including the *Measurement Initiation Result* IE containing no admitted measurements, the eNB<sub>1</sub> shall consider the procedure as failed.

If the *Report Characteristics* IE bitmap is set to "0" (all bits are set to "0") in the RESOURCE STATUS REQUEST message then eNB<sub>2</sub> shall initiate a RESOURCE STATUS FAILURE message, the cause shall be set to appropriate value e.g. "ReportCharacteristicsEmpty".

If the *Reporting Periodicity* IE value is not specified when at least one of the bits of the *Report Characteristics* IE, for which semantics is specified, other than the sixth or seventh bit, is set to 1 then eNB<sub>2</sub> shall initiate a RESOURCE STATUS FAILURE message, the cause shall be set to appropriate value e.g. "NoReportPeriodicity".

If the *Reporting Periodicity of RSRP Measurement Report* IE value is not specified when the sixth bit of the *Report Characteristics* IE is set to 1, then eNB<sub>2</sub> shall initiate the RESOURCE STATUS FAILURE message and the cause shall be set to appropriate value e.g. "NoReportPeriodicity".

If the *Reporting Periodicity of CSI Report* IE value is not specified when the seventh bit of the *Report Characteristics* IE is set to 1, then eNB<sub>2</sub> shall initiate the RESOURCE STATUS FAILURE message and the cause shall be set to appropriate value e.g. "NoReportPeriodicity".

If the eNB<sub>2</sub> received a RESOURCE STATUS REQUEST message which includes the *Registration Request* IE set to "start" and the *eNB1Measurement ID* IE corresponding to an existing on-going load measurement reporting, then eNB<sub>2</sub> shall initiate a RESOURCE STATUS FAILURE message, the cause shall be set to appropriate value e.g. "ExistingMeasurementID".

If the *Registration Request* IE is set to "stop", "partial stop" or "add" and the RESOURCE STATUS REQUEST message does not contain *eNB2 Measurement ID* IE, eNB<sub>2</sub> shall consider the procedure as failed and respond with the RESOURCE STATUS FAILURE message, the cause shall be set to appropriate value e.g. "Unknown eNB Measurement ID".

If the *Registration Request* IE is set to "partial stop" and the *Cell To Report* IE contains cells that have not been initiated for the reporting before, eNB<sub>2</sub> shall consider the procedure as failed and respond with the RESOURCE STATUS FAILURE message, the cause shall be set to appropriate value e.g. "Cell not Available". If the *Registration Request* IE is set to "add" and the *Cell To Report* IE contains cells that have been initiated for the reporting before, eNB<sub>2</sub> shall consider the procedure as failed and respond with the RESOURCE STATUS FAILURE message, the cause shall be set to appropriate value e.g. "Cell not Available".

### 8.3.7 Resource Status Reporting

#### 8.3.7.1 General

This procedure is initiated by eNB<sub>2</sub> to report the result of measurements admitted by eNB<sub>2</sub> following a successful Resource Status Reporting Initiation procedure.

The procedure uses non UE-associated signalling.

### 8.3.7.2 Successful Operation



**Figure 8.3.7.2-1: Resource Status Reporting, successful operation**

The eNB<sub>2</sub> shall report the results of the admitted measurements in RESOURCE STATUS UPDATE message. The admitted measurements are the measurements that were successfully initiated during the preceding Resource Status Reporting Initiation procedure, and thus not reported in the *Measurement Failed Report Characteristics* IE for the concerned cell in the RESOURCE STATUS RESPONSE message.

If the eNB<sub>1</sub> receives the RESOURCE STATUS UPDATE message which includes the *UE ID* IE in the *RSRP Measurement Report List* IE, the eNB<sub>1</sub> may use the *UE ID* IE to link the associated RSRP measurement report with other measurement results (e.g. CSI reports, RSRP measurement reports) of the same UE.

If the *CSI Report* IE including the *CSI Process Configuration Index* IE is received, eNB<sub>1</sub> shall interpret this IE as an index identifying one of the CSI process configurations that can be configured for all UEs within the cell where the CSI measurements were collected. For all UEs within the cell, the maximum number of CSI process configurations is given by the maximum value of the *CSI Process Configuration Index* IE.

If the eNB<sub>1</sub> receives the RESOURCE STATUS UPDATE message, which includes the *Cell Reporting Indicator* IE set to "stop request" in one or more items of the *Cell Measurement Result* IE, the eNB<sub>1</sub> should initialise the Resource Status Reporting Initiation procedure to remove all or some of the corresponding cells from the measurement.

### 8.3.7.3 Unsuccessful Operation

Not applicable.

### 8.3.7.4 Abnormal Conditions

If the eNB<sub>1</sub> 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 eNB<sub>1</sub> shall ignore the *DL ABS Status* IE.

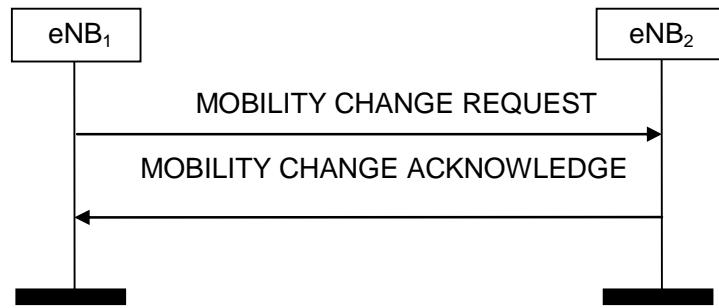
## 8.3.8 Mobility Settings Change

### 8.3.8.1 General

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

The procedure uses non UE-associated signalling.

### 8.3.8.2 Successful Operation

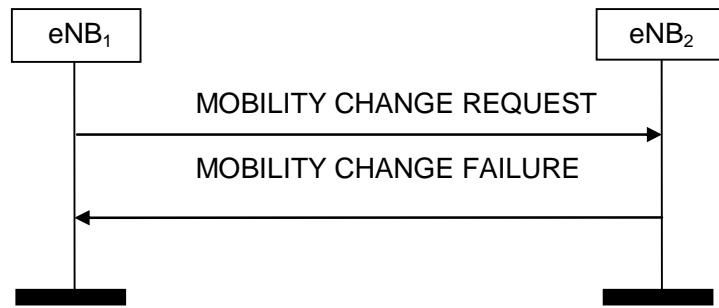


**Figure 8.3.8.2-1: Mobility Settings Change, successful operation**

The procedure is initiated with a MOBILITY CHANGE REQUEST message sent from eNB<sub>1</sub> to eNB<sub>2</sub>.

Upon receipt, eNB<sub>2</sub> shall evaluate if the proposed eNB<sub>2</sub> handover trigger modification may be accepted. If eNB<sub>2</sub> is able to successfully complete the request it shall reply with MOBILITY CHANGE ACKNOWLEDGE.

### 8.3.8.3 Unsuccessful Operation



**Figure 8.3.8.3-1: Mobility Settings Change, unsuccessful operation**

If the requested parameter modification is refused by the eNB<sub>2</sub>, or if the eNB<sub>2</sub> is not able to complete the procedure, the eNB<sub>2</sub> shall send a MOBILITY CHANGE FAILURE message with the *Cause* IE set to an appropriate value. The eNB<sub>2</sub> may include *eNB2 Mobility Parameters Modification Range* IE in MOBILITY CHANGE FAILURE message, for example in cases when the proposed change is out of permitted range.

### 8.3.8.4 Abnormal Conditions

Void.

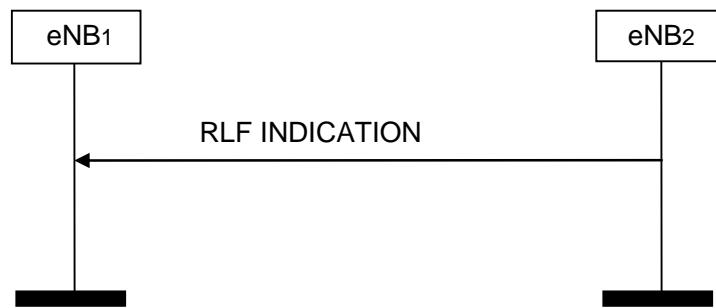
## 8.3.9 Radio Link Failure Indication

### 8.3.9.1 General

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

The procedure uses non UE-associated signalling.

### 8.3.9.2 Successful Operation



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

eNB<sub>2</sub> initiates the procedure by sending the RLF INDICATION message to eNB<sub>1</sub> following a re-establishment attempt or an RLF Report reception from a UE at eNB<sub>2</sub>, when eNB<sub>2</sub> considers that the UE may have previously suffered a connection failure at a cell controlled by eNB<sub>1</sub>.

eNB<sub>2</sub> may include the *ShortMAC-I IE* in the RLF INDICATION message, e.g., in order to aid the eNB<sub>1</sub> to resolve a potential PCI confusion situation or to aid the eNB<sub>1</sub> to identify the UE.

eNB<sub>2</sub> may include the *UE RLF Report Container IE* and optionally also the *UE RLF Report Container for extended bands IE* in the RLF INDICATION message, which may be used by the eNB<sub>1</sub> to determine the nature of the failure. If the *UE RLF Report Container IE* is included in the RLF INDICATION message sent after successful re-establishment, the eNB<sub>2</sub> shall use the *Re-establishment Cell ECGI IE* in the RLF INDICATION message to indicate the ECGI of the cell where the re-establishment was successful.

eNB<sub>2</sub> may include the *RRC Conn Setup Indicator IE* in the RLF INDICATION message, which indicates that the RLF Report is retrieved after an RRC connection setup or an incoming successful handover.

If the *RRC Conn Setup Indicator IE* is present in the RLF INDICATION message, the eNB<sub>1</sub> shall ignore the values in the *Failure cell PCI IE*, *Re-establishment cell ECGI IE*, *C-RNTI IE* and *ShortMAC-I IE*.

eNB<sub>2</sub> may include the *RRC Conn Reestab Indicator IE* in the RLF INDICATION message, which may be used by the eNB<sub>1</sub> to determine where the failure occurred.

### 8.3.9.3 Unsuccessful Operation

Not applicable.

### 8.3.9.4 Abnormal Conditions

Void.

## 8.3.10 Handover Report

### 8.3.10.1 General

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

The procedure uses non UE-associated signalling.

### 8.3.10.2 Successful Operation



**Figure 8.3.10.2-1: Handover Report, successful operation**

An eNB initiates the procedure by sending an HANOVER REPORT message to another eNB. By sending the message eNB<sub>1</sub> indicates to eNB<sub>2</sub> that a mobility-related problem was detected.

If the *Handover Report Type* IE is set to "HO too early" or "HO to wrong cell", then the eNB<sub>1</sub> indicates to eNB<sub>2</sub> that, following a successful handover from a cell of eNB<sub>2</sub> to a cell of eNB<sub>1</sub>, a radio link failure occurred and the UE attempted RRC Re-establishment either at the original cell of eNB<sub>2</sub> (Handover Too Early), or at another cell (Handover to Wrong Cell). The detection of Handover Too Early and Handover to Wrong Cell events is made according to TS 36.300 [15].

If the UE-related information is available in eNB<sub>1</sub>, the eNB<sub>1</sub> should include in HANOVER REPORT message:

- the *Mobility Information* IE, if the *Mobility Information* IE was sent for this handover from eNB<sub>2</sub>;
- the *Source cell C-RNTI* IE.

If received, the eNB<sub>2</sub> uses the above information according to TS 36.300 [15].

If the UE RLF Report received from the eNB sending the RLF INDICATION message, as described in TS 36.300 [15], is available, the eNB<sub>1</sub> may also include it in the HANOVER REPORT as *UE RLF Report Container* IE and optionally also *UE RLF Report Container for extended bands* IE.

If the *Handover Report Type* IE is set to "InterRAT ping-pong", then the eNB<sub>1</sub> indicates to eNB<sub>2</sub> that a completed handover from a cell of eNB<sub>2</sub> to a cell in other RAT might have resulted in an inter-RAT ping-pong and the UE was successfully handed over to a cell of eNB<sub>1</sub> (indicated with *Failure cell ECGI* IE).

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

### 8.3.10.3 Unsuccessful Operation

Not applicable.

### 8.3.10.4 Abnormal Conditions

Void.

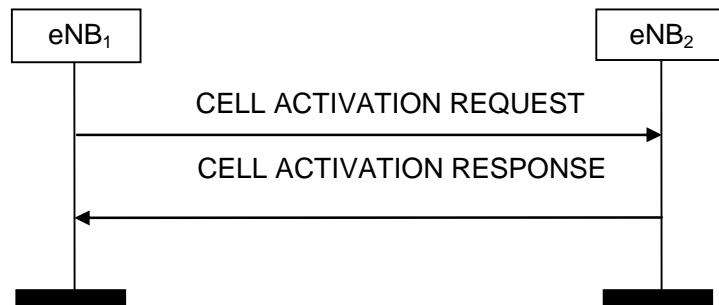
## 8.3.11 Cell Activation

### 8.3.11.1 General

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

The procedure uses non UE-associated signalling.

### 8.3.11.2 Successful Operation



**Figure 8.3.11.2-1: Cell Activation, successful operation**

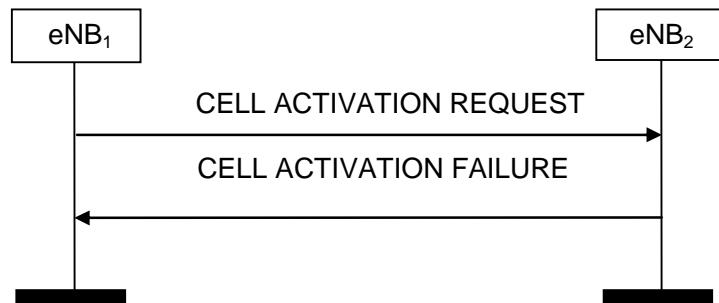
An eNB<sub>1</sub> initiates the procedure by sending a CELL ACTIVATION REQUEST message to a peer eNB<sub>2</sub>.

Upon receipt of this message, eNB<sub>2</sub> should activate the cell/s indicated in the CELL ACTIVATION REQUEST message and shall indicate in the CELL ACTIVATION RESPONSE message for which cells the request was fulfilled.

#### Interactions with eNB Configuration Update procedure:

eNB<sub>2</sub> shall not send an ENB CONFIGURATION UPDATE message to eNB<sub>1</sub> just for the reason of the cell/s indicated in the CELL ACTIVATION REQUEST message changing state, as the receipt of the CELL ACTIVATION RESPONSE message by eNB<sub>1</sub> is used to update the information about cell activation state of eNB<sub>2</sub> cells in eNB<sub>1</sub>.

### 8.3.11.3 Unsuccessful Operation



**Figure 8.3.11.3-1: Cell Activation, unsuccessful operation**

If the eNB<sub>2</sub> cannot activate any of the cells indicated in the CELL ACTIVATION REQUEST message, it shall respond with a CELL ACTIVATION FAILURE message with an appropriate cause value.

### 8.3.11.4 Abnormal Conditions

Not applicable.

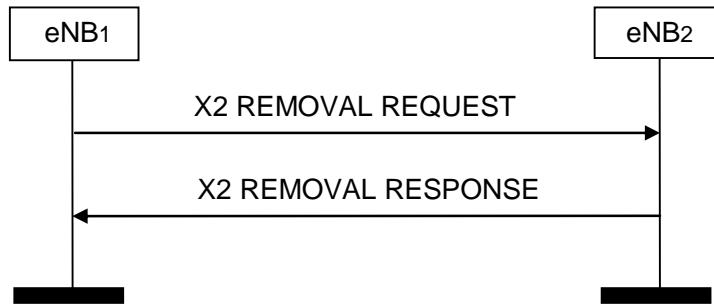
## 8.3.12 X2 Removal

### 8.3.12.1 General

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

The procedure uses non UE-associated signaling.

### 8.3.12.2 Successful Operation

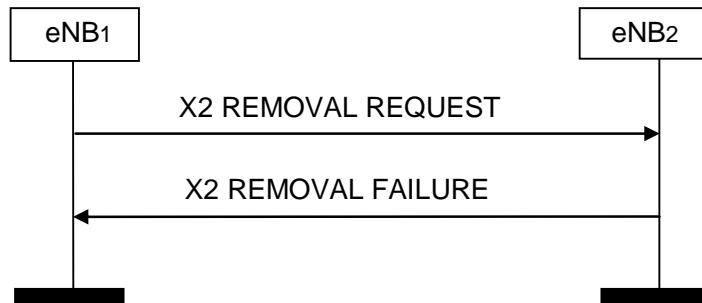


**Figure 8.3.12.2-1: X2 Removal, successful operation**

An eNB<sub>1</sub> initiates the procedure by sending the X2 REMOVAL REQUEST message to a candidate eNB<sub>2</sub>. Upon reception of the X2 REMOVAL REQUEST message the candidate eNB<sub>2</sub> shall reply with the X2 REMOVAL RESPONSE message. After receiving the X2 REMOVAL RESPONSE message, the initiating eNB<sub>1</sub> shall initiate removal of the TNL association towards eNB<sub>2</sub> and may remove all resources associated with that signaling connection. The candidate eNB<sub>2</sub> may then remove all resources associated with that signaling connection.

If the *X2 Removal Threshold IE* is included in the X2 REMOVAL REQUEST message, the candidate eNB<sub>2</sub> shall, if supported, accept to remove the signalling connection with eNB<sub>1</sub> if the X2 Benefit Value of the signalling connection determined at the candidate eNB<sub>2</sub> is lower than the value of the *X2 Removal Threshold IE*.

### 8.3.12.3 Unsuccessful Operation



**Figure 8.3.12.3-1: X2 Removal, unsuccessful operation**

If the candidate eNB<sub>2</sub> cannot accept to remove the signalling connection with eNB<sub>1</sub> it shall respond with an X2 REMOVAL FAILURE message with an appropriate cause value.

### 8.3.12.4 Abnormal Conditions

Void.

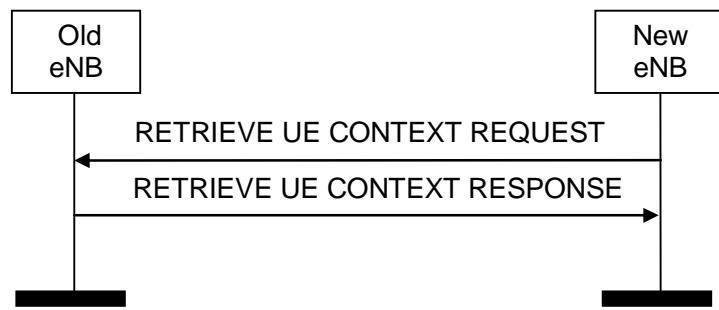
## 8.3.13 Retrieve UE Context

### 8.3.13.1 General

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

The procedure uses UE-associated signalling.

### 8.3.13.2 Successful Operation



**Figure 8.3.13.2-1: Retrieve UE Context, successful operation**

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

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

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

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

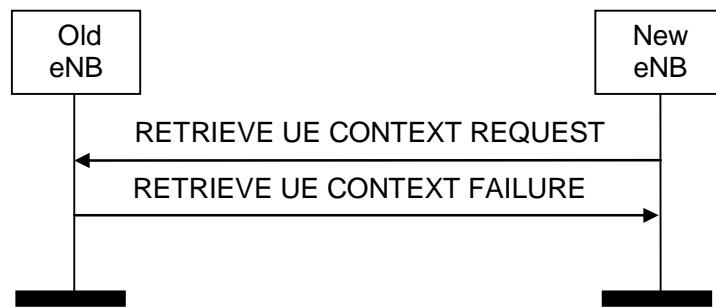
If the PLMN of the new cell is not the Serving PLMN stored in the UE Context the old eNB shall replace the Serving PLMN with the PLMN of the new cell and move the Serving PLMN to the equivalent PLMN list, before propagating the roaming and access restriction information to the new eNB. The new eNB shall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

- *UE Security Capabilities IE,*
  - *AS Security Information IE,*
  - *Subscriber Profile ID for RAT/Frequency priority IE,*
  - *Handover Restriction List IE,*
  - *Location Reporting Information IE,*
  - *Management Based MDT Allowed IE*
  - *Management Based MDT PLMN List IE*
  - *Trace Activation IE,*
  - *SRVCC Operation Possible IE,*
  - *Masked IMEISV IE*
  - *Expected UE Behaviour IE,*
  - *ProSe Authorized IE,*
  - *V2X Services Authorized IE,*

within the RETRIEVE UE CONTEXT RESPONSE message as specified for the target eNB upon reception of the HANOVER 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.

### 8.3.13.3 Unsuccessful Operation



**Figure 8.3.13.3-1: Retrieve UE Context, unsuccessful operation**

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

### 8.3.13.4 Abnormal Conditions

Void.

## 8.4 X2 Release

### 8.4.1 General

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

### 8.4.2 Successful Operation



**Figure 8.4.2-1: X2AP Release, successful operation**

eNB<sub>1</sub> initiates the procedure by sending the X2 RELEASE message to eNB<sub>2</sub>. Upon the reception of X2 RELEASE message, eNB<sub>2</sub> shall consider that the signalling connection to an eNB indicated by the *eNB ID* IE is unavailable. eNB<sub>2</sub> may delete all the context information related to the indicated eNB.

### 8.4.3 Unsuccessful Operation

Not Applicable

### 8.4.4 Abnormal Condition

Not Applicable.

## 8.5 X2AP Message Transfer

### 8.5.1 General

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

### 8.5.2 Successful Operation



**Figure 8.5.2-1: X2AP Message Transfer, successful operation**

eNB<sub>1</sub> initiates the procedure by sending the X2AP MESSAGE TRANSFER message to eNB<sub>2</sub>.

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

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

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

### 8.5.3 Unsuccessful Operation

Not Applicable.

### 8.5.4 Abnormal Condition

Not Applicable.

## 8.6 Procedures for Dual Connectivity

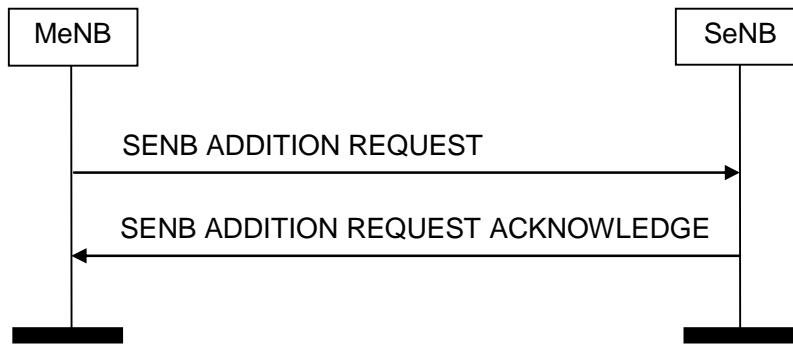
### 8.6.1 SeNB Addition Preparation

#### 8.6.1.1 General

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

The procedure uses UE-associated signalling.

### 8.6.1.2 Successful Operation



**Figure 8.6.1.2-1: SeNB Addition Preparation, successful operation**

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

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

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

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

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

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

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

For each E-RAB configured with the SCG bearer option

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

- If the *SIPTO Correlation ID* IE for the concerned E-RAB is received by the SeNB, the SeNB shall use this information for SIPTO@LN operation for the concerned E-RAB.

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

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

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

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

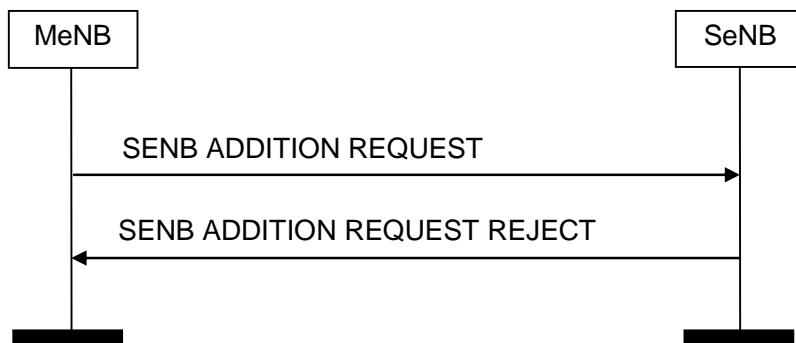
If the *SeNB UE X2AP ID* IE and/or *SeNB UE X2AP ID Extension* IE are contained in the SENB ADDITION REQUEST message, the SeNB shall, if supported, store this information and use it as defined in TS 36.300 [15].

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

#### **Interactions with the SeNB Reconfiguration Completion procedure:**

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

#### **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 *SIP TO Correlation ID* IEs for the same E-RAB, the SeNB shall consider the establishment of the corresponding E-RAB as failed.

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

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

#### **Interactions with the MeNB initiated SeNB Release procedure:**

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

### **8.6.2 SeNB Reconfiguration Completion**

#### **8.6.2.1 General**

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

The procedure uses UE-associated signalling.

#### **8.6.2.2 Successful Operation**



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

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

The SENB RECONFIGURATION COMPLETE message may contain information that

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

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

#### **8.6.2.3 Abnormal Conditions**

Void.

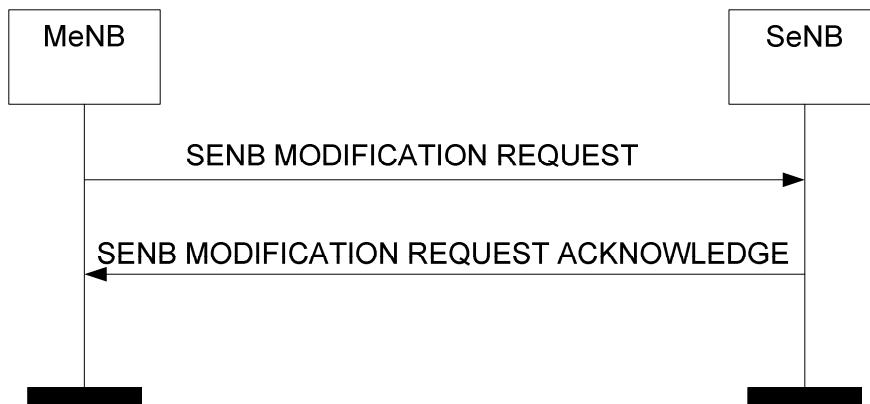
### 8.6.3 MeNB initiated SeNB Modification Preparation

#### 8.6.3.1 General

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

The procedure uses UE-associated signalling.

#### 8.6.3.2 Successful Operation



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

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

The SENB MODIFICATION REQUEST message may contain

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

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

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

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

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

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

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

For each E-RAB configured with the SCG bearer option

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

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

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

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

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

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

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

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

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

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

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

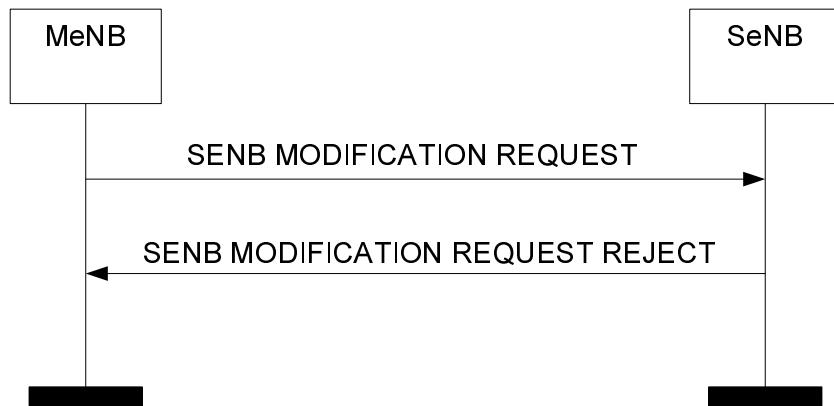
Upon reception of the SENB MODIFICATION REQUEST ACKNOWLEDGE message the MeNB shall stop the timer  $T_{DC\text{prep}}$ . If the SENB MODIFICATION REQUEST ACKNOWLEDGE message has included the *SeNB to MeNB Container IE* the MeNB is then defined to have a Prepared SeNB Modification for that X2 UE-associated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

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

#### Interactions with the SeNB Reconfiguration Completion procedure:

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

#### 8.6.3.3 Unsuccessful Operation



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

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

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

#### 8.6.3.4 Abnormal Conditions

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

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

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

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

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

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

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

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

### **Interaction with the SeNB initiated SeNB Modification Preparation procedure:**

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

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

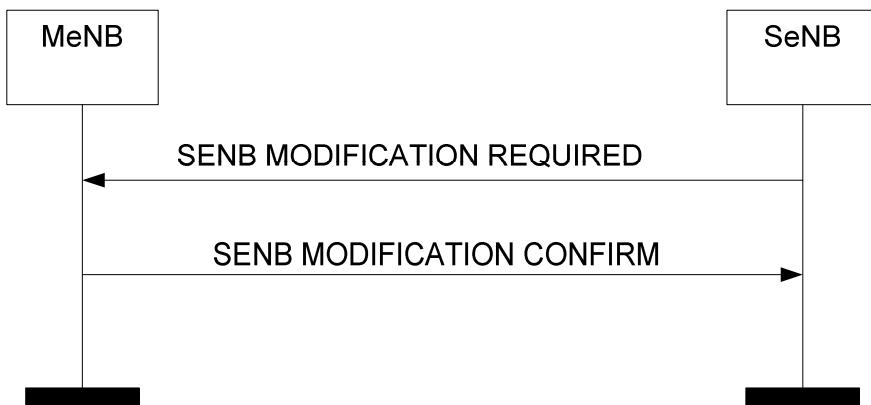
## **8.6.4 SeNB initiated SeNB Modification**

### **8.6.4.1 General**

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

The procedure uses UE-associated signalling.

### **8.6.4.2 Successful Operation**



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

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

The SENB MODIFICATION REQUIRED message may contain

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

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

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

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

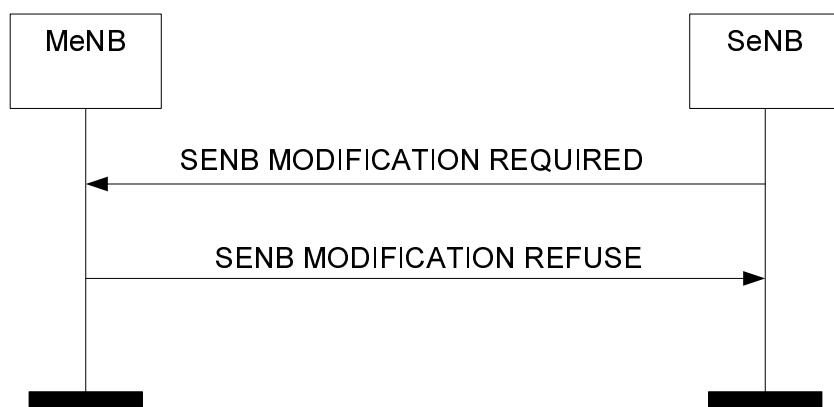
### **Interaction with the MeNB initiated SeNB Modification Preparation procedure:**

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

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

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

#### 8.6.4.3 Unsuccessful Operation



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

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

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

#### 8.6.4.4 Abnormal Conditions

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

If the MeNB is aware that the SeNB didn't receive the latest configuration information concerning the MCG, the MeNB may respond with the SENB MODIFICATION REFUSE message to the SeNB with an appropriate cause value in the *Cause IE*.

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

#### Interaction with the MeNB initiated SeNB Modification Preparation procedure:

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

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

- continue with the MeNB initiated SeNB Modification Preparation procedure as specified in section 8.6.3.

## 8.6.5 MeNB initiated SeNB Release

### 8.6.5.1 General

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

The procedure uses UE-associated signalling.

### 8.6.5.2 Successful Operation



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

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

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

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

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

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.

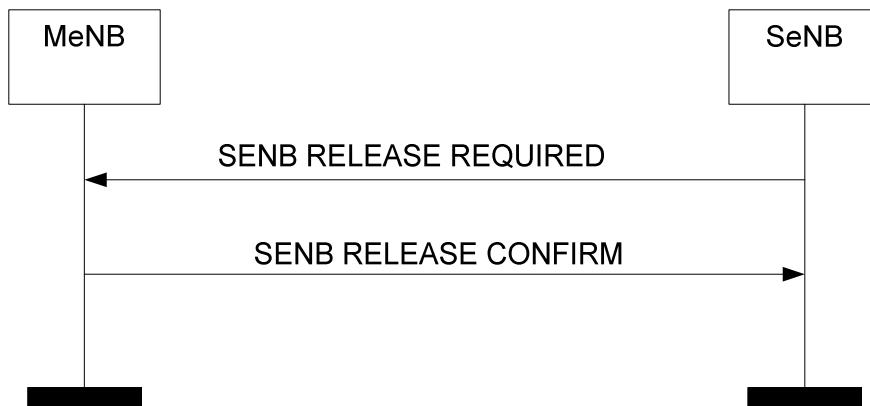
## 8.6.6 SeNB initiated SeNB Release

### 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.

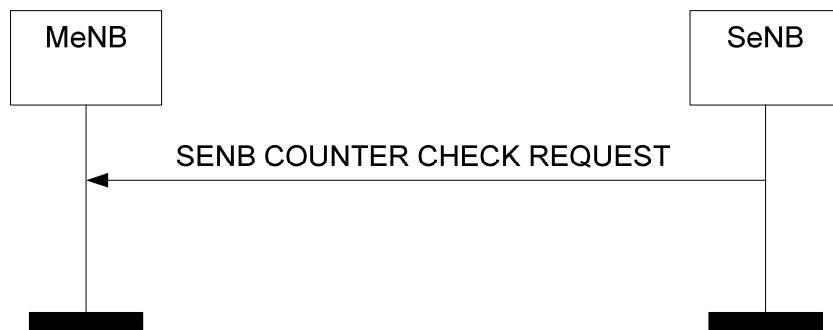
## 8.6.7 SeNB Counter Check

### 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.

## 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 HANOVER 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
<b>UE Context Information</b>		1			YES	reject
>MME UE S1AP ID	M		INTEGER (0..2 <sup>32</sup> -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		—	—
<b>&gt;E-RABs To Be Setup List</b>		1			—	—
<b>&gt;&gt;E-RABs To Be Setup Item</b>		1 .. <maxnoof Bearers>			EACH	ignore
>>>E-RAB ID	M		9.2.23		—	—
>>>E-RAB Level QoS Parameters	M		9.2.9	Includes necessary QoS parameters	—	—
>>>DL Forwarding	O		9.2.5		—	—
>>>UL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SGW endpoint of the S1 transport bearer. For delivery of UL PDUs.	—	—
>>>Bearer Type	O		9.2.92		YES	reject
>RRC Context	M		OCTET STRING	Includes the RRC <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
<b>&gt;Management Based MDT PLMN List</b>	O		MDT PLMN List 9.2.64		YES	ignore
>UE Sidelink Aggregate Maximum Bit Rate	O		9.2.97	This IE applies only if the UE is authorized for V2X services.	YES	Ignore
UE History Information	M		9.2.38	Same definition as in TS 36.413 [4]	YES	ignore
Trace Activation	O		9.2.2		YES	ignore
SRVCC Operation Possible	O		9.2.33		YES	ignore
CSG Membership Status	O		9.2.52		YES	reject

Mobility Information	O		BIT STRING (SIZE (32))	Information related to the handover; the source eNB provides it in order to enable later analysis of the conditions that led to a wrong HO.	YES	ignore
Masked IMEISV	O		9.2.69		YES	ignore
UE History Information from the UE	O		OCTET STRING	VisitedCellInfoList contained in the UEInformationResponse message (TS 36.331 [9])	YES	ignore
Expected UE Behaviour	O		9.2.70		YES	ignore
ProSe Authorized	O		9.2.78		YES	ignore
UE Context Reference at the SeNB	O				YES	ignore
>Global SeNB ID	M		Global eNB ID 9.2.22			
>SeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the SeNB		
>SeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB		
Old eNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the source eNB	YES	reject
V2X Services Authorized	O		9.2.93		YES	ignore
UE Context Reference at the WT	O				YES	ignore
>WT ID	M		9.2.95			
>WT UE XwAP ID	M		9.2.96			

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

### 9.1.1.2 HANOVER 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
<b>E-RABs Admitted List</b>		1			YES	ignore
> E-RABs Admitted Item		1 .. <maxnoofBearers>			EACH	ignore
>>E-RAB ID	M		9.2.23		—	—
>>UL GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	—	—
>>DL GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer. used for forwarding of DL PDUs	—	—
E-RABs Not Admitted List	O		E-RAB List 9.2.28	A value for <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

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

### 9.1.1.3 HANOVER PREPARATION FAILURE

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

Direction: target eNB → source eNB.

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

### 9.1.1.4 SN STATUS TRANSFER

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

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	ignore
Old eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated for handover at the source eNB and for dual connectivity at the eNB from which the E-RAB context is transferred	YES	reject
New eNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated for handover at the target eNB and for dual connectivity at the eNB to which the E-RAB context is transferred	YES	reject
<b>E-RABs Subject To Status Transfer List</b>		1			YES	ignore
<b>&gt;E-RABs Subject To Status Transfer Item</b>		1 .. <maxnoof Bearers>			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 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 $N^{\text{th}}$ bit indicates the status of the UL PDCP SDU in position $(N + \text{First Missing SDU Number}) \bmod (1 + \text{the maximum value of the PDCP-SN})$ .  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 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 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 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 at the eNB to which the E-RAB context is transferred.	YES	reject

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

### 9.1.1.5 UE CONTEXT RELEASE

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

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

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

### 9.1.1.6 HANOVER CANCEL

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

Direction: source eNB → target eNB.

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

## 9.1.2 Messages for global procedures

### 9.1.2.1 LOAD INFORMATION

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

Direction: eNB<sub>1</sub> → eNB<sub>2</sub>.

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.

Direction: eNB<sub>1</sub> → eNB<sub>2</sub>.

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

### 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:  $\text{eNB}_1 \rightarrow \text{eNB}_2$ .

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
Global eNB ID	M		9.2.22		YES	reject
<b>Served Cells</b>		1 .. <maxCellInNB>		Complete list of cells served by the eNB	YES	reject
>Served Cell Information	M		9.2.8		-	-
>Neighbour Information		0 .. <maxnoofNeighbours>			-	-
>>ECGI	M		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the neighbour cell	-	-
>>PCI	M		INTEGER (0..503, ...)	Physical Cell Identifier of the neighbour cell	-	-
>>EARFCN	M		9.2.26	DL EARFCN for FDD or EARFCN for TDD	-	-
>>TAC	O		OCTET STRING (2)	Tracking Area Code	YES	ignore
>>EARFCN Extension	O		9.2.65	DL EARFCN for FDD or EARFCN for TDD. If this IE is present, the value signalled in the EARFCN IE is ignored.	YES	reject
<b>GU Group Id List</b>		0 .. <maxfPools>		List of all the pools to which the eNB belongs	GLOBAL	reject
>GU Group Id	M		9.2.20		-	-
LHN ID	O		9.2.83		YES	ignore

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

#### 9.1.2.4 X2 SETUP RESPONSE

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

Direction: eNB<sub>2</sub> → eNB<sub>1</sub>.

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
<b>Served Cells</b>		1 .. <maxCellInNB>		Complete list of cells served by the eNB	GLOBAL	reject
>Served Cell Information	M		9.2.8		-	-
<b>&gt;Neighbour Information</b>		0 .. <maxnoofNeighbours>			-	-
>>ECGI	M		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the neighbour cell	-	-
>>PCI	M		INTEGER (0..503, ...)	Physical Cell Identifier of the neighbour cell	-	-
>>EARFCN	M		9.2.26	DL EARFCN for FDD or EARFCN for TDD	-	-
>>TAC	O		OCTET STRING (2)	Tracking Area Code	YES	ignore
>>EARFCN Extension	O		9.2.65	DL EARFCN for FDD or EARFCN for TDD. If this IE is present, the value signalled in the EARFCN IE is ignored.	YES	reject
<b>GU Group Id List</b>		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
maxCellInNB	Maximum no. cells that can be served by an eNB. Value is 256.
maxnoofNeighbours	Maximum no. of neighbour cells associated to a given served cell. Value is 512.
maxPools	Maximum no. of pools an eNB can belong to. Value is 16.

### 9.1.2.5 X2 SETUP FAILURE

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

Direction: eNB<sub>2</sub> → eNB<sub>1</sub>.

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 and is used to request the X2 interface between the two eNB to be reset.

Direction:  $eNB_1 \rightarrow eNB_2$ .

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

### 9.1.2.7 RESET RESPONSE

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

Direction:  $eNB_2 \rightarrow eNB_1$ .

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

### 9.1.2.8 ENB CONFIGURATION UPDATE

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

Direction:  $eNB_1 \rightarrow eNB_2$ .

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
<b>Served Cells To Add</b>		0 .. <maxCellInNB>		Complete list of added cells served by the eNB	GLOBAL	reject
>Served Cell Information	M		9.2.8		-	-
<b>&gt;Neighbour Information</b>		0 .. <maxnoofNeighbours>			-	-
>>ECGI	M		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the neighbour cell	-	-
>>PCI	M		INTEGER (0..503, ...)	Physical Cell Identifier of the neighbour cell	-	-
>>EARFCN	M		9.2.26	DL EARFCN for FDD or EARFCN for TDD	-	-
>>TAC	O		OCTET STRING (2)	Tracking Area Code	YES	ignore
>>EARFCN Extension	O		9.2.65	DL EARFCN for FDD or EARFCN for TDD. If this IE is present, the value signalled in the EARFCN IE is ignored.	YES	reject
<b>Served Cells To Modify</b>		0 .. <maxCellInNB>		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		-	-
<b>&gt;Neighbour Information</b>		0 .. <maxnoofNeighbours>			-	-
>>ECGI	M		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the neighbour cell	-	-
>>PCI	M		INTEGER (0..503, ...)	Physical Cell Identifier of the neighbour cell	-	-
>>EARFCN	M		9.2.26	DL EARFCN for FDD or EARFCN for TDD	-	-
>>TAC	O		OCTET STRING (2)	Tracking Area Code	YES	ignore
>>EARFCN Extension	O		9.2.65	DL EARFCN for FDD or EARFCN for TDD. If this IE is present, the value signalled in the EARFCN IE is ignored.	YES	reject

>Deactivation Indication	O		ENUMERATED(deactivated, ...)	Indicates that the concerned cell is switched off for energy saving reasons	YES	ignore
<b>Served Cells To Delete</b>		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	-	-
<b>GU Group Id To Add List</b>		0 .. <maxPools>			GLOBAL	reject
>GU Group Id	M		9.2.20		-	-
<b>GU Group Id To Delete List</b>		0 .. <maxPools>			GLOBAL	reject
>GU Group Id	M		9.2.20		-	-
Coverage Modification List		0 .. <maxCellineNB>		List of cells with modified coverage	GLOBAL	reject
>ECGI	M		ECGI 9.2.14	E-UTRAN Cell Global Identifier of the cell to be modified	-	-
>Cell Coverage State	M		INTEGER (0..15, ...)	Value '0' indicates that the cell is inactive. Other values Indicates that the cell is active and also indicates the coverage configuration of the concerned cell	-	-
>Cell Deployment Status Indicator	O		ENUMERATED(pre-change-notification, ...)	Indicates the Cell Coverage State is planned to be used at the next reconfiguration		
>Cell Replacing Info	C-ifCellDeploymentStatusIndicator Present					
>>Replacing Cells		0 .. <maxCellineNB>				
>>>ECGI			ECGI 9.2.14	E-UTRAN Cell Global Identifier of a cell that may replace all or part of the coverage of the cell to be modified		

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

Condition	Explanation
ifCellDeploymentStatusIndicatorPresent	This IE shall be present if the <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:  $eNB_2 \rightarrow eNB_1$ .

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

### 9.1.2.10 ENB CONFIGURATION UPDATE FAILURE

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

Direction:  $eNB_2 \rightarrow eNB_1$ .

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

### 9.1.2.11 RESOURCE STATUS REQUEST

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

Direction:  $eNB_1 \rightarrow eNB_2$ .

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
eNB1 Measurement ID	M		INTEGER (1..4095,...)	Allocated by eNB <sub>1</sub>	YES	reject
eNB2 Measurement ID	C-ifRegistrationRequest StoporPartialStoporAdd		INTEGER (1..4095,...)	Allocated by eNB <sub>2</sub>	YES	ignore
Registration Request	M		ENUMERATED(start, stop, ..., partial stop, add)	Type of request for which the resource status is required.	YES	reject
Report Characteristics	O		BITSTRING (SIZE(32))	Each position in the bitmap indicates measurement object the eNB <sub>2</sub> 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 <sub>2</sub> .	YES	reject
Cell To Report		1		Cell ID list to which the request applies.	YES	ignore
>Cell To Report Item		1 .. <maxCellNb>			EACH	ignore
>>Cell ID	M		ECGI 9.2.14		—	—
Reporting Periodicity	O		ENUMERATED(1000ms, 2000ms, 5000ms, 10000ms, ...)	Periodicity that can be used for reporting of PRB Periodic, TNL Load Ind Periodic, HW Load Ind Periodic, Composite Available Capacity Periodic or ABS Status Periodic.	YES	ignore
Partial Success Indicator	O		ENUMERATED(partial success allowed, ...)	Included if partial success is allowed	YES	ignore
Reporting Periodicity of RSRP Measurement Report	O		ENUMERATED(120ms, 240ms, 480ms, 640ms, ...)	Periodicity that can be used for the reporting of RSRP Measurement Report Periodic.	YES	ignore

Reporting Periodicity of CSI Report	O		ENUMERATED(5ms, 10ms, 20ms, 40ms, 80ms, ...)	Periodicity that can be used for the reporting of CSI Report Periodic.	YES	ignore
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Range bound	Explanation
maxCellInNB	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 eNB<sub>2</sub> to indicate that the requested measurement, for all or for a subset of the measurement objects included in the measurement is successfully initiated.

Direction: eNB<sub>2</sub> → eNB<sub>1</sub>.

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 <sub>1</sub>	YES	reject
eNB2 Measurement ID	M		INTEGER (1..4095,...)	Allocated by eNB <sub>2</sub>	YES	reject
Criticality Diagnostics	O		9.2.7		YES	ignore
<b>Measurement Initiation Result</b>		0..1		List of all cells in which measurement objects were requested, included when indicating partial success	YES	ignore
<b>&gt;Measurement Initiation Result Item</b>		1 .. <maxCe llineNB>			EACH	ignore
>>Cell ID	M		ECGI 9.2.14		-	-
>>Measurement Failure Cause List		0..1		Indicates that eNB <sub>2</sub> could not initiate the measurement for at least one of the requested measurement objects in the cell	-	-
>>>Measurement Failure Cause Item		1 .. <maxFa illedMe asObject s>			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 <sub>2</sub> . 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 <sub>1</sub> .	-	-
>>>Cause	M		9.2.6	Failure cause for measurement objects for which the measurement cannot be initiated	-	-

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

### 9.1.2.13 RESOURCE STATUS FAILURE

This message is sent by the eNB<sub>2</sub> to indicate that for none of the requested measurement objects the measurement can be initiated.

Direction: eNB<sub>2</sub> → eNB<sub>1</sub>.

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 <sub>1</sub>	YES	reject
eNB2 Measurement ID	M		INTEGER (1..4095,...)	Allocated by eNB <sub>2</sub>	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
<b>Complete Failure Cause Information</b>		0..1		Complete list of failure causes for all requested cells	YES	ignore
<b>&gt;Complete Failure Cause Information Item</b>		1 .. <maxCelineNB>			EACH	ignore
>>Cell ID	M		ECGI 9.2.14		–	–
>>Measurement Failure Cause List		1			–	–
>>>Measurement Failure Cause Item		1 .. <maxFailedMeasObjects>			EACH	ignore
>>>Measurement Failed Report Characteristics	M		BITSTRING (SIZE(32))	Each position in the bitmap indicates measurement object that failed to be initiated in the eNB <sub>2</sub> . 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 <sub>1</sub> .	–	–
>>>Cause	M		9.2.6	Failure cause for measurements that cannot be initiated	–	–

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

### 9.1.2.14 RESOURCE STATUS UPDATE

This message is sent by eNB<sub>2</sub> to neighbouring eNB<sub>1</sub> to report the results of the requested measurements.

Direction: eNB<sub>2</sub> → eNB<sub>1</sub>.

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 <sub>1</sub>	YES	reject
eNB2 Measurement ID	M		INTEGER (1..4095,...)	Allocated by eNB <sub>2</sub>	YES	reject
<b>Cell Measurement Result</b>		1			YES	ignore
<b>&gt;Cell Measurement Result Item</b>		1 .. <maxCellineNB>			EACH	ignore
>>Cell ID	M		ECGI 9.2.14			
>>Hardware Load Indicator	O		9.2.34			
>>S1 TNL Load Indicator	O		9.2.35			
>>Radio Resource Status	O		9.2.37			
>>Composite Available Capacity Group	O		9.2.44		YES	ignore
>>ABS Status	O		9.2.58		YES	ignore
>>RSRP Measurement Report List	O		9.2.76		YES	ignore
>>CSI Report	O		9.2.79		YES	ignore
>>Cell Reporting Indicator	O		ENUMERATED(stop request, ...)		YES	ignore

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

### 9.1.2.15 MOBILITY CHANGE REQUEST

This message is sent by an eNB<sub>1</sub> to neighbouring eNB<sub>2</sub> to initiate adaptation of mobility parameters.

Direction: eNB<sub>1</sub> → eNB<sub>2</sub>.

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 <sub>1</sub> cell	YES	ignore
eNB2 Proposed Mobility Parameters	M		Mobility Parameters Information 9.2.48	Proposed configuration change in eNB <sub>2</sub> cell	YES	reject
Cause	M		9.2.6		YES	reject

### 9.1.2.16 MOBILITY CHANGE ACKNOWLEDGE

This message is sent by the eNB<sub>2</sub> to indicate that the eNB<sub>2</sub> Proposed Mobility Parameter proposed by eNB<sub>1</sub> was accepted.

Direction: eNB<sub>2</sub> → eNB<sub>1</sub>.

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

### 9.1.2.17 MOBILITY CHANGE FAILURE

This message is sent by the eNB<sub>2</sub> to indicate that the eNB<sub>2</sub> Proposed Mobility Parameter proposed by eNB<sub>1</sub> was refused.

Direction: eNB<sub>2</sub> → eNB<sub>1</sub>.

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

### 9.1.2.18 RLF INDICATION

This message is sent by the eNB<sub>2</sub> to indicate an RRC re-establishment attempt or a reception of an RLF Report from a UE that suffered a connection failure at eNB<sub>1</sub>.

Direction: eNB<sub>2</sub> → eNB<sub>1</sub>.

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 UEInformationResponse 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(configurationFailure, handoverFailure, otherFailure, ...)	The Reestablishment Cause in RRCConnection Reestablishment Request 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 UEInformationResponse message (TS 36.331 [9])	YES	ignore

### 9.1.2.19 HANOVER REPORT

This message is sent by the eNB<sub>1</sub> to report a handover failure event or other critical mobility problem.

Direction: eNB<sub>1</sub> → eNB<sub>2</sub>.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	ignore
Handover Report Type	M		ENUMERATED (HO too early, HO to wrong cell, ..., InterRAT ping-pong)		YES	ignore
Handover Cause	M		Cause 9.2.6	Indicates handover cause employed for handover from eNB <sub>2</sub>	YES	ignore
Source cell ECGI	M		ECGI 9.2.14	ECGI of source cell for handover procedure (in eNB <sub>2</sub> )	YES	ignore
Failure cell ECGI	M		ECGI 9.2.14	ECGI of target cell for handover procedure (in eNB <sub>1</sub> )	YES	ignore
Re-establishment cell ECGI	C-ifHandoverReportType HoToWrongCell		ECGI 9.2.14	ECGI of cell where UE attempted re-establishment	YES	ignore
Target cell in UTRAN	C-ifHandoverReportType InterRATpingpong		OCTET STRING	Encoded according to <i>UTRAN Cell ID</i> in the <i>Last Visited UTRAN Cell Information IE</i> , as defined 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 <sub>2</sub> ) 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 <sub>2</sub> .	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 IE</i> received in the RLF INDICATION message.	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"

### 9.1.2.20 CELL ACTIVATION REQUEST

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

Direction: eNB<sub>1</sub> → eNB<sub>2</sub>.

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

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

### 9.1.2.21 CELL ACTIVATION RESPONSE

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

Direction:  $eNB_2 \rightarrow eNB_1$ .

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

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

### 9.1.2.22 CELL ACTIVATION FAILURE

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

Direction:  $eNB_2 \rightarrow eNB_1$ .

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

### 9.1.2.23 X2 RELEASE

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

Direction:  $eNB_1 \rightarrow eNB_2$ .

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

### 9.1.2.24 X2AP MESSAGE TRANSFER

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

Direction:  $eNB_1 \rightarrow eNB_2$ .

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

### 9.1.2.25 X2 REMOVAL REQUEST

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

Direction:  $eNB_1 \rightarrow eNB_2$ .

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

### 9.1.2.26 X2 REMOVAL RESPONSE

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

Direction:  $eNB_2 \rightarrow eNB_1$ .

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

### 9.1.2.27 X2 REMOVAL FAILURE

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

Direction:  $eNB_2 \rightarrow eNB_1$ .

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

### 9.1.2.28 RETRIEVE UE CONTEXT REQUEST

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

Direction: new eNB  $\rightarrow$  old eNB.

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

### 9.1.2.29 RETRIEVE UE CONTEXT RESPONSE

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

Direction: old eNB → 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
<b>UE Context Information</b>		1			YES	reject
>MME UE S1AP ID	M		INTEGER (0..2 <sup>32</sup> - 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		-	-
<b>&gt;E-RABs To Be Setup List</b>		1			-	-
>>E-RABs To Be Setup Item		1 .. <maxno of Bearers >			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		YES	reject
>>>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
>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		-	-
<b>&gt;Management Based MDT PLMN List</b>	O		MDT PLMN List 9.2.64		-	-
>UE Sidelink Aggregate Maximum Bit Rate	O		9.2.97	This IE applies only if the UE is authorized for V2X services.	YES	ignore
Trace Activation	O		9.2.2		YES	ignore
SRVCC Operation Possible	O		9.2.33		YES	ignore
Masked IMEISV	O		9.2.69		YES	ignore
Expected UE Behaviour	O		9.2.70		YES	ignore
ProSe Authorized	O		9.2.78		YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
V2X Services Authorized	O		9.2.93		YES	ignore

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

## 9.1.3 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
<b>E-RABs To Be Added List</b>		1			YES	reject
<b>&gt;E-RABs To Be Added Item</b>		1 .. <maxnoof Bearers>			EACH	reject
>>CHOICE Bearer Option	M					
>>>SCG Bearer						
>>>E-RAB ID	M		9.2.23		–	–
>>>E-RAB Level QoS Parameters	M		9.2.9	Includes necessary QoS parameters	–	–
>>>DL Forwarding	O		9.2.5		–	–
>>>S1 UL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SGW endpoint of the S1 transport bearer. For delivery of UL PDUs.	–	–
>>>Correlation ID	O		Correlation ID 9.2.84		–	–
>>>SIPTO Correlation ID	O		Correlation ID 9.2.84		–	–
>>>Split Bearer						
>>>E-RAB ID	M		9.2.23		–	–
>>>E-RAB Level QoS Parameters	M		9.2.9	Includes necessary QoS parameters	–	–
>>>MeNB GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2 transport bearer. For delivery of UL PDUs.	–	–
MeNB to SeNB Container	M		OCTET STRING	Includes the SCG-ConfigInfo message as defined in TS 36.331 [9]	YES	reject
CSG Membership Status	O		9.2.52		YES	reject
SeNB UE X2AP ID	O		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	reject

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

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

Condition	Explanation
ifSCGBearerOption	This IE shall be present if the <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
<b>E-RABs Admitted To Be Added List</b>		1			YES	ignore
<b>&gt;E-RABs Admitted To Be Added Item</b>		1 .. <maxnoof Bearers>			EACH	ignore
>>CHOICE Bearer Option	M					
>>>SCG Bearer						
>>>E-RAB ID	M		9.2.23		–	–
>>>S1 DL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SeNB endpoint of the S1 transport bearer. For delivery of DL PDUs.	–	–
>>>DL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	–	–
>>>UL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	–	–
>>>Split Bearer						
>>>E-RAB ID	M		9.2.23		–	–
>>>SeNB GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	Endpoint of the X2 transport bearer at the SeNB.	–	–
E-RABs Not Admitted List	O		E-RAB List 9.2.28	A value for E-RAB ID shall only be present once in E-RABs Admitted List IE and in E-RABs Not Admitted List IE.	YES	ignore
SeNB to MeNB Container	M		OCTET STRING	Includes the SCG-Config message as defined in TS 36.331 [9]	YES	reject
Criticality Diagnostics	O		9.2.7		YES	ignore
GW Transport Layer Address	O		BIT STRING (1..160, ...)	Indicating GW Transport Layer Address.	YES	ignore
SIPTO L-GW Transport Layer Address	O		BIT STRING (1..160, ...)	Indicating SIPTO L-GW Transport Layer Address.	YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	reject
Tunnel Information for BBF	O		Tunnel Information 9.2.89	Indicating eNB's Local IP Address assigned by the broadband access provider, UDP port Number.	YES	ignore

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

### 9.1.3.3 SENB ADDITION REQUEST REJECT

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

Direction: SeNB → MeNB.

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

### 9.1.3.4 SENB RECONFIGURATION COMPLETE

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

Direction: MeNB → SeNB.

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

### 9.1.3.5 SENB MODIFICATION REQUEST

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

Direction: MeNB → SeNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	reject
Cause	M		9.2.6		YES	ignore
SCG Change Indication	O		9.2.73		YES	ignore
Serving PLMN	O		PLMN Identity 9.2.4	The serving PLMN of the SCG in the SeNB.	YES	ignore
<b>UE Context Information</b>		0..1			YES	reject
>UE Security Capabilities	O		9.2.29		—	—
>SeNB Security Key	O		9.2.72		—	—
>SeNB UE Aggregate Maximum Bit Rate	O		UE Aggregate Maximum Bit Rate 9.2.12		—	—
<b>&gt;E-RABs To Be Added List</b>		0..1			—	—
<b>&gt;&gt;E-RABs To Be Added Item</b>		1 .. <maxnoof Bearers>			EACH	ignore
>>>CHOICE Bearer Option	M					
>>>>SCG Bearer						
>>>>E-RAB ID	M		9.2.23		—	—
>>>>E-RAB Level QoS Parameters	M		9.2.9	Includes necessary QoS parameters	—	—
>>>>DL Forwarding	O		9.2.5		—	—
>>>>S1 UL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SGW endpoint of the S1 transport bearer. For delivery of UL PDUs.	—	—
>>>>Correlation ID	O		Correlation ID 9.2.84		—	—
>>>>SIPTO Correlation ID	O		Correlation ID 9.2.84		—	—
>>>>Split Bearer						
>>>>E-RAB ID	M		9.2.23		—	—
>>>>E-RAB Level QoS Parameters	M		9.2.9	Includes necessary QoS parameters	—	—
>>>>MeNB GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2 transport bearer. For delivery of UL PDUs.	—	—
<b>&gt;E-RABs To Be Modified List</b>		0..1			—	—
<b>&gt;&gt;E-RABs To Be Modified Item</b>		1 .. <maxnoof Bearers>			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
<b>E-RABs Admitted List</b>		0..1			YES	ignore
<b>&gt;E-RABs Admitted To Be Added List</b>		1			-	-
<b>&gt;&gt;E-RABs Admitted To Be Added Item</b>		1 .. <maxnoof Bearers>			EACH	ignore
<b>&gt;&gt;&gt;CHOICE Bearer Option</b>	M					
<b>&gt;&gt;&gt;SCG Bearer</b>						
<b>&gt;&gt;&gt;&gt;E-RAB ID</b>	M		9.2.23		-	-
<b>&gt;&gt;&gt;&gt;S1 DL GTP Tunnel Endpoint</b>	M		GTP Tunnel Endpoint 9.2.1	SeNB endpoint of the S1 transport bearer. For delivery of DL PDUs.	-	-
<b>&gt;&gt;&gt;&gt;DL Forwarding GTP Tunnel Endpoint</b>	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs	-	-
<b>&gt;&gt;&gt;&gt;UL Forwarding GTP Tunnel Endpoint</b>	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	-	-
<b>&gt;&gt;&gt;&gt;Split Bearer</b>						
<b>&gt;&gt;&gt;&gt;E-RAB ID</b>	M		9.2.23		-	-
<b>&gt;&gt;&gt;&gt;SeNB GTP Tunnel Endpoint</b>	M		GTP Tunnel Endpoint 9.2.1	Endpoint of the X2 transport bearer at the SeNB.	-	-
<b>&gt;E-RABs Admitted To Be Modified List</b>		0..1			-	-
<b>&gt;&gt;E-RABs Admitted To Be Modified Item</b>		1 .. <maxnoof Bearers>			EACH	ignore
<b>&gt;&gt;&gt;CHOICE Bearer Option</b>	M					
<b>&gt;&gt;&gt;SCG Bearer</b>						
<b>&gt;&gt;&gt;&gt;E-RAB ID</b>	M		9.2.23		-	-
<b>&gt;&gt;&gt;&gt;S1 DL GTP Tunnel Endpoint</b>	O		GTP Tunnel Endpoint 9.2.1	SeNB endpoint of the S1 transport bearer. For delivery of DL PDUs.	-	-
<b>&gt;&gt;&gt;&gt;Split Bearer</b>						
<b>&gt;&gt;&gt;&gt;E-RAB ID</b>	M		9.2.23		-	-
<b>&gt;&gt;&gt;&gt;SeNB GTP Tunnel Endpoint</b>	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 .. <maxnoof Bearers>			EACH	ignore
>>>CHOICE Bearer Option	M					
>>>>SCG Bearer						
>>>>E-RAB ID	M		9.2.23		-	-
>>>>Split Bearer						
>>>>E-RAB ID	M		9.2.23		-	-
E-RABs Not Admitted List	O		E-RAB List 9.2.28	A value for E-RAB ID shall only be present once in E-RABs Admitted List IE and in E-RABs Not Admitted List IE.	YES	ignore
SeNB to MeNB Container	O		OCTET STRING	Includes the SCG-Config message as defined in TS 36.331 [9]	YES	ignore
Criticality Diagnostics	O		9.2.7		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	Ignore

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

### 9.1.3.7 SENB MODIFICATION REQUEST REJECT

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

Direction: SeNB → MeNB.

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

### 9.1.3.8 SENB MODIFICATION REQUIRED

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

Direction: SeNB → MeNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	reject
Cause	M		9.2.6		YES	ignore
SCG Change Indication	O		9.2.73		YES	ignore
E-RABs To Be Released List		0..1			YES	ignore
>E-RABs To Be Released Item		1 .. <maxnoof Bearers>			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

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

### 9.1.3.10 SENB MODIFICATION REFUSE

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

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
<b>E-RABs To Be Released List</b>		0..1			YES	ignore
> E-RABs To Be Released Item		1 .. <maxnoof Bearers>			EACH	ignore
>>CHOICE Bearer Option	M					
>>>SCG Bearer						
>>>E-RAB ID	M		9.2.23		–	–
>>>UL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs	–	–
>>>DL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer. used for forwarding of DL PDUs	–	–
>>>Split Bearer						
>>>E-RAB ID	M		9.2.23		–	–
>>>DL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer. used for forwarding of DL PDUs	–	–
UE Context Kept Indicator	O		9.2.85		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the SeNB	YES	reject
MakeBeforeBreak Indicator	O		ENUMERATED (True, ...)		YES	ignore

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

### 9.1.3.12 SENB RELEASE REQUIRED

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

Direction: SeNB → MeNB.

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

### 9.1.3.13 SENB RELEASE CONFIRM

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

Direction: MeNB → SeNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		YES	reject
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	YES	ignore
SeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the SeNB	YES	ignore
<b>E-RABs to be Released List</b>		0..1			YES	ignore
>E-RABs To Be Released Item		1 .. <maxnoof Bearers>			-	-
>>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
<b>E-RABs Subject to Counter Check List</b>		1			YES	ignore
<b>&gt;E-RABs Subject to Counter Check Item</b>		1 .. <maxnoofBearers>			EACH	ignore
<b>&gt;&gt;E-RAB ID</b>	M		9.2.23		-	-
<b>&gt;&gt;UL COUNT</b>	M	INTEGER(0..4294967295)		Indicates the value of uplink COUNT associated to this E-RAB.	-	-
<b>&gt;&gt;DL COUNT</b>	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

## 9.2 Information Element definitions

### 9.2.0 General

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

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

### 9.2.1 GTP Tunnel Endpoint

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

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Transport Layer Address	M		BIT STRING (1..160, ...)	For details on the Transport Layer Address, see TS 36.424 [8], TS 36.414 [19]	–	–
GTP TEID	M		OCTET STRING (4)	For details and range, see TS 29.281 [26]	–	–

## 9.2.2 Trace Activation

Defines parameters related to trace activation.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
E-UTRAN Trace ID	M		OCTET STRING (8)	The E-UTRAN Trace ID IE is composed of the following: Trace Reference defined in TS 32.422 [6] (leftmost 6 octets, with PLMN information coded as in 9.2.4), and Trace Recording Session Reference defined in TS 32.422 [6] (last 2 octets)	–	–
Interfaces To Trace	M		BIT STRING (8)	Each position in the bitmap represents a eNB interface: first bit =S1-MME, second bit =X2, third bit =Uu. 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, MaximumWithoutVendorSpecificExtension, ...)	Defined in TS 32.421 [7]	–	–
Trace Collection Entity IP Address	M		BIT STRING (1..160,...)	For details on the Transport Layer Address, see TS 36.424 [8], TS 36.414 [19]	–	–
MDT Configuration	O		9.2.56		YES	ignore

## 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		–	–
<b>Equivalent PLMNs</b>		<i>0..&lt;maxnoofEPLMNs&gt;</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		–	–
<b>Forbidden TAs</b>		<i>0..&lt;maxnoofEPLMNsPlusOne&gt;</i>		intra E-UTRAN roaming restrictions	–	–
>PLMN Identity	M		9.2.4	The PLMN of forbidden TACs	–	–
<b>&gt;Forbidden TACs</b>		<i>1..&lt;maxnoofForbTACs&gt;</i>			–	–
>>TAC	M		OCTET STRING(2)	The forbidden TAC	–	–
<b>Forbidden LAs</b>		<i>0..&lt;maxnoofEPLMNsPlusOne&gt;</i>		inter-3GPP RAT roaming restrictions	–	–
>PLMN Identity	M		9.2.4		–	–
<b>&gt;Forbidden LACs</b>		<i>1..&lt;maxnoofForbLACs&gt;</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	–	–

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"> <li>- digits 0 to 9, encoded 0000 to 1001,</li> <li>- 1111 used as filler digit,</li> <li>two digits per octet,</li> <li>- bits 4 to 1 of octet n encoding digit <math>2n-1</math></li> <li>- bits 8 to 5 of octet n encoding digit <math>2n</math></li> </ul> <p>The PLMN identity consists of 3 digits from MCC followed by either</p> <ul style="list-style-type: none"> <li>-a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or</li> <li>-3 digits from MNC (in case of a 3 digit MNC).</li> </ul>

## 9.2.5 DL Forwarding

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

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

## 9.2.6 Cause

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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Cause Group	M			
>Radio Network Layer				
>>Radio Network Layer Cause	M		ENUMERATED (Handover Desirable for Radio Reasons, Time Critical Handover, Resource Optimisation Handover, Reduce Load in Serving Cell, Partial Handover, Unknown New eNB UE X2AP ID, Unknown Old eNB UE X2AP ID, Unknown Pair of UE X2AP ID, HO Target not Allowed, $T_{X2RELOCoverall}$ Expiry, $T_{RELOCprep}$ Expiry, Cell not Available, No Radio Resources Available in Target Cell, Invalid MME Group ID, Unknown MME Code, Encryption And/Or Integrity Protection Algorithms Not Supported, ReportCharacteristicsEmpty, NoReportPeriodicity, ExistingMeasurementID, Unknown eNB Measurement ID, Measurement Temporarily not Available, Unspecified,...,Load Balancing, Handover Optimisation, Value out of allowed range, Multiple E-RAB ID instances, Switch Off Ongoing, Not supported QCI value, Measurement not supported for the object, $T_{DCoverall}$ Expiry, $T_{DCprep}$ Expiry, Action Desirable for Radio Reasons, Reduce Load, Resource Optimisation, Time Critical action, Target not Allowed, No Radio Resources Available, Invalid QoS combination, Encryption Algorithms Not Supported, Procedure cancelled, RRM purpose, Improve user bit rate, User Inactivity, Radio Connection With UE Lost, Failure in the Radio Interface Procedure, Bearer Option not Supported)	
>Transport Layer				
>>Transport Layer Cause	M		ENUMERATED (Transport Resource Unavailable, Unspecified,...)	
>Protocol				

>>Protocol Cause	M		ENUMERATED (Transfer Syntax Error,Abstract Syntax Error (Reject),Abstract Syntax Error (Ignore and Notify),Message not Compatible with Receiver State,Semantic Error,Unspecified,Abstract Syntax Error (Falsey 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 HANOVER 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.
TX2RELOCoverall Expiry	The reason for the action is expiry of timer TX2RELOCoverall.
TRELOCprep Expiry	Handover Preparation procedure is cancelled when timer TRELOCprep 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.
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 <sub>2</sub> 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.
TDCoverall Expiry	The reason for the action is expiry of timer TDCoverall.
TDCprep Expiry	The reason for the action is expiry of timer TDCprep.
Action Desirable for Radio Reasons	The reason for requesting the action is radio related. In the current version of this specification applicable for Dual Connectivity only.
Reduce Load	Load in the cell(group) served by the requesting node needs to be reduced. In the current version of this specification applicable for Dual Connectivity only.

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

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

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

Miscellaneous cause	Meaning
Control Processing Overload	eNB control processing overload
Hardware Failure	eNB hardware failure
Not enough User Plane Processing 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 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).
<b>Information Element Criticality Diagnostics</b>		0..<maxNrOfErrors>		
>IE Criticality	M		ENUMERATED(reject, ignore, notify)	The IE Criticality is used for reporting the criticality of the triggering IE. The value "ignore" shall not be used.
>IE ID	M		INTEGER (0..65535)	The IE ID of the not understood or missing IE
>Type Of Error	M		ENUMERATED(not understood, missing, ...)	

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

## 9.2.8 Served Cell Information

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PCI	M		INTEGER (0..503, ...)	Physical Cell ID	-	-
Cell ID	M		ECGI 9.2.14		-	-
TAC	M		OCTET STRING(2)	Tracking Area Code	-	-
<b>Broadcast PLMNs</b>		1..<maxnoof BPLMNs>		Broadcast PLMNs	-	-
>PLMN Identity	M		9.2.4		-	-
CHOICE EUTRA-Mode-Info	M				-	-
>FDD						
<b>&gt;&gt;FDD Info</b>		1			-	-
>>>UL EARFCN	M		EARFCN 9.2.26	Corresponds to N <sub>UL</sub> in TS 36.104 [16] for E-UTRA operating bands for which it is defined; ignored for E-UTRA operating bands for which N <sub>UL</sub> is not defined	-	-
>>>DL EARFCN	M		EARFCN 9.2.26	Corresponds to N <sub>DL</sub> 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 <sub>DL</sub> 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 <sub>UL</sub> in TS 36.104 [16]	YES	reject
>TDD					-	-
<b>&gt;&gt;TDD Info</b>		1			-	-
>>>EARFCN	M		9.2.26	Corresponds to N <sub>DL</sub> /N <sub>UL</sub> 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]	-	-
>>> <b>Special Subframe Info</b>		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,...)		-	-
>>> <b>Additional Special Subframe Info</b>	O			Special subframe configuration information defined in TS 36.211 [10]. Only for newly defined configuration of special subframe from Release 11.	YES	ignore
>>>>Additional Special Subframe Patterns	M		ENUMERATED (ssp0, ssp1, ssp2, ssp3, ssp4, ssp5, ssp6, ssp7, ssp8, ssp9, ...)		-	-
>>>>Cyclic Prefix DL	M		ENUMERATED (Normal, Extended,...)		-	-
>>>>Cyclic Prefix UL	M		ENUMERATED (Normal, Extended,...)		-	-
>>>EARFCN Extension	O		9.2.65	If this IE is present, the value signalled in the EARFCN IE is ignored.	YES	reject
>>> <b>Additional Special Subframe Extension Info</b>	O			Special subframe configuration information defined in TS 36.211 [10]. Only for newly defined configuration of special subframe from Release 14.	YES	ignore

>>>Additional Special Subframe Patterns Extension	M		ENUMERATED (ssp10, ...)		-	-
>>>Cyclic Prefix DL	M		ENUMERATED (Normal, Extended,...)		-	-
>>>Cyclic Prefix UL	M		ENUMERATED (Normal, Extended,...)		-	-
Number of Antenna Ports	O		9.2.43		YES	ignore
PRACH Configuration	O		PRACH Configuration 9.2.50		YES	ignore
<b>MBSFN Subframe Info</b>		0..<maxnoof MBSFN>		MBSFN subframe defined in TS 36.331 [9]	GLOBAL	ignore
>Radioframe Allocation Period	M		ENUMERATED (n1, n2, n4, n8, n16, n32, ...)		-	-
>Radioframe Allocation Offset	M		INTEGER (0..7, ...)		-	-
>Subframe Allocation	M		9.2.51		-	-
CSG ID	O		9.2.53		YES	ignore
<b>MBMS Service Area Identity List</b>		0..<maxnoof MBMSServiceAreaIdentities >		Supported MBMS Service Area Identities in the cell	GLOBAL	ignore
>MBMS Service Area Identity			OCTET STRING(2)	MBMS Service Area Identities as defined in TS 23.003 [29]		
MultibandInfoList	O		9.2.60		YES	ignore
FreqBandIndicatorPriority	O		ENUMERATED (not-broadcasted, broadcasted, ...)	This IE indicates that the eNodeB supports <i>FreqBandIndicatorPriority</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 SystemInformationBlockType1-BR is scheduled in the cell (see TS 36.331 [9])	YES	ignore

Range bound	Explanation
maxnoofBPLMN	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.	—	—

### 9.2.10 GBR QoS Information

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

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

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

### 9.2.11 Bit Rate

This IE indicates the number of bits delivered by E-UTRAN in UL or to E-UTRAN in DL 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		-	-
UE Aggregate Maximum Bit Rate Uplink	M		Bit Rate 9.2.11		-	-

### 9.2.13 Message Type

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

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

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

## 9.2.18 UL High Interference Indication

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

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

## 9.2.19 Relative Narrowband Tx Power (RNTP)

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
RNTP Per PRB	M		BIT STRING (6..110, ...)	Each position in the bitmap represents a $n_{PRB}$ value (i.e. first bit=PRB 0 and so on), for which the bit value represents $RNTP(n_{PRB})$ , defined in TS 36.213 [11]. Value 0 indicates "Tx not exceeding RNTP threshold". Value 1 indicates "no promise on the Tx power is given". The IE is ignored if the Enhanced RNTP IE is included.	-	-
RNTP Threshold	M		ENUMERATE D (-∞, -11, -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, ...)	$RNTP_{threshold}$ is defined in TS 36.213 [11].	-	-
Number Of Cell-specific Antenna Ports	M		ENUMERATE D (1, 2, 4, ...)	$P$ (number of antenna ports for cell-specific reference signals) defined in TS 36.211 [10]	-	-
P_B	M		INTEGER (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

> <i>Enhanced RNTP Bitmap</i>	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).</p> <p>The length of the bit string is an integer multiple of <math>2 \times N_{\text{RB}}^{\text{DL}}</math>.</p> <p><math>N_{\text{RB}}^{\text{DL}}</math> is defined in TS 36.211 [10].</p> <p>The Enhanced RNTP pattern is continuously repeated.</p>	
> <i>RNTP High Power Threshold</i>	M		ENUMERATE D (-∞, -11, -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, ...)	Defined as the $\text{RNTP}_{\text{threshold}}$ in TS 36.213 [11].	
> <i>Enhanced RNTP Start Time</i>		0..1			
>> <i>Start SFN</i>	M		INTEGER (0..1023, ...)	SFN of the radio frame containing the first subframe when the <i>Enhanced RNTP</i> IE is valid.	
>> <i>Start Subframe Number</i>	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, ...)		-	-

### 9.2.22 Global eNB ID

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

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

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

### 9.2.25 Subscriber Profile ID for RAT/Frequency priority

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Subscriber Profile ID for RAT/Frequency Priority	M		INTEGER (1..256)	

### 9.2.26 EARFCN

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

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

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

### 9.2.27 Transmission Bandwidth

The *Transmission Bandwidth* IE is used to indicate the UL or DL transmission bandwidth expressed in units of resource blocks "N<sub>RB</sub>" (TS 36.104 [16]). The values bw1, bw6, bw15, bw25, bw50, bw75, bw100 correspond to the number of resource blocks "N<sub>RB</sub>" 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)	<p><b>Desc.:</b> This IE should be understood as “priority of allocation and retention” (see TS 23.401 [12]).</p> <p><b>Usage:</b> 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.</p>
Pre-emption Capability	M		ENUMERATED(shall not trigger pre-emption, may trigger pre-emption)	<p><b>Descr.:</b> This IE indicates the pre-emption capability of the request on other E-RABs</p> <p><b>Usage:</b> 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.</p>
Pre-emption Vulnerability	M		ENUMERATED(not pre-emptable, pre-emptable)	<p><b>Desc.:</b> This IE indicates the vulnerability of the E-RAB to pre-emption of other E-RABs.</p> <p><b>Usage:</b> 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.</p>

### 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]).

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)	

### 9.2.38 UE History Information

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

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

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

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

## 9.2.39 Last Visited Cell Information

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

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

## 9.2.40 Last Visited E-UTRAN Cell Information

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

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

## 9.2.41 Last Visited GERAN Cell Information

The Last Visited Cell Information for GERAN is currently undefined.

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CHOICE <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 eNB<sub>2</sub> at the moment the MOBILITY CHANGE FAILURE message is sent.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Handover Trigger Change Lower Limit	M		INTEGER (-20..20)	The actual value is IE value * 0.5 dB.
Handover Trigger Change Upper Limit	M		INTEGER (-20..20)	The actual value is IE value * 0.5 dB.

## 9.2.50 PRACH Configuration

This IE indicates the PRACH resources used in neighbor cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
RootSequenceIndex	M		INTEGER (0..837)	See section 5.7.2. in TS 36.211 [10]	-	-
ZeroCorrelationZoneConfiguration	M		INTEGER (0..15)	See section 5.7.2. in TS 36.211 [10]	-	-
HighSpeedFlag	M		BOOLEAN	TRUE corresponds to Restricted set and FALSE to Unrestricted set. See section 5.7.2 in TS 36.211 [10]	-	-
PRACH-FrequencyOffset	M		INTEGER (0..94)	See section 5.7.1 of TS 36.211 [10]	-	-
PRACH-ConfigurationIndex	O		INTEGER (0..63)	Mandatory for TDD, shall not be present for FDD. See section 5.7.1. in TS 36.211 [10]	-	-

## 9.2.51 Subframe Allocation

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

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

## 9.2.52 CSG Membership Status

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

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

## 9.2.53 CSG ID

This element indicates the identifier of the Closed Subscriber Group.

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

## 9.2.54 ABS Information

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

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

>ABS Inactive	M		NULL	Indicates that interference coordination by means of almost blank sub frames is not active
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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 ofTAforM DT>			-	-
>>>TAC	M		OCTET STRING (2)	Tracking Area Code. The TAI is derived using the current serving PLMN.	-	-
>PLMN Wide			NULL		-	-
>TAI based						
>>TAI List for MDT		1..<maxno ofTAforM DT>				
>>>TAC	M		OCTET STRING (2)	Tracking Area Code		
>>>PLMN Identity	M		9.2.4			
Measurements to Activate	M		BITSTRING (SIZE(8))	Each position in the bitmap indicates a MDT measurement, as defined in TS 37.320 [25]. First Bit = M1, Second Bit = M2, Third Bit = M3, Fourth Bit = M4, Fifth Bit = M5, Sixth Bit = logging of M1 from event triggered measurement reports according to existing RRM configuration. Seventh Bit = M6, Eighth Bit = M7. Value "1" indicates "activate" and value "0" indicates "do not activate".	-	-
M1 Reporting Trigger	M		ENUMERATED (periodic, A2event-triggered, ..., A2event-triggered periodic)	This IE shall be ignored if the Measurements to Activate IE has the first bit set to "0".	-	-
M1 Threshold Event A2	C-ifM1A2trigger			Included in case of event-triggered or event-triggered periodic reporting for measurement M1	-	-
>CHOICE Threshold	M				-	-
>>RSRP					-	-
>>>Threshold RSRP	M		INTEGER (0..97)	This IE is defined in TS 36.331 [9].	-	-
>>RSRQ					-	-
>>>Threshold RSRQ	M		INTEGER (0..34)	This IE is defined in TS 36.331 [9].	-	-

M1 Periodic reporting	C-ifperiodic MDT			Included in case of periodic or event-triggered periodic reporting for measurement M1	-	-
>Report interval	M		ENUMERATED ( ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, min1, min6, min12, min30, min60)	This IE is defined in TS 36.331 [9].	-	-
>Report amount	M		ENUMERATED (1, 2, 4, 8, 16, 32, 64, infinity)	Number of reports	-	-
M3 Configuration	C-ifM3		9.2.61		YES	ignore
M4 Configuration	C-ifM4		9.2.62		YES	ignore
M5 Configuration	C-ifM5		9.2.63		YES	ignore
MDT Location Information	O		BITSTRING(SIZE(8))	Each position in the bitmap represents requested location information as defined in TS 37.320 [31]. First Bit = GNSS Second Bit = E-CID information. Other bits are reserved for future use and are ignored if received. Value "1" indicates "activate" and value "0" indicates "do not activate".  The eNB shall ignore the first bit unless the <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

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 <sub>2</sub> for DL traffic needing protection by ABS from inter-cell interference for DL scheduling, or allocated by the eNB <sub>2</sub> 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		–	–
>FDD			–	–
>>Usable ABS Pattern Info	M		BIT STRING (SIZE(40))	Each position in the bitmap represents a subframe, for which value "1" indicates 'ABS that has been designated as protected from inter-cell interference by the eNB <sub>1</sub> , and available to serve this purpose for DL scheduling in the eNB <sub>2</sub> ' 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 <sub>1</sub> .
>TDD			–	–
>>Usable ABS Pattern Info	M		BIT STRING (1..70)	Each position in the bitmap represents a subframe, for which value "1" indicates 'ABS that has been designated as protected from inter-cell interference by the eNB <sub>1</sub> , and available to serve this purpose for DL scheduling in the eNB <sub>2</sub> ' 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 <sub>1</sub> .

## 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
<b>BandInfo</b>		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
<b>MDT PLMN List</b>		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 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..<maxnoofCoM PCells>		
>Cell ID	M		ECGI 9.2.14	ID of the cell for which the CoMP Hypothesis IE is applied.
>CoMP Hypothesis	M		BIT STRING (6..4400, ...)	<p>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.</p> <p>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.</p> <p>The bit string may span across multiple contiguous subframes.</p> <p>The length of the bit string is an integer (maximum 40) multiple of <math>N_{\text{RB}}^{\text{DL}}</math>. <math>N_{\text{RB}}^{\text{DL}}</math> is defined in TS 36.211 [10].</p> <p>The CoMP hypothesis pattern is continuously repeated.</p>

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 <sub>2</sub> 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 PA 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 PA 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 <sub>2</sub> 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 Wideband CQI Codeword 1	O			
>4-bit CQI	M		INTEGER (0..15, ...)	Value defined in TS 36.213 [11].
>3-bit spatial differential CQI	M		INTEGER (0..7, ...)	Value defined in TS 36.213 [11].

## 9.2.81 Subband CQI

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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Subband CQI Codeword 0	M			
>4-bit CQI	M		INTEGER (0..15, ...)	Value defined in TS 36.213 [11].
>2-bit Subband differential CQI	M		INTEGER (0..3, ...)	Value defined in TS 36.213 [11].
>2-bit differential CQI	M		INTEGER (0..3, ...)	Value defined in TS 36.213 [11].
CHOICE Subband CQI Codeword 1	O			
>4-bit CQI	M		INTEGER (0..15, ...)	Value defined in TS 36.213 [11].
>3-bit spatial differential CQI	M		INTEGER (0..7, ...)	Value defined in TS 36.213 [11].
>2-bit Subband differential CQI	M		INTEGER (0..3, ...)	Value defined in TS 36.213 [11].
>2-bit differential CQI	M		INTEGER (0..3, ...)	Value defined in TS 36.213 [11].

## 9.2.82 COUNT Value for PDCP SN Length 18

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDCP-SN Length 18	M		INTEGER (0..262143)		-	-
HFN for PDCP-SN Length 18	M		INTEGER (0..16383)		-	-

## 9.2.83 LHN ID

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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Local Home Network ID	M		OCTET STRING (SIZE (32..256))	Identifies the Local Home Network.

## 9.2.84 Correlation ID

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

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

## 9.2.85 UE Context Kept Indicator

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

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

## 9.2.86 eNB UE X2AP ID Extension

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

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description
eNB UE X2AP ID Extension	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>				
>> <i>Resume ID not truncated</i>	M		BIT STRING (SIZE (40))	40 bit Resume Identity contained in the RRConnection 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>				
>> <i>Resume ID truncated</i>	M		BIT STRING (SIZE (24))	24 bit Resume Identity contained in the RRConnection 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 DL EARFCN	M		ENUMERATED (-10,-9,-8,-7,-6,-5,-4,-3,-2,-1,-0.5,0,1,2,3,4,5,6,7,8,9,...)	

### 9.2.95 WT ID

This IE is used to identify a WT.

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

### 9.2.96 WT UE XwAP ID

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

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

### 9.2.97 UE Sidelink Aggregate Maximum Bit Rate

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

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

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

### 9.3.1 General

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

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

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

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

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

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

### 9.3.2 Usage of Private Message Mechanism for Non-standard Use

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

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

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

### 9.3.3 Elementary Procedure Definitions

\*\*\*\*\*

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

```
X2Release,  
X2APMessageTransfer,  
SeNBAdditionRequest,  
SeNBAdditionRequestAcknowledge,  
SeNBAdditionRequestReject,  
SeNBReconfigurationComplete,  
SeNBModificationRequest,  
SeNBModificationRequestAcknowledge,  
SeNBModificationRequestReject,  
SeNBModificationRequired,  
SeNBModificationConfirm,  
SeNBModificationRefuse,  
SeNBReleaseRequest,  
SeNBReleaseRequired,  
SeNBReleaseConfirm,  
SeNBCounterCheckRequest,  
X2RemovalFailure,  
X2RemovalRequest,  
X2RemovalResponse,  
RetrieveUEContextRequest,  
RetrieveUEContextResponse,  
RetrieveUEContextFailure
```

FROM X2AP-PDU-Contents

```
id-cellActivation,  
id-eNBConfigurationUpdate,  
id-errorIndication,  
id-handoverCancel,  
id-handoverReport,  
id-handoverPreparation,  
  
id-loadIndication,  
id-privateMessage,  
id-reset,  
  
id-resourceStatusReporting,  
id-resourceStatusReportingInitiation,  
id-rLFIIndication,  
id-snStatusTransfer,  
id-uEContextRelease,  
id-x2Setup,  
id-mobilitySettingsChange,  
id-x2Release,  
id-x2APMessageTransfer,  
id-seNBAdditionPreparation,  
id-seNBReconfigurationCompletion,  
id-meNBinitiatedSeNBModificationPreparation,  
id-seNBinitiatedSeNBModification,  
id-meNBinitiatedSeNBRelease,  
id-seNBinitiatedSeNBRelease,  
id-seNBCounterCheck,  
id-x2Removal,  
id-retrieveUEContext
```

```

FROM X2AP-Constants;

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

X2AP-ELEMENTARY-PROCEDURE ::= CLASS {
    &InitiatingMessage           ,
    &SuccessfulOutcome          OPTIONAL,
    &UnsuccessfulOutcome        OPTIONAL,
    &procedureCode               ProcedureCode 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
    criticality     X2AP-ELEMENTARY-PROCEDURE.&criticality
    value           X2AP-ELEMENTARY-PROCEDURE.&InitiatingMessage
}                                     ( {X2AP-ELEMENTARY-PROCEDURES}),
                                         ( {X2AP-ELEMENTARY-PROCEDURES}{@procedureCode}),
                                         ( {X2AP-ELEMENTARY-PROCEDURES}{@procedureCode})

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

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

```

```
-- ****
-- Interface Elementary Procedure List
--
-- ****

X2AP-ELEMENTARY-PROCEDURES X2AP-ELEMENTARY-PROCEDURE ::= {
    X2AP-ELEMENTARY-PROCEDURES-CLASS-1
    |
    X2AP-ELEMENTARY-PROCEDURES-CLASS-2
    ,
    ...
}

X2AP-ELEMENTARY-PROCEDURES-CLASS-1 X2AP-ELEMENTARY-PROCEDURE ::= {
    handoverPreparation
    reset
    x2Setup
    resourceStatusReportingInitiation
    eNBConfigurationUpdate
    mobilitySettingsChange
    cellActivation
    seNBAdditionPreparation
    meNBinitiatedSeNBModificationPreparation
    seNBinitiatedSeNBModification
    seNBinitiatedSeNBRelease
    x2Removal
    retrieveUEContext,
    ...
}

X2AP-ELEMENTARY-PROCEDURES-CLASS-2 X2AP-ELEMENTARY-PROCEDURE ::= {
    snStatusTransfer
    uEContextRelease
    handoverCancel
    errorIndication
    resourceStatusReporting
    loadIndication
    privateMessage
    rLFIIndication
    handoverReport
    x2Release
    x2APMessageTransfer
    seNBReconfigurationCompletion
    meNBinitiatedSeNBRelease
    seNBCounterCheck,
    ...
}

-- ****
-- 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
}

END

```

### 9.3.4 PDU Definitions

```

-- ****
-- 
-- 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,  
CriticalityDiagnostics,  
CRNTI,  
CSGMembershipStatus,  
CSG-Id,  
DeactivationIndication,  
DL-Forwarding,  
DynamicDLTransmissionInformation,  
ECGI,  
E-RAB-ID,  
E-RAB-Level-QoS-Parameters,  
E-RAB-List,  
EUTRANTraceID,  
GlobalENB-ID,  
GTPtunnelEndpoint,  
GUGroupIDList,  
GUMMEI,  
HandoverReportType,  
HandoverRestrictionList,  
Masked-IMEISV,  
InvokeIndication,  
LocationReportingInformation,  
MDT-Configuration,  
ManagementBasedMDTallowed,  
MDTPLMNList,  
Neighbour-Information,  
PCI,  
PDCP-SN,  
PLMN-Identity,  
ReceiveStatusofULPDCPSDUs,  
Registration-Request,  
RelativeNarrowbandTxPower,  
RadioResourceStatus,  
RRCConnReestabIndicator,  
RRCConnSetupIndicator,  
UE-RLF-Report-Container,  
RRC-Context,  
ServedCell-Information,  
ServedCells,  
ShortMAC-I,  
SRVCCOperationPossible,  
SubscriberProfileIDforRFP,  
TargetCellInUTRAN,  
TargeteNBtoSource-eNBtransparentContainer,  
TimeToWait,  
TraceActivation,  
TraceDepth,

```

TransportLayerAddress,
UEAggregateMaximumBitRate,
UE-HistoryInformation,
UE-HistoryInformationFromTheUE,
UE-S1AP-ID,
UESecurityCapabilities,
UE-X2AP-ID,
UL-HighInterferenceIndicationInfo,
UL-InterferenceOverloadIndication,
HWLoadIndicator,
S1TNLLoadIndicator,
Measurement-ID,
ReportCharacteristics,
MobilityParametersInformation,
MobilityParametersModificationRange,
ReceiveStatusOfULPDCPSDUsExtended,
COUNTValueExtended,
SubframeAssignment,
ExtendedULInterferenceOverloadInfo,
ExpectedUEBehaviour,
SeNBSecurityKey,
MeNBtoSeNBContainer,
SeNBtoMeNBContainer,
SCGChangeIndication,
CoMPIInformation,
ReportingPeriodicityRSRPMR,
RSRPMRList,
UE-RLF-Report-Container-for-extended-bands,
ProSeAuthorized,
CoverageModificationList,
ReportingPeriodicityCSIR,
CSIReportList,
ReceiveStatusOfULPDCPSDUsPDCP-SNlength18,
COUNTvaluePDCP-SNlength18,
LHN-ID,
UE-ContextKeptIndicator,
UE-X2AP-ID-Extension,
SIPTOBearerDeactivationIndication,
TunnelInformation,
V2XServicesAuthorized,
X2BenefitValue,
ResumeID,
EUTRANCellIdentifier,
MakeBeforeBreakIndicator,
WTID,
WT-UE-XwAP-ID,
UESidelinkAggregateMaximumBitRate

```

FROM X2AP-IES

```

PrivateIE-Container{},
ProtocolExtensionContainer{},
ProtocolIE-Container{},
ProtocolIE-ContainerList{},

```

```
ProtocolIE-ContainerPair{},
ProtocolIE-ContainerPairList{},
ProtocolIE-Single-Container{},
X2AP-PRIVATE-IES,
X2AP-PROTOCOL-EXTENSION,
X2AP-PROTOCOL-IES,
X2AP-PROTOCOL-IES-PAIR
FROM X2AP-Containers

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

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

id-ResponseInformationSeNBReconfComp,  
id-UE-ContextInformationSeNBModReq,  
id-E-RABS-ToBeAdded-ModReqItem,  
id-E-RABS-ToBeModified-ModReqItem,  
id-E-RABS-ToBeReleased-ModReqItem,  
id-E-RABS-Admitted-ToBeAdded-ModAckList,  
id-E-RABS-Admitted-ToBeModified-ModAckList,  
id-E-RABS-Admitted-ToBeReleased-ModAckList,  
id-E-RABS-Admitted-ToBeAdded-ModAckItem,  
id-E-RABS-Admitted-ToBeModified-ModAckItem,  
id-E-RABS-Admitted-ToBeReleased-ModAckItem,  
id-SCGChangeIndication,  
id-E-RABS-ToBeReleased-ModReqd,  
id-E-RABS-ToBeReleased-ModReqdItem,  
id-E-RABS-ToBeReleased-List-RelReq,  
id-E-RABS-ToBeReleased-RelReqItem,  
id-E-RABS-ToBeReleased-List-RelConf,  
id-E-RABS-ToBeReleased-RelConfItem,  
id-E-RABS-SubjectToCounterCheck-List,  
id-E-RABS-SubjectToCounterCheckItem,  
id-CoMPIformation,  
id-ReportingPeriodicityRSRPMR,  
id-RSRPMRList,  
id-UE-RLF-Report-Container-for-extended-bands,  
id-ProSeAuthorized,  
id-CoverageModificationList,  
id-ReportingPeriodicityCSIR,  
id-CSIReportList,  
id-ReceiveStatusOfULPDCPSDUsPDCP-SNlength18,  
id-ULCOUNTValuePDCP-SNlength18,  
id-DLCOUNTValuePDCP-SNlength18,  
id-LHN-ID,  
id-Correlation-ID,  
id-SIPTO-Correlation-ID,  
id-UE-ContextReferenceAtSeNB,  
id-UE-ContextReferenceAtWT,  
id-UE-ContextKeptIndicator,  
id-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,

maxCelllineNB,
maxnoofBearers,
maxnoofPDCP-SN,
maxFailedMeasObjects,
maxnoofCellIDforMDT,
maxnoofTAforMDT
FROM X2AP-Constants;

-- ****
-- HANOVER 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 }, ...
}

UE-ContextInformation ::= SEQUENCE {
    mME-UE-S1AP-ID                  UE-S1AP-ID,
    uESecurityCapabilities           UESecurityCapabilities,
    aS-SecurityInformation           AS-SecurityInformation,
    uAggregateMaximumBitRate         UEAggregateMaximumBitRate,
    subscriberProfileIDforRFP       SubscriberProfileIDforRFP      OPTIONAL,
    e-RABs-ToBeSetup-List            E-RABs-ToBeSetup-List,
    rRC-Context                      RRC-Context,
    handoverRestrictionList          HandoverRestrictionList      OPTIONAL,
    locationReportingInformation     LocationReportingInformation OPTIONAL,
}

```

```

iE-Extensions                               ProtocolExtensionContainer { {UE-ContextInformation-ExtIEs} } OPTIONAL,
...
}

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

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

E-RABs-ToBeSetup-ItemIEs X2AP-PROTOCOL-IES ::= {
{ ID id-E-RABs-ToBeSetup-Item   CRITICALITY ignore   TYPE E-RABs-ToBeSetup-Item  PRESENCE mandatory },
...
}

E-RABs-ToBeSetup-Item ::= SEQUENCE {
e-RAB-ID                           E-RAB-ID,
e-RAB-Level-QoS-Parameters        E-RAB-Level-QoS-Parameters,
dL-Forwarding                      DL-Forwarding                                OPTIONAL,
uL-GTPtunnelEndpoint              GTPtunnelEndpoint,
iE-Extensions                       ProtocolExtensionContainer { {E-RABs-ToBeSetup-ItemExtIEs} } OPTIONAL,
...
}

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

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

UE-ContextReferenceAtSeNB ::= SEQUENCE {
source-GlobalSeNB-ID    GlobalENB-ID,
seNB-UE-X2AP-ID         UE-X2AP-ID,
seNB-UE-X2AP-ID-Extension  UE-X2AP-ID-Extension,
iE-Extensions           ProtocolExtensionContainer { {UE-ContextReferenceAtSeNB-ItemExtIEs} } OPTIONAL,
...
}

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

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

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

```

```

}

-- ****
-- HANOVER REQUEST ACKNOWLEDGE
-- ****

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

HandoverRequestAcknowledge-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-Old-eNB-UE-X2AP-ID           CRITICALITY ignore   TYPE UE-X2AP-ID           PRESENCE mandatory } |
    { ID id-New-eNB-UE-X2AP-ID          CRITICALITY ignore   TYPE UE-X2AP-ID           PRESENCE mandatory } |
    { ID id-E-RABs-Admitted-List        CRITICALITY ignore   TYPE E-RABs-Admitted-List     PRESENCE mandatory } |
    { ID id-E-RABs-NotAdmitted-List     CRITICALITY ignore   TYPE E-RAB-List          PRESENCE optional } |
    { ID id-TargeteNBtoSource-eNBTransparentContainer CRITICALITY ignore   TYPE TargeteNBtoSource-eNBTransparentContainer PRESENCE mandatory } |
    { ID id-CriticalityDiagnostics    CRITICALITY ignore   TYPE CriticalityDiagnostics PRESENCE optional } |
    { ID id-UE-ContextKeptIndicator    CRITICALITY ignore   TYPE UE-ContextKeptIndicator PRESENCE optional } |
    { ID id-SeNB-UE-X2AP-ID-Extension CRITICALITY ignore   TYPE UE-X2AP-ID-Extension PRESENCE optional } |
    { ID id-Old-eNB-UE-X2AP-ID-Extension CRITICALITY ignore   TYPE UE-X2AP-ID-Extension PRESENCE optional } |
    { ID id-New-eNB-UE-X2AP-ID-Extension CRITICALITY reject   TYPE UE-X2AP-ID-Extension PRESENCE optional } |
    { ID id-WT-UE-ContextKeptIndicator CRITICALITY ignore   TYPE UE-ContextKeptIndicator PRESENCE optional },
    ...
}

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

E-RABs-Admitted-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-Admitted-Item      CRITICALITY ignore   TYPE E-RABs-Admitted-Item   PRESENCE mandatory }
}

E-RABs-Admitted-Item ::= SEQUENCE {
    e-RAB-ID                  E-RAB-ID,
    uL-GTP-TunnelEndpoint     GTPtunnelEndpoint           OPTIONAL,
    dL-GTP-TunnelEndpoint     GTPtunnelEndpoint           OPTIONAL,
    iE-Extensions             ProtocolExtensionContainer { {E-RABs-Admitted-Item-ExtIEs} }   OPTIONAL,
    ...
}

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

-- ****
-- HANOVER 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
  { ID id-Cause                         CRITICALITY ignore  TYPE Cause
  { ID id-CriticalityDiagnostics       CRITICALITY ignore  TYPE CriticalityDiagnostics
  { ID id-Old-eNB-UE-X2AP-ID-Extension  CRITICALITY ignore  TYPE UE-X2AP-ID-Extension
                                            PRESENCE mandatory}|  

                                            PRESENCE mandatory}|  

                                            PRESENCE optional}|  

                                            PRESENCE optional},

}

-- *****
-- Handover Report
-- *****

HandoverReport ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container     {{HandoverReport-IEs}},

}

HandoverReport-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-HandoverReportType            CRITICALITY ignore  TYPE HandoverReportType
  { ID id-Cause                        CRITICALITY ignore  TYPE Cause
  { ID id-SourceCellECGI              CRITICALITY ignore  TYPE ECGI
  { ID id-FailureCellECGI             CRITICALITY ignore  TYPE ECGI
  { ID id-Re-establishmentCellECGI    CRITICALITY ignore  TYPE ECGI
                                            PRESENCE mandatory}|  

                                            PRESENCE mandatory}|  

                                            PRESENCE mandatory}|  

                                            PRESENCE mandatory}|  

                                            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
  { ID id-MobilityInformation        CRITICALITY ignore  TYPE MobilityInformation
  { ID id-UE-RLF-Report-Container   CRITICALITY ignore  TYPE UE-RLF-Report-Container
  { ID id-UE-RLF-Report-Container-for-extended-bands CRITICALITY ignore  TYPE UE-RLF-Report-Container-for-extended-bands
                                            PRESENCE optional}|  

                                            PRESENCE optional}|  

                                            PRESENCE optional}|  

                                            PRESENCE optional},  

}

-- *****
-- SN Status Transfer
-- *****

SNStatusTransfer ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container     {{SNStatusTransfer-IEs}},

}

SNStatusTransfer-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-Old-eNB-UE-X2AP-ID           CRITICALITY reject   TYPE UE-X2AP-ID
  { ID id-New-eNB-UE-X2AP-ID           CRITICALITY reject   TYPE UE-X2AP-ID
                                            PRESENCE mandatory}|  

                                            PRESENCE mandatory}|
```

```

{ ID id-E-RABs-SubjectToStatusTransfer-List      CRITICALITY ignore   TYPE E-RABs-SubjectToStatusTransfer-List      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},
...
}

E-RABs-SubjectToStatusTransfer-List ::= SEQUENCE (SIZE (1..maxnofBearers)) 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},
...
}

```

```

-- ****
-- 
-- HANOVER CANCEL
-- 
-- ****

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

HandoverCancel-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-Old-eNB-UE-X2AP-ID           CRITICALITY reject   TYPE UE-X2AP-ID          PRESENCE mandatory} |
    { ID id-New-eNB-UE-X2AP-ID          CRITICALITY ignore   TYPE UE-X2AP-ID          PRESENCE optional} |
    { ID id-Cause                      CRITICALITY ignore   TYPE Cause             PRESENCE mandatory} |
    { ID id-Old-eNB-UE-X2AP-ID-Extension CRITICALITY reject   TYPE UE-X2AP-ID-Extension PRESENCE optional} |
    { ID id-New-eNB-UE-X2AP-ID-Extension CRITICALITY ignore   TYPE UE-X2AP-ID-Extension PRESENCE optional},
    ...
}

-- ****
-- 
-- ERROR INDICATION
-- 
-- ****

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

ErrorIndication-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-Old-eNB-UE-X2AP-ID           CRITICALITY ignore   TYPE UE-X2AP-ID          PRESENCE optional} |
    { ID id-New-eNB-UE-X2AP-ID          CRITICALITY ignore   TYPE UE-X2AP-ID          PRESENCE optional} |
    { ID id-Cause                      CRITICALITY ignore   TYPE Cause             PRESENCE optional} |
    { ID id-CriticalityDiagnostics     CRITICALITY ignore   TYPE CriticalityDiagnostics PRESENCE optional} |
    { ID id-Old-eNB-UE-X2AP-ID-Extension CRITICALITY ignore   TYPE UE-X2AP-ID-Extension PRESENCE optional} |
    { ID id-New-eNB-UE-X2AP-ID-Extension CRITICALITY ignore   TYPE UE-X2AP-ID-Extension PRESENCE optional},
    ...
}

-- ****
-- 
-- Reset Request
-- 
-- ****

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

ResetRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-Cause                  CRITICALITY ignore   TYPE Cause             PRESENCE mandatory},
    ...
}

```

```

}
  ...
-- *****
-- Reset Response
--
-- *****
ResetResponse ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container    { {ResetResponse-IEs} },
  ...
}

ResetResponse-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-CriticalityDiagnostics CRITICALITY ignore   TYPE CriticalityDiagnostics           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..maxCelllineNB)) 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-ABSIInformation           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-CoMPIInformation          CRITICALITY ignore EXTENSION CoMPIInformation        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 },
...
}

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 FAILURE
-- ****

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..maxCelllineNB)) 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
  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..maxCelllineNB)) 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
  measurementFailureCause-List
  iE-Extensions
  ...
}

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

MeasurementFailureCause-List ::= SEQUENCE (SIZE (1..maxFailedMeasObjects)) OF ProtocolIE-Single-Container { { MeasurementFailureCause-ItemIEs} }

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

MeasurementFailureCause-Item ::= SEQUENCE {
  measurementFailedReportCharacteristics
  cause
  iE-Extensions
  ...
}

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
    measurementFailureCause-List
    iE-Extensions
    ...
}
ECGI,
MeasurementFailureCause-List,
ProtocolExtensionContainer { { CompleteFailureCauseInformation-Item-ExtIEs} } OPTIONAL,  

}

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

-- *****
--  

-- Resource Status Update  

--  

-- *****

ResourceStatusUpdate ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container     { {ResourceStatusUpdate-IEs} },
    ...
}
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
    hWLoadIndicator
    s1TNLLoadIndicator
    radioResourceStatus
    iE-Extensions
    ...
}
ECGI,  

HWLoadIndicator  OPTIONAL,  

S1TNLLoadIndicator  OPTIONAL,  

RadioResourceStatus  OPTIONAL,  

ProtocolExtensionContainer { {CellMeasurementResult-Item-ExtIEs} }  OPTIONAL,  

}

```

```

}

CellMeasurementResult-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
{ ID id-CompositeAvailableCapacityGroup CRITICALITY ignore EXTENSION CompositeAvailableCapacityGroup PRESENCE optional}|  

{ ID id-ABS-Status CRITICALITY ignore EXTENSION ABS-Status PRESENCE optional}|  

{ ID id-RSRPMRList CRITICALITY ignore EXTENSION RSRPMRList PRESENCE optional}|  

{ ID id-CSIReportList CRITICALITY ignore EXTENSION CSIReportList PRESENCE optional}|  

{ ID id-CellReportingIndicator CRITICALITY ignore EXTENSION CellReportingIndicator PRESENCE optional},  

...
}

-- *****
--  

-- PRIVATE MESSAGE  

--  

-- *****

PrivateMessage ::= SEQUENCE {
    privateIEs      PrivateIE-Container {{PrivateMessage-IEs}},
    ...
}

PrivateMessage-IEs X2AP-PRIVATE-IES ::= {
    ...
}

-- *****
--  

-- MOBILITY CHANGE REQUEST  

--  

-- *****

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

MobilityChangeRequest-IEs X2AP-PROTOCOL-IES ::= {
{ ID id-ENB1-Cell-ID          CRITICALITY reject   TYPE ECGI PRESENCE mandatory}|  

{ ID id-ENB2-Cell-ID          CRITICALITY reject   TYPE ECGI PRESENCE mandatory}|  

{ ID id-ENB1-Mobility-Parameters CRITICALITY ignore  TYPE MobilityParametersInformation PRESENCE optional}|  

{ ID id-ENB2-Proposed-Mobility-Parameters CRITICALITY reject  TYPE MobilityParametersInformation PRESENCE mandatory}|  

{ ID id-Cause                  CRITICALITY reject   TYPE Cause PRESENCE mandatory},  

...
}

-- *****
--  

-- MOBILITY CHANGE ACKNOWLEDGE  

--  

-- *****

MobilityChangeAcknowledge ::= SEQUENCE {
}

```

```

protocolIEs      ProtocolIE-Container     {{MobilityChangeAcknowledge-IEs}},

}

MobilityChangeAcknowledge-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-ENB1-Cell-ID          CRITICALITY reject   TYPE ECGI
  { ID id-ENB2-Cell-ID          CRITICALITY reject   TYPE ECGI
  { ID id-CriticalityDiagnostics CRITICALITY ignore   TYPE CriticalityDiagnostics
  ...
}

-- *****
-- MOBILITY CHANGE FAILURE
--

-- *****

MobilityChangeFailure ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container     {{MobilityChangeFailure-IEs}},

}

MobilityChangeFailure-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-ENB1-Cell-ID          CRITICALITY ignore   TYPE ECGI
  { ID id-ENB2-Cell-ID          CRITICALITY ignore   TYPE ECGI
  { ID id-Cause                 CRITICALITY ignore   TYPE Cause
  { ID id-ENB2-Mobility-Parameters-Modification-Range CRITICALITY ignore   TYPE MobilityParametersModificationRange
  { ID id-CriticalityDiagnostics CRITICALITY ignore   TYPE CriticalityDiagnostics
  ...
}

-- *****
-- Radio Link Failure Indication
--

-- *****

RLFIndication ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container     {{RLFIndication-IEs}},

}

RLFIndication-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-FailureCellPCI        CRITICALITY ignore   TYPE PCI
  { ID id-Re-establishmentCellECGI CRITICALITY ignore   TYPE ECGI
  { ID id-FailureCellCRNTI       CRITICALITY ignore   TYPE CRNTI
  { ID id-ShortMAC-I            CRITICALITY ignore   TYPE ShortMAC-I
  { ID id-UE-RLF-Report-Container CRITICALITY ignore   TYPE UE-RLF-Report-Container
  { ID id-RRCConnSetupIndicator  CRITICALITY reject    TYPE RRCConnSetupIndicator
  { ID id-RRCConnReestabIndicator CRITICALITY ignore   TYPE RRCConnReestabIndicator
  { ID id-UE-RLF-Report-Container-for-extended-bands CRITICALITY ignore   TYPE UE-RLF-Report-Container-for-extended-bands
  ...
}

```

```

-- ****
-- 
-- 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..maxCelllineNB)) 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..maxCelllineNB)) 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 {
    protocols      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-SeNSEcurityKey           CRITICALITY reject   TYPE SeNSEcurityKey         PRESENCE conditional}||
    -- This IE shall be present if the Bearer Option IE is set to the value "SCG bearer" --
    { ID id-SeNBUEAggregateMaximumBitRate CRITICALITY reject   TYPE UEAggregateMaximumBitRate PRESENCE mandatory}||
    { ID id-ServingPLMN               CRITICALITY ignore   TYPE PLMN-Identity          PRESENCE optional}||
    { ID id-E-RABs-ToBeAdded-List    CRITICALITY reject   TYPE E-RABs-ToBeAdded-List  PRESENCE mandatory}||
    { ID id-MeNBtoSeNBContainer      CRITICALITY reject   TYPE MeNBtoSeNBContainer  PRESENCE mandatory}||
    { ID id-CSGMembershipStatus     CRITICALITY reject   TYPE CSGMembershipStatus  PRESENCE optional}||
    { ID id-SeNB-UE-X2AP-ID          CRITICALITY reject   TYPE UE-X2AP-ID           PRESENCE optional}||
    { ID id-SeNB-UE-X2AP-ID-Extension CRITICALITY reject   TYPE UE-X2AP-ID-Extension PRESENCE optional}||
    { ID id-ExpectedUEBehaviour     CRITICALITY ignore   TYPE ExpectedUEBehaviour  PRESENCE optional}||
    { ID id-MeNB-UE-X2AP-ID-Extension CRITICALITY reject   TYPE UE-X2AP-ID-Extension PRESENCE optional},
    ...
}

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

E-RABs-ToBeAdded-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeAdded-Item   CRITICALITY reject   TYPE E-RABs-ToBeAdded-Item      PRESENCE mandatory},
    ...
}

E-RABs-ToBeAdded-Item ::= CHOICE {
    sCG-Bearer      E-RABs-ToBeAdded-Item-SCG-Bearer,
    split-Bearer    E-RABs-ToBeAdded-Item-Split-Bearer,
    ...
}

```

```

}

E-RABs-ToBeAdded-Item-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID                                E-RAB-ID,
    e-RAB-Level-QoS-Parameters                E-RAB-Level-QoS-Parameters,
    dL-Forwarding                            DL-Forwarding                               OPTIONAL,
    s1-UL-GTPtunnelEndpoint                  GTPtunnelEndpoint,
    iE-Extensions                           ProtocolExtensionContainer { {E-RABs-ToBeAdded-Item-SCG-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeAdded-Item-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-Correlation-ID                  CRITICALITY ignore   EXTENSION Correlation-ID          PRESENCE optional}|  

    { ID id-SIPTO-Correlation-ID           CRITICALITY ignore   EXTENSION Correlation-ID          PRESENCE optional},
    ...
}

E-RABs-ToBeAdded-Item-Split-Bearer ::= SEQUENCE {
    e-RAB-ID                                E-RAB-ID,
    e-RAB-Level-QoS-Parameters                E-RAB-Level-QoS-Parameters,
    meNB-GTPtunnelEndpoint                  GTPtunnelEndpoint,
    iE-Extensions                           ProtocolExtensionContainer { {E-RABs-ToBeAdded-Item-Split-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeAdded-Item-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--  

-- SENB ADDITION REQUEST ACKNOWLEDGE  

--  

-- *****

SeNBAdditionRequestAcknowledge ::= SEQUENCE {
    protocolsIES      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-SenNB-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-SenNB-UE-X2AP-ID-Extension     CRITICALITY reject    TYPE UE-X2AP-ID-Extension          PRESENCE optional}|  

    { ID id-Tunnel-Information-for-BBF    CRITICALITY ignore   TYPE TunnelInformation          PRESENCE optional},
    ...
}

```

```

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

E-RABs-Admitted-ToBeAdded-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-Admitted-ToBeAdded-Item CRITICALITY ignore TYPE E-RABs-Admitted-ToBeAdded-Item PRESENCE mandatory}
}

E-RABs-Admitted-ToBeAdded-Item ::= CHOICE {
    sCG-Bearer      E-RABs-Admitted-ToBeAdded-Item-SCG-Bearer,
    split-Bearer    E-RABs-Admitted-ToBeAdded-Item-Split-Bearer,
    ...
}

E-RABs-Admitted-ToBeAdded-Item-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID           E-RAB-ID,
    s1-DL-GTPtunnelEndpoint   GTPtunnelEndpoint,
    dL-Forwarding-GTPtunnelEndpoint   GTPtunnelEndpoint OPTIONAL,
    uL-Forwarding-GTPtunnelEndpoint   GTPtunnelEndpoint OPTIONAL,
    iE-Extensions       ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-Item-SCG-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeAdded-Item-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-Admitted-ToBeAdded-Item-Split-Bearer ::= SEQUENCE {
    e-RAB-ID           E-RAB-ID,
    seNB-GTPtunnelEndpoint   GTPtunnelEndpoint,
    iE-Extensions       ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-Item-Split-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeAdded-Item-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
-- 
-- SENB ADDITION REQUEST REJECT
-- 
-- *****

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

SeNBAdditionRequestReject-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID          CRITICALITY reject TYPE UE-X2AP-ID          PRESENCE mandatory},
    { ID id-SeNB-UE-X2AP-ID          CRITICALITY reject TYPE UE-X2AP-ID          PRESENCE mandatory},
    { ID id-Cause                     CRITICALITY ignore TYPE Cause             PRESENCE mandatory},
    { ID id-CriticalityDiagnostics  CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional},
    { ID id-MeNB-UE-X2AP-ID-Extension CRITICALITY reject TYPE UE-X2AP-ID-Extension PRESENCE optional}
}

```

```

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

-- ****
-- SENB RECONFIGURATION COMPLETE
-- ****

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

SeNBReconfigurationComplete-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-MeNB-UE-X2AP-ID           CRITICALITY reject   TYPE UE-X2AP-ID                  PRESENCE mandatory}| 
  { ID id-SeNB-UE-X2AP-ID           CRITICALITY reject   TYPE UE-X2AP-ID                  PRESENCE mandatory}| 
  { ID id-ResponseInformationSeNBReconfComp  CRITICALITY ignore  TYPE ResponseInformationSeNBReconfComp  PRESENCE mandatory}| 
  { ID id-MeNB-UE-X2AP-ID-Extension  CRITICALITY reject   TYPE UE-X2AP-ID-Extension          PRESENCE optional}| 
  { ID id-SeNB-UE-X2AP-ID-Extension  CRITICALITY reject   TYPE UE-X2AP-ID-Extension          PRESENCE optional},
...
}

ResponseInformationSeNBReconfComp ::= CHOICE {
  success            ResponseInformationSeNBReconfComp-SuccessItem,
  reject-by-MeNB    ResponseInformationSeNBReconfComp-RejectByMeNBItem,
...
}

ResponseInformationSeNBReconfComp-SuccessItem ::= SEQUENCE {
  meNBtoSeNBContainer      MeNBtoSeNBContainer OPTIONAL,
  iE-Extensions             ProtocolExtensionContainer { {ResponseInformationSeNBReconfComp-SuccessItemExtIEs} } OPTIONAL,
...
}

ResponseInformationSeNBReconfComp-SuccessItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
...
}

ResponseInformationSeNBReconfComp-RejectByMeNBItem ::= SEQUENCE {
  cause                Cause,
  meNBtoSeNBContainer  MeNBtoSeNBContainer OPTIONAL,
  iE-Extensions         ProtocolExtensionContainer { {ResponseInformationSeNBReconfComp-RejectByMeNBItemExtIEs} } OPTIONAL,
...
}

ResponseInformationSeNBReconfComp-RejectByMeNBItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
...
}

-- ****
-- SENB MODIFICATION REQUEST
-- ****

```

```

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

SeNBModificationRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID          CRITICALITY reject   TYPE UE-X2AP-ID           PRESENCE mandatory},
    { ID id-SeNB-UE-X2AP-ID          CRITICALITY reject   TYPE UE-X2AP-ID           PRESENCE mandatory},
    { ID id-Cause                   CRITICALITY ignore   TYPE Cause                PRESENCE mandatory},
    { ID id-SCGChangeIndication     CRITICALITY ignore   TYPE SCGChangeIndication  PRESENCE optional},
    { ID id-ServingPLMN             CRITICALITY ignore   TYPE PLMN-Identity        PRESENCE optional},
    { ID id-UE-ContextInformationSeNBModReq  CRITICALITY reject   TYPE UE-ContextInformationSeNBModReq  PRESENCE optional},
    { ID id-MeNBtoSeNBContainer     CRITICALITY ignore   TYPE MeNBtoSeNBContainer  PRESENCE optional},
    { ID id-CSGMembershipStatus    CRITICALITY reject   TYPE CSGMembershipStatus  PRESENCE optional},
    { ID id-MeNB-UE-X2AP-ID-Extension  CRITICALITY reject   TYPE UE-X2AP-ID-Extension  PRESENCE optional},
    { ID id-SeNB-UE-X2AP-ID-Extension  CRITICALITY reject   TYPE UE-X2AP-ID-Extension  PRESENCE optional},
    ...
}

UE-ContextInformationSeNBModReq ::= SEQUENCE {
    uE-SecurityCapabilities      UESecurityCapabilities          OPTIONAL,
    seNB-SecurityKey              SeNBSecurityKey            OPTIONAL,
    seNBUEAggregateMaximumBitRate UEAgregateMaximumBitRate    OPTIONAL,
    e-RABs-ToBeAdded               E-RABs-ToBeAdded-List-ModReq  OPTIONAL,
    e-RABs-ToBeModified            E-RABs-ToBeModified-List-ModReq  OPTIONAL,
    e-RABs-ToBeReleased            E-RABs-ToBeReleased-List-ModReq  OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer {{ UE-ContextInformationSeNBModReqExtIEs }}  OPTIONAL,
    ...
}

UE-ContextInformationSeNBModReqExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-ToBeAdded-List-ModReq ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container {{ E-RABs-ToBeAdded-ModReqItemIEs }}

E-RABs-ToBeAdded-ModReqItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-ToBeAdded-ModReqItem CRITICALITY ignore   TYPE E-RABs-ToBeAdded-ModReqItem  PRESENCE mandatory},
    ...
}

E-RABs-ToBeAdded-ModReqItem ::= CHOICE {
    sCG-Bearer      E-RABs-ToBeAdded-ModReqItem-SCG-Bearer,
    split-Bearer    E-RABs-ToBeAdded-ModReqItem-Split-Bearer,
    ...
}

E-RABs-ToBeAdded-ModReqItem-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID,          E-RAB-ID,
    e-RAB-Level-QoS-Parameters  E-RAB-Level-QoS-Parameters,
    dL-Forwarding,    DL-Forwarding
    ...
    OPTIONAL,
}

```

```

s1-UL-GTPtunnelEndpoint      GTPtunnelEndpoint,
iE-Extensions                 ProtocolExtensionContainer { {E-RABs-ToBeAdded-ModReqItem-SCG-BearerExtIEs} } OPTIONAL,
...
}

E-RABs-ToBeAdded-ModReqItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  { ID id-Correlation-ID          CRITICALITY ignore EXTENSION Correlation-ID          PRESENCE optional}|  

  { ID id-SIPTO-Correlation-ID    CRITICALITY ignore EXTENSION Correlation-ID          PRESENCE optional},
...
}

E-RABs-ToBeAdded-ModReqItem-Split-Bearer ::= SEQUENCE {
  e-RAB-ID                      E-RAB-ID,  

  e-RAB-Level-QoS-Parameters     E-RAB-Level-QoS-Parameters,  

  meNB-GTPtunnelEndpoint         GTPtunnelEndpoint,  

  iE-Extensions                  ProtocolExtensionContainer { {E-RABs-ToBeAdded-ModReqItem-Split-BearerExtIEs} } OPTIONAL,
...
}

E-RABs-ToBeAdded-ModReqItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
...
}

E-RABs-ToBeModified-List-ModReq ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeModified-ModReqItemIEs} }

E-RABs-ToBeModified-ModReqItemIEs X2AP-PROTOCOL-IES ::= {
  { ID id-E-RABs-ToBeModified-ModReqItem CRITICALITY ignore TYPE E-RABs-ToBeModified-ModReqItem PRESENCE mandatory},
...
}

E-RABs-ToBeModified-ModReqItem ::= CHOICE {
  sCG-Bearer        E-RABs-ToBeModified-ModReqItem-SCG-Bearer,  

  split-Bearer      E-RABs-ToBeModified-ModReqItem-Split-Bearer,  

...
}

E-RABs-ToBeModified-ModReqItem-SCG-Bearer ::= SEQUENCE {
  e-RAB-ID           E-RAB-ID,  

  e-RAB-Level-QoS-Parameters   E-RAB-Level-QoS-Parameters  
                                OPTIONAL,  

  s1-UL-GTPtunnelEndpoint     GTPtunnelEndpoint  
                                OPTIONAL,  

  iE-Extensions        ProtocolExtensionContainer { {E-RABs-ToBeModified-ModReqItem-SCG-BearerExtIEs} } OPTIONAL,
...
}

E-RABs-ToBeModified-ModReqItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
...
}

E-RABs-ToBeModified-ModReqItem-Split-Bearer ::= SEQUENCE {
  e-RAB-ID           E-RAB-ID,  

  e-RAB-Level-QoS-Parameters   E-RAB-Level-QoS-Parameters  
                                OPTIONAL,  

  meNB-GTPtunnelEndpoint     GTPtunnelEndpoint  
                                OPTIONAL,  

  iE-Extensions        ProtocolExtensionContainer { {E-RABs-ToBeModified-ModReqItem-Split-BearerExtIEs} } OPTIONAL,
}

```

```

}

E-RABs-ToBeModified-ModReqItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

E-RABs-ToBeReleased-List-ModReq ::= SEQUENCE (SIZE(1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-ToBeReleased-ModReqItemIEs} }

E-RABs-ToBeReleased-ModReqItemIEs X2AP-PROTOCOL-IES ::= {
  { ID id-E-RABs-ToBeReleased-ModReqItem CRITICALITY ignore TYPE E-RABs-ToBeReleased-ModReqItem PRESENCE mandatory},
  ...
}

E-RABs-ToBeReleased-ModReqItem ::= CHOICE {
  sCG-Bearer      E-RABs-ToBeReleased-ModReqItem-SCG-Bearer,
  split-Bearer    E-RABs-ToBeReleased-ModReqItem-Split-Bearer,
  ...
}

E-RABs-ToBeReleased-ModReqItem-SCG-Bearer ::= SEQUENCE {
  e-RAB-ID           E-RAB-ID,
  dL-GTPtunnelEndpoint   GTPtunnelEndpoint          OPTIONAL,
  uL-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-GTPtunnelEndpoint   GTPtunnelEndpoint          OPTIONAL,
  iE-Extensions       ProtocolExtensionContainer { {E-RABs-ToBeReleased-ModReqItem-Split-BearerExtIEs} } OPTIONAL,
  ...
}

E-RABs-ToBeReleased-ModReqItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

-- ****
-- 
-- SENB MODIFICATION REQUEST ACKNOWLEDGE
-- 
-- ****

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

```

```

SeNBModificationRequestAcknowledge-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-MeNB-UE-X2AP-ID           CRITICALITY ignore   TYPE UE-X2AP-ID           PRESENCE mandatory} |
    { ID id-SeNB-UE-X2AP-ID           CRITICALITY ignore   TYPE UE-X2AP-ID           PRESENCE mandatory} |
    { ID id-E-RABs-Admitted-ToBeAdded-ModAckList   CRITICALITY ignore   TYPE E-RABs-Admitted-ToBeAdded-ModAckList   PRESENCE optional} |
    { ID id-E-RABs-Admitted-ToBeModified-ModAckList   CRITICALITY ignore   TYPE E-RABs-Admitted-ToBeModified-ModAckList   PRESENCE optional} |
    { ID id-E-RABs-Admitted-ToBeReleased-ModAckList   CRITICALITY ignore   TYPE E-RABs-Admitted-ToBeReleased-ModAckList   PRESENCE optional} |
    { ID id-E-RABs-NotAdmitted-List       CRITICALITY ignore   TYPE E-RAB-List           PRESENCE optional} |
    { ID id-SeNBtoMeNBContainer        CRITICALITY ignore   TYPE SeNBtoMeNBContainer  PRESENCE optional} |
    { ID id-CriticalityDiagnostics     CRITICALITY ignore   TYPE CriticalityDiagnostics PRESENCE optional} |
    { ID id-MeNB-UE-X2AP-ID-Extension  CRITICALITY ignore   TYPE UE-X2AP-ID-Extension PRESENCE optional} |
    { ID id-SeNB-UE-X2AP-ID-Extension  CRITICALITY ignore   TYPE UE-X2AP-ID-Extension PRESENCE optional},
    ...
}

E-RABs-Admitted-ToBeAdded-ModAckList ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-Admitted-ToBeAdded-ModAckItemIEs} }

E-RABs-Admitted-ToBeAdded-ModAckItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RABs-Admitted-ToBeAdded-ModAckItem   CRITICALITY ignore   TYPE E-RABs-Admitted-ToBeAdded-ModAckItem   PRESENCE mandatory}
}

E-RABs-Admitted-ToBeAdded-ModAckItem ::= CHOICE {
    sCG-Bearer      E-RABs-Admitted-ToBeAdded-ModAckItem-SCG-Bearer,
    split-Bearer    E-RABs-Admitted-ToBeAdded-ModAckItem-Split-Bearer,
    ...
}

E-RABs-Admitted-ToBeAdded-ModAckItem-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID          E-RAB-ID,
    s1-DL-GTPtunnelEndpoint  GTPtunnelEndpoint,
    dL-Forwarding-GTPtunnelEndpoint  GTPtunnelEndpoint          OPTIONAL,
    uL-Forwarding-GTPtunnelEndpoint  GTPtunnelEndpoint          OPTIONAL,
    iE-Extensions     ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-ModAckItem-SCG-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeAdded-ModAckItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-Admitted-ToBeAdded-ModAckItem-Split-Bearer ::= SEQUENCE {
    e-RAB-ID          E-RAB-ID,
    seNB-GTPtunnelEndpoint  GTPtunnelEndpoint,
    iE-Extensions     ProtocolExtensionContainer { {E-RABs-Admitted-ToBeAdded-ModAckItem-Split-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-Admitted-ToBeAdded-ModAckItem-Split-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RABs-Admitted-ToBeModified-ModAckList ::= SEQUENCE (SIZE (1..maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RABs-Admitted-ToBeModified-ModAckItemIEs} }

E-RABs-Admitted-ToBeModified-ModAckItemIEs X2AP-PROTOCOL-IES ::= {

```

```

{ ID id-E-RABs-Admitted-ToBeModified-ModAckItem      CRITICALITY ignore   TYPE E-RABs-Admitted-ToBeModified-ModAckItem  PRESENCE mandatory}
}

E-RABs-Admitted-ToBeModified-ModAckItem ::= CHOICE {
    sCG-Bearer      E-RABs-Admitted-ToBeModified-ModAckItem-SCG-Bearer,
    split-Bearer    E-RABs-Admitted-ToBeModified-ModAckItem-Split-Bearer,
    ...
}

E-RABs-Admitted-ToBeModified-ModAckItem-SCG-Bearer ::= SEQUENCE {
    e-RAB-ID          E-RAB-ID,
    s1-DL-GTPtunnelEndpoint  GTPtunnelEndpoint
    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
    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,
    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-GTPtunnelEndpoint          GTPtunnelEndpoint          OPTIONAL,
    dL-GTPtunnelEndpoint          GTPtunnelEndpoint          OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { {E-RABs-ToBeReleased-RelReqItem-SCG-BearerExtIEs} } OPTIONAL,
    ...
}

E-RABs-ToBeReleased-RelReqItem-SCG-BearerExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

E-RABs-ToBeReleased-RelReqItem-Split-Bearer ::= SEQUENCE {
    e-RAB-ID
        E-RAB-ID,
    dL-GTPtunnelEndpoint
        GTPtunnelEndpoint
    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-RelConfItemsIEs} }

```

```

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-GTPtunnelEndpoint  GTPtunnelEndpoint           OPTIONAL,
    dL-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-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 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-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,
  uL-Count    INTEGER (0..4294967295),
  dL-Count    INTEGER (0..4294967295),
  iE-Extensions ProtocolExtensionContainer { {E-RABs-SubjectToCounterCheckItemExtIEs} } OPTIONAL,
  ...
}

E-RABs-SubjectToCounterCheckItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

-- *****
-- 
-- X2 REMOVAL REQUEST
-- 
-- *****

X2RemovalRequest ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container { {X2RemovalRequest-IEs} },
  ...
}

X2RemovalRequest-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-GlobalENB-ID           CRITICALITY reject  TYPE GlobalENB-ID      PRESENCE mandatory} |
  { ID id-X2RemovalThreshold     CRITICALITY reject  TYPE X2BenefitValue  PRESENCE optional},
  ...
}

-- *****
-- 
-- X2 REMOVAL RESPONSE
-- 
-- *****

X2RemovalResponse ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container { {X2RemovalResponse-IEs} },
  ...
}

X2RemovalResponse-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-GlobalENB-ID           CRITICALITY reject  TYPE GlobalENB-ID      PRESENCE mandatory} |
  { ID id-CriticalityDiagnostics CRITICALITY ignore   TYPE CriticalityDiagnostics  PRESENCE optional},
  ...
}

```

```

-- ****
-- X2 REMOVAL FAILURE
-- ****

X2RemovalFailure ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    { { X2RemovalFailure-IEs } },
    ...
}

X2RemovalFailure-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-Cause                      CRITICALITY ignore   TYPE Cause                  PRESENCE mandatory} |
    { ID id-CriticalityDiagnostics     CRITICALITY ignore   TYPE CriticalityDiagnostics  PRESENCE optional},
    ...
}

-- ****
-- RETRIEVE UE CONTEXT REQUEST
-- ****

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

RetrieveUEContextRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-New-eNB-UE-X2AP-ID          CRITICALITY reject   TYPE UE-X2AP-ID                PRESENCE mandatory} |
    { ID id-SeNB-UE-X2AP-ID-Extension  CRITICALITY reject   TYPE UE-X2AP-ID-Extension  PRESENCE optional} |
    { ID id-resumeID                   CRITICALITY reject   TYPE ResumeID               PRESENCE mandatory} |
    { ID id-ShortMAC-I                 CRITICALITY reject   TYPE ShortMAC-I             PRESENCE mandatory} |
    { ID id-NewEUTRANCellIdentifier   CRITICALITY reject   TYPE EUTRANCellIdentifier  PRESENCE mandatory},
    ...
}

-- ****
-- 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},

}

UE-ContextInformationRetrieve ::= SEQUENCE {
  mME-UE-S1AP-ID                  UE-S1AP-ID,
  uESecurityCapabilities           UESecurityCapabilities,
  aS-SecurityInformation           AS-SecurityInformation,
  uEAggregateMaximumBitRate        UEAggregateMaximumBitRate,
  subscriberProfileIDforRFP       SubscriberProfileIDforRFP OPTIONAL,
  e-RABs-ToBeSetup-ListRetrieve   E-RABs-ToBeSetup-ListRetrieve,
  rRC-Context                      RRC-Context,
  handoverRestrictionList          HandoverRestrictionList OPTIONAL,
  locationReportingInformation     LocationReportingInformation OPTIONAL,
  managBasedMDTallowed             ManagementBasedMDTallowed OPTIONAL,
  managBasedMDTPLMNList            MDTPLMNList OPTIONAL,
  iE-Extensions                     ProtocolExtensionContainer { {UE-ContextInformationRetrieve-ExtIEs} } OPTIONAL,
}

UE-ContextInformationRetrieve-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
{ ID id-UESidelinkAggregateMaximumBitRate  CRITICALITY ignore  EXTENSION UESidelinkAggregateMaximumBitRate  PRESENCE optional},
  ...
}

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

E-RABs-ToBeSetupRetrieve-ItemIEs X2AP-PROTOCOL-IES ::= {
{ ID id-E-RABs-ToBeSetupRetrieve-Item  CRITICALITY ignore  TYPE E-RABs-ToBeSetupRetrieve-Item  PRESENCE mandatory},
  ...
}

E-RABs-ToBeSetupRetrieve-Item ::= SEQUENCE {
  e-RAB-ID                         E-RAB-ID,
  e-RAB-Level-QoS-Parameters        E-RAB-Level-QoS-Parameters,
  bearerType                        BearerType OPTIONAL,
  iE-Extensions                     ProtocolExtensionContainer { {E-RABs-ToBeSetupRetrieve-ItemExtIEs} } OPTIONAL,
}

E-RABs-ToBeSetupRetrieve-ItemExtIEs X2AP-PROTOCOL-EXTENSION ::= {
{ ID id-uL-GTPtunnelEndpoint      CRITICALITY reject   EXTENSION GTPtunnelEndpoint  PRESENCE mandatory},
  ...
}

```

```
-- ****
-- 
-- 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},
    ...
}

END
```

### 9.3.5 Information Element definitions

```
-- ****
-- 
-- Information Element Definitions
-- 
-- ****

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

DEFINITIONS AUTOMATIC TAGS :=

BEGIN

IMPORTS

    id-E-RAB-Item,
    id-Number-of-Antennaports,
    id-MBSFN-Subframe-Info,
    id-PRACH-Configuration,
    id-CSG-Id,
    id-MDTConfiguration,
    id-SignallingBasedMDTPLMNList,
    id-MultibandInfoList,
    id-FreqBandIndicatorPriority,
    id-NeighbourTAC,
    id-Time-UE-StayedInCell-EnhancedGranularity,
    id-MBMS-Service-Area-List,
    id-HO-cause,
```

```

id-eARFCNExtension,
id-DL-EARFCNExtension,
id-UL-EARFCNExtension,
id-M3Configuration,
id-M4Configuration,
id-M5Configuration,
id-MDT-Location-Info,
id-AdditionalSpecialSubframe-Info,
id-UEID,
id-enhancedRNTP,
id-ProSeUEtoNetworkRelaying,
id-M6Configuration,
id-M7Configuration,
id-OffsetOfNbIotChannelNumberToDL-EARFCN,
id-OffsetOfNbIotChannelNumberToUL-EARFCN,
id-AdditionalSpecialSubframeExtension-Info,
id-BandwidthReducedSI,
maxnoofBearers,
maxCelllineNB,
maxEARFCN,
maxEARFCNplusOne,
newmaxEARFCN,
maxInterfaces,

maxnoofBands,
maxnoofBPLMNs,
maxnoofCells,
maxnoofEPLMNs,
maxnoofEPLMNPlusOne,
maxnoofForbLACs,
maxnoofForbTACs,
maxnoofNeighbours,
maxnoofPRBs,
maxNrOfErrors,
maxPools,
maxnoofMBSFN,
maxnoofTAforMDT,
maxnoofCellIDforMDT,
maxnoofMBSServiceAreaIdentities,
maxnoofMDTPLMNs,
maxnoofCoMPHypothesisSet,
maxnoofCoMPCells,
maxUEReport,
maxCellReport,
maxnoofPA,
maxCSIProcess,
maxCSIReport,
maxSubband

```

FROM X2AP-Constants

```

Criticality,
ProcedureCode,
ProtocolIE-ID,

```

```

TriggeringMessage
FROM X2AP-CommonDataTypes

ProtocolExtensionContainer{},
ProtocolIE-Single-Container{},
X2AP-PROTOCOL-EXTENSION,
X2AP-PROTOCOL-IES
FROM X2AP-Containers;

-- A

ABSInformation ::= CHOICE {
    fdd                  ABSInformationFDD,
    tdd                  ABSInformationTDD,
    abs-inactive         NULL,
    ...
}

ABSInformationFDD ::= SEQUENCE {
    abs-pattern-info      BIT STRING (SIZE(40)),
    numberOfCellSpecificAntennaPorts  ENUMERATED {one, two, four, ...},
    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 ::= {
    ...
}

```

```

AdditionalSpecialSubframe-Info ::= SEQUENCE {
    additionalspecialSubframePatterns,
    cyclicPrefixDL,
    cyclicPrefixUL,
    iE-Extensions
    ...
}

AdditionalSpecialSubframe-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

AdditionalSpecialSubframePatterns ::= ENUMERATED {
    ssp0,
    ssp1,
    ssp2,
    ssp3,
    ssp4,
    ssp5,
    ssp6,
    ssp7,
    ssp8,
    ssp9,
    ...
}

AdditionalSpecialSubframeExtension-Info ::= SEQUENCE {
    additionalspecialSubframePatternsExtension AdditionalSpecialSubframePatternsExtension,
    cyclicPrefixDL,
    cyclicPrefixUL,
    iE-Extensions
    ProtocolExtensionContainer { { AdditionalSpecialSubframeExtension-Info-ExtIEs } } OPTIONAL,
    ...
}

AdditionalSpecialSubframeExtension-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

AdditionalSpecialSubframePatternsExtension ::= ENUMERATED {
    ssp10,
    ...
}

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
}

AS-SecurityInformation ::= SEQUENCE {
    key-eNodeB-star      Key-eNodeB-Star,
    nextHopChainingCount NextHopChainingCount,
    iE-Extensions        ProtocolExtensionContainer { { AS-SecurityInformation-ExtIEs} } OPTIONAL,
    ...
}

AS-SecurityInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- B

BandwidthReducedSI ::= ENUMERATED {
    scheduled,
    ...
}

BearerType ::= ENUMERATED {
    non-IP,
    ...
}

BenefitMetric ::= INTEGER (-101..100, ...)

BitRate ::= INTEGER (0..10000000000)
BroadcastPLMNs-Item ::= SEQUENCE (SIZE(1..maxnoofBPLMNs)) OF PLMN-Identity

-- C

CapacityValue ::= INTEGER (0..100)

Cause ::= CHOICE {
    radioNetwork       CauseRadioNetwork,
    transport          CauseTransport,
    protocol           CauseProtocol,
    misc               CauseMisc,
    ...
}

CauseMisc ::= ENUMERATED {
    control-processing-overload,
    hardware-failure,
}

```

```
om-intervention,
not-enough-user-plane-processing-resources,
unspecified,
...
}

CauseProtocol ::= ENUMERATED {
    transfer-syntax-error,
    abstract-syntax-error-reject,
    abstract-syntax-error-ignore-and-notify,
    message-not-compatible-with-receiver-state,
    semantic-error,
    unspecified,
    abstract-syntax-error-falsely-constructed-message,
    ...
}

CauseRadioNetwork ::= ENUMERATED {
    handover-desirable-for-radio-reasons,
    time-critical-handover,
    resource-optimisation-handover,
    reduce-load-in-serving-cell,
    partial-handover,
    unknown-new-eNB-UE-X2AP-ID,
    unknown-old-eNB-UE-X2AP-ID,
    unknown-pair-of-UE-X2AP-ID,
    ho-target-not-allowed,
    tx2relocoverall-expiry,
    trelocprep-expiry,
    cell-not-available,
    no-radio-resources-available-in-target-cell,
    invalid-MME-GroupID,
    unknown-MME-Code,
    encryption-and-or-integrity-protection-algorithms-not-supported,
    reportCharacteristicsEmpty,
    noReportPeriodicity,
    existingMeasurementID,
    unknown-eNB-Measurement-ID,
    measurement-temporarily-not-available,
    unspecified,
    ...,
    load-balancing,
    handover-optimisation,
    value-out-of-allowed-range,
    multiple-E-RAB-ID-instances,
    switch-off-ongoing,
    not-supported-QCI-value,
    measurement-not-supported-for-the-object,
    tDCoverall-expiry,
    tDCprep-expiry,
    action-desirable-for-radio-reasons,
    reduce-load,
    resource-optimisation,
    time-critical-action,
```

```

target-not-allowed,
no-radio-resources-available,
invalid-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
}

CauseTransport ::= ENUMERATED {
    transport-resource-unavailable,
    unspecified,
    ...
}

CellBasedMDT ::= SEQUENCE {
    cellIdListforMDT    CellIdListforMDT,
    iE-Extensions       ProtocolExtensionContainer { {CellBasedMDT-ExtIEs} } OPTIONAL,
    ...
}

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

CellCapacityClassValue ::= INTEGER (1..100, ...)

CellDeploymentStatusIndicator ::= ENUMERATED {pre-change-notification, ...}

CellIdListforMDT ::= SEQUENCE (SIZE(1..maxnoofCellIDforMDT)) OF ECGI

CellReplacingInfo ::= SEQUENCE {
    replacingCellsList          ReplacingCellsList,
    iE-Extensions               ProtocolExtensionContainer { { CellReplacingInfo-ExtIEs} } OPTIONAL,
    ...
}

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

CellReportingIndicator ::= ENUMERATED {stop-request, ... }

Cell-Size ::= ENUMERATED {verysmall, small, medium, large, ... }

CellType ::= SEQUENCE {
    cell-Size                 Cell-Size,
    iE-Extensions             ProtocolExtensionContainer { { CellType-ExtIEs} } OPTIONAL,
    ...
}

```

```

}

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

CoMPHypothesisSet ::= 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 ::= {
  ...
}

CoMPIInformation ::= SEQUENCE {
  coMPIInformationItem,           CoMPIInformationItem,
  coMPIInformationStartTime,     CoMPIInformationStartTime,
  iE-Extensions                  ProtocolExtensionContainer { { CoMPIInformation-ExtIEs} } OPTIONAL,
  ...
}

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

CoMPIInformationItem ::= SEQUENCE (SIZE(1..maxnoofCoMPHypothesisSet)) OF
SEQUENCE {
  coMPHypothesisSet              CoMPHypothesisSet,
  benefitMetric                 BenefitMetric,
  iE-Extensions                  ProtocolExtensionContainer { { CoMPIInformationItem-ExtIEs} } OPTIONAL,
  ...
}

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

CoMPIInformationStartTime ::= SEQUENCE (SIZE(0..1)) OF
SEQUENCE {
  startSFN                       INTEGER (0..1023, ...),
  startSubframeNumber            INTEGER (0..9, ...),
  iE-Extensions                  ProtocolExtensionContainer { { CoMPIInformationStartTime-ExtIEs} } OPTIONAL,
  ...
}

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

```

```

CompositeAvailableCapacity ::= SEQUENCE {
    cellCapacityClassValue
    capacityValue
    iE-Extensions
    ...
}

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

CompositeAvailableCapacityGroup ::= SEQUENCE {
    dL-CompositeAvailableCapacity
    uL-CompositeAvailableCapacity
    iE-Extensions
    ...
}

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

Correlation-ID ::= OCTET STRING (SIZE (4))

COUNTvalue ::= SEQUENCE {
    pDCP-SN
    hFN
    iE-Extensions
    ...
}

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

COUNTValueExtended ::= SEQUENCE {
    pDCP-SNExtended
    hFNModified
    iE-Extensions
    ...
}

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

COUNTvaluePDCP-SNlength18 ::= SEQUENCE {
    pDCP-SNlength18
    hFNforPDCP-SNlength18
    iE-Extensions
    ...
}

```

```

COUNTvaluePDCP-SNlength18-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CoverageModificationList ::= SEQUENCE (SIZE (1..maxCelllineNB)) OF CoverageModification-Item

CoverageModification-Item ::= SEQUENCE {
    eCGI                      ECGI,
    coverageState               INTEGER (0..15, ...),
    cellDeploymentStatusIndicator CellDeploymentStatusIndicator           OPTIONAL,
    cellReplacingInfo           CellReplacingInfo                  OPTIONAL,
-- Included in case the Cell Deployment Status Indicator IE is present
    ...
}

CriticalityDiagnostics ::= SEQUENCE {
    procedureCode              ProcedureCode                         OPTIONAL,
    triggeringMessage          TriggeringMessage                    OPTIONAL,
    procedureCriticality       Criticality                          OPTIONAL,
    iEsCriticalityDiagnostics CriticalityDiagnostics-IE-List   OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { {CriticalityDiagnostics-ExtIEs} } OPTIONAL,
    ...
}

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

CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE (1..maxNrOfErrors)) OF
    SEQUENCE {
        iECriticality      Criticality,
        iE-ID               ProtocolIE-ID,
        typeOfError         TypeOfError,
        iE-Extensions       ProtocolExtensionContainer { {CriticalityDiagnostics-IE-List-ExtIEs} } OPTIONAL,
        ...
    }

CriticalityDiagnostics-IE-List-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CRNTI ::= BIT STRING (SIZE (16))

CSGMembershipStatus ::= ENUMERATED {
    member,
    not-member
}

CSG-Id ::= BIT STRING (SIZE (27))

CSIReportList ::= SEQUENCE (SIZE(1..maxUEReport)) OF
    SEQUENCE {
        uEID                UEID,
        ...
    }
}

```

```

cSIReportPerCSIProcess          cSIReportPerCSIProcess,
iE-Extensions                   ProtocolExtensionContainer { { CSIReportList-ExtIEs} } OPTIONAL,
...
}

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

CSIReportPerCSIProcess ::= SEQUENCE (SIZE(1.. maxCSIProcess)) OF
SEQUENCE {
  cSIProcessConfigurationIndex   INTEGER (1..7, ...),
  CSIReportPerCSIProcessItem,    CSIReportPerCSIProcessItem,
  iE-Extensions                 ProtocolExtensionContainer { { CSIReportPerCSIProcess-ExtIEs} } OPTIONAL,
  ...
}

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

CSIReportPerCSIProcessItem ::= SEQUENCE (SIZE(1.. maxCSIReport)) OF
SEQUENCE {
  rI                           INTEGER (1..8, ...),
  widebandCQI                  WidebandCQI,
  subbandSize                  SubbandSize,
  subbandCQIList               SubbandCQIList OPTIONAL,
  iE-Extensions                 ProtocolExtensionContainer { { CSIReportPerCSIProcessItem-ExtIEs} } OPTIONAL,
  ...
}

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

CyclicPrefixDL ::= ENUMERATED {
  normal,
  extended,
  ...
}

CyclicPrefixUL ::= ENUMERATED {
  normal,
  extended,
  ...
}

-- D

DeactivationIndication ::= ENUMERATED {
  deactivated,
  ...
}

```

```

DL-ABS-status ::= INTEGER (0..100)

DL-Forwarding ::= ENUMERATED {
    dL-forwardingProposed,
    ...
}

DL-GBR-PRB-usage ::= INTEGER (0..100)

DL-non-GBR-PRB-usage ::= INTEGER (0..100)

DL-Total-PRB-usage ::= INTEGER (0..100)

DynamicDLTransmissionInformation ::= CHOICE {
    naics-active          DynamicNAICSInformation,
    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 ::= {
    ...
}

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, ...))

EPLMNes ::= SEQUENCE (SIZE(1..maxnoofEPLMNes)) OF PLMN-Identity

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 ::= {
  ...
}

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 ::= {
  ...
}

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 ::= {
    ...
}

-- F

FDD-Info ::= SEQUENCE {
    uL-EARFCN                    EARFCN,
    dL-EARFCN                    EARFCN,
    uL-Transmission-Bandwidth    Transmission-Bandwidth,
    dL-Transmission-Bandwidth    Transmission-Bandwidth,
    iE-Extensions                 ProtocolExtensionContainer { { FDD-Info-ExtIEs } } OPTIONAL,
    ...
}

FDD-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-UL-EARFCNExtension   CRITICALITY reject   EXTENSION EARFCNExtension      PRESENCE optional}|  

    { ID id-DL-EARFCNExtension   CRITICALITY reject   EXTENSION EARFCNExtension      PRESENCE optional}|  

    { ID id-OffsetOfNbIotChannelNumberToDL-EARFCN   CRITICALITY reject   EXTENSION OffsetOfNbIotChannelNumberToEARFCN  PRESENCE optional}|  

    { ID id-OffsetOfNbIotChannelNumberToUL-EARFCN   CRITICALITY reject   EXTENSION OffsetOfNbIotChannelNumberToEARFCN  PRESENCE optional},
    ...
}

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,
    ...
}

-- 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 ::= {
    ...
}

GlobalENB-ID ::= SEQUENCE {
    pLMN-Identity      PLMN-Identity,
    eNB-ID            ENB-ID,
    iE-Extensions      ProtocolExtensionContainer { {GlobalENB-ID-ExtIEs} } OPTIONAL,
    ...
}

GlobalENB-ID-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

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

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

GTP-TEI                   ::= OCTET STRING (SIZE (4))

GUGroupIDList             ::= SEQUENCE (SIZE (1..maxPools)) OF GU-Group-ID

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 ::= {
    ...
}

-- H

HandoverReportType ::= ENUMERATED {
    hoTooEarly,
    hoToWrongCell,
    ...,
    interRATpingpong
}

HandoverRestrictionList ::= SEQUENCE {
    servingPLMN                 PLMN-Identity,
    equivalentPLMNs              EPLMNs
                                            OPTIONAL,
}

```

```

forbiddenTAs          ForbiddenTAs                      OPTIONAL,
forbiddenLAs          ForbiddenLAs                      OPTIONAL,
forbiddenInterRATs   ForbiddenInterRATs                OPTIONAL,
iE-Extensions         ProtocolExtensionContainer { {HandoverRestrictionList-ExtIEs} } OPTIONAL,
...
}

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

HFN ::= INTEGER (0..1048575)

HFNModified ::= INTEGER (0..131071)

HFNforPDCP-SNlength18 ::= INTEGER (0..16383)

HWLoadIndicator ::= SEQUENCE {
  dLHWLoadIndicator    LoadIndicator,
  uLHWLoadIndicator    LoadIndicator,
  iE-Extensions        ProtocolExtensionContainer { { HWLoadIndicator-ExtIEs} } OPTIONAL,
  ...
}
}

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

-- I

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

InterfacesToTrace ::= BIT STRING (SIZE (8))

InvokeIndication ::= ENUMERATED{
  abs-information,
  ...,
  naics-information-start,
  naics-information-stop
}

-- J
-- 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,
...
}

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,
    ...
}

LastVisitedUTRANCellInformation ::= OCTET STRING

LHN-ID ::= OCTET STRING(SIZE (32..256))

Links-to-log ::= ENUMERATED {uplink, downlink, both-uplink-and-downlink, ...}

LoadIndicator ::= ENUMERATED {
    lowLoad,
    mediumLoad,
    highLoad,
    overLoad,
    ...
}

LocationReportingInformation ::= SEQUENCE {
    eventType      EventType,
    reportArea     ReportArea,
    iE-Extensions  ProtocolExtensionContainer { {LocationReportingInformation-ExtIEs} } OPTIONAL,
    ...
}

LocationReportingInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::={

    ...
}

-- M

M1PeriodicReporting ::= SEQUENCE {
    reportInterval        ReportIntervalMDT,
    reportAmount          ReportAmountMDT,
}

```

```

iE-Extensions          ProtocolExtensionContainer { { M1PeriodicReporting-ExtIEs} } OPTIONAL,
...
}

M1PeriodicReporting-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

M1ReportingTrigger ::= ENUMERATED{
  periodic,
  a2eventtriggered,
  ...
  a2eventtriggered-periodic
}

M1ThresholdEventA2 ::= SEQUENCE {
  measurementThreshold      MeasurementThresholdA2,
  iE-Extensions            ProtocolExtensionContainer { { M1ThresholdEventA2-ExtIEs} } OPTIONAL,
  ...
}

M1ThresholdEventA2-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

M3Configuration ::= SEQUENCE {
  m3period        M3period,
  iE-Extensions   ProtocolExtensionContainer { { M3Configuration-ExtIEs} } OPTIONAL,
  ...
}

M3Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

M3period ::= ENUMERATED {ms100, ms1000, ms10000, ... }

M4Configuration ::= SEQUENCE {
  m4period        M4period,
  m4-links-to-log Links-to-log,
  iE-Extensions   ProtocolExtensionContainer { { M4Configuration-ExtIEs} } OPTIONAL,
  ...
}

M4Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

M4period ::= ENUMERATED {ms1024, ms2048, ms5120, ms10240, min1, ... }

M5Configuration ::= SEQUENCE {
  m5period        M5period,
  m5-links-to-log Links-to-log,
  ...
}

```

```

iE-Extensions      ProtocolExtensionContainer { { M5Configuration-ExtIEs} } OPTIONAL,
...
}

M5Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

M5period ::= ENUMERATED {ms1024, ms2048, ms5120, ms10240, min1, ... }

M6Configuration ::= SEQUENCE {
  m6report-interval    M6report-interval,
  m6delay-threshold   M6delay-threshold   OPTIONAL,
-- This IE shall be present if the M6 Links to log IE is set to "uplink" or to "both-uplink-and-downlink" --
  m6-links-to-log      Links-to-log,
  iE-Extensions        ProtocolExtensionContainer { { M6Configuration-ExtIEs} } OPTIONAL,
  ...
}

M6Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

M6report-interval ::= ENUMERATED { ms1024, ms2048, ms5120, ms10240, ... }

M6delay-threshold ::= ENUMERATED { ms30, ms40, ms50, ms60, ms70, ms80, ms90, ms100, ms150, ms300, ms500, ms750, ... }

M7Configuration ::= SEQUENCE {
  m7period            M7period,
  m7-links-to-log     Links-to-log,
  iE-Extensions       ProtocolExtensionContainer { { M7Configuration-ExtIEs} } OPTIONAL,
  ...
}

M7Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

M7period ::= INTEGER(1..60, ...)

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

ManagementBasedMDTallowed ::= ENUMERATED {allowed, ...}

Masked-IMEISV ::= BIT STRING (SIZE (64))

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

MDT-Configuration ::= SEQUENCE {
  mdt-Activation      MDT-Activation,
  ...
}

```

```

areaScopeOfMDT          AreaScopeOfMDT,
measurementsToActivate   MeasurementsToActivate,
m1reportingTrigger      M1ReportingTrigger,
m1thresholdEventA2      M1ThresholdEventA2      OPTIONAL,
-- Included in case of event-triggered, or event-triggered periodic reporting for measurement M1
m1periodicReporting     M1PeriodicReporting    OPTIONAL,
-- Included in case of periodic, or event-triggered periodic reporting for measurement M1
iE-Extensions           ProtocolExtensionContainer { { MDT-Configuration-ExtIEs } } OPTIONAL,
...
}

MDT-Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
{ID id-M3Configuration      CRITICALITY ignore EXTENSION M3Configuration      PRESENCE conditional}||
{ID id-M4Configuration      CRITICALITY ignore EXTENSION M4Configuration      PRESENCE conditional}||
{ID id-M5Configuration      CRITICALITY ignore EXTENSION M5Configuration      PRESENCE conditional}||
{ID id-MDT-Location-Info    CRITICALITY ignore EXTENSION MDT-Location-Info    PRESENCE optional}||
{ID id-SignallingBasedMDTPLMNList CRITICALITY ignore EXTENSION MDTPLMNList      PRESENCE optional}||
{ID id-M6Configuration      CRITICALITY ignore EXTENSION M6Configuration      PRESENCE conditional}||
{ID id-M7Configuration      CRITICALITY ignore EXTENSION M7Configuration      PRESENCE conditional},
...
}

MDTPLMNList ::= SEQUENCE (SIZE(1..maxnoofMDTPLMNs)) OF PLMN-Identity

MDT-Location-Info ::= BIT STRING (SIZE (8))

Measurement-ID ::= INTEGER (1..4095, ...)

MeasurementsToActivate ::= BIT STRING (SIZE (8))

MeasurementThresholdA2 ::= CHOICE {
  threshold-RSRP            Threshold-RSRP,
  threshold-RSRQ            Threshold-RSRQ,
...
}

MeNBtoSeNBContainerer ::= OCTET STRING

MME-Group-ID ::= OCTET STRING (SIZE (2))

MME-Code ::= OCTET STRING (SIZE (1))

MBMS-Service-Area-Identity-List ::= SEQUENCE (SIZE(1.. maxnoofMBMSServiceAreaIdentities)) OF MBMS-Service-Area-Identity

MBMS-Service-Area-Identity ::= OCTET STRING (SIZE (2))

MBSFN-Subframe-Infolist ::= SEQUENCE (SIZE(1.. maxnoofMBSFN)) OF MBSFN-Subframe-Info

MBSFN-Subframe-Info ::= SEQUENCE {
  radioframeAllocationPeriod RadioframeAllocationPeriod,
  radioframeAllocationOffset RadioframeAllocationOffset,
  subframeAllocation        SubframeAllocation,
  iE-Extensions             ProtocolExtensionContainer { { MBSFN-Subframe-Info-ExtIEs } } OPTIONAL,
...
}

```

```

}

MBSFN-Subframe-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

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

MobilityParametersInformation ::= SEQUENCE {
  handoverTriggerChange          INTEGER (-20..20),
  ...
}

MultibandInfoList ::= SEQUENCE (SIZE(1..maxnoofBands)) OF BandInfo

BandInfo    ::= SEQUENCE {
  freqBandIndicator      FreqBandIndicator,
  iE-Extensions         ProtocolExtensionContainer { { BandInfo-ExtIEs } } OPTIONAL,
  ...
}

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

-- N

Neighbour-Information ::= SEQUENCE (SIZE (0..maxnoofNeighbours)) OF SEQUENCE {
  eCGI                  ECGI,
  pCI                   PCI,
  eARFCN                EARFCN,
  iE-Extensions         ProtocolExtensionContainer { { Neighbour-Information-ExtIEs } } OPTIONAL,
  ...
}

Neighbour-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  { ID id-NeighbourTAC      CRITICALITY ignore   EXTENSION TAC           PRESENCE optional} |
  { ID id-eARFCNExtension   CRITICALITY reject   EXTENSION EARFCNExtension PRESENCE optional},
  ...
}

NextHopChainingCount ::= INTEGER (0..7)

Number-of-Antennaports ::= ENUMERATED {
  an1,
  an2,
  an4,
  ...
}

```

```
-- O

OffsetOfNbOfChannelNumberToEARFCN ::= ENUMERATED {
    minusTen,
    minusNine,
    minusEight,
    minusSeven,
    minusSix,
    minusFive,
    minusFour,
    minusThree,
    minusTwo,
    minusOne,
    minusZeroDotFive,
    zero,
    one,
    two,
    three,
    four,
    five,
    six,
    seven,
    eight,
    nine,
    ...
}

Oneframe ::= BIT STRING (SIZE (6))
```

```
-- P

PA-Values ::= ENUMERATED {
    dB-6,
    dB-4dot77,
    dB-3,
    dB-1dot77,
    dB0,
    dB1,
    dB2,
    dB3,
    ...
}
```

PDCP-SN ::= INTEGER (0..4095)

PDCP-SNExtended ::= INTEGER (0..32767)

PDCP-SNlength18 ::= INTEGER (0..262143)

PCI ::= INTEGER (0..503, ...)

PLMN-Identity ::= OCTET STRING (SIZE(3))

```

Port-Number ::= OCTET STRING (SIZE (2))

PRACH-Configuration ::= SEQUENCE {
    rootSequenceIndex           INTEGER (0..837),
    zeroCorrelationIndex        INTEGER (0..15),
    highSpeedFlag               BOOLEAN,
    prach-FreqOffset             INTEGER (0..94),
    prach-ConfigIndex            INTEGER (0..63)      OPTIONAL, -- present for TDD --
    iE-Extensions                ProtocolExtensionContainer { {PRACH-Configuration-ExtIEs} } OPTIONAL,
    ...
}

PRACH-Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

Pre-emptionCapability ::= ENUMERATED {
    shall-not-trigger-pre-emption,
    may-trigger-pre-emption
}

Pre-emptionVulnerability ::= ENUMERATED {
    not-pre-emptable,
    pre-emptable
}

PriorityLevel ::= INTEGER { spare (0), highest (1), lowest (14), no-priority (15) } (0..15)

ProSeAuthorized ::= SEQUENCE {
    proSeDirectDiscovery          ProSeDirectDiscovery          OPTIONAL,
    proSeDirectCommunication       ProSeDirectCommunication       OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { {ProSeAuthorized-ExtIEs} } OPTIONAL,
    ...
}

ProSeAuthorized-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    { ID id-ProSeUEtoNetworkRelaying   CRITICALITY ignore   EXTENSION ProSeUEtoNetworkRelaying   PRESENCE optional},
    ...
}

ProSeDirectDiscovery ::= ENUMERATED {
    authorized,
    not-authorized,
    ...
}

ProSeDirectCommunication ::= ENUMERATED {
    authorized,
    not-authorized,
    ...
}

ProSeUEtoNetworkRelaying ::= ENUMERATED {
    authorized,
    ...
}

```

```

not-authorized,
...
}

-- Q

QCI ::= INTEGER (0..255)

-- R

RadioframeAllocationOffset ::= INTEGER (0..7, ...)

RadioframeAllocationPeriod ::= ENUMERATED{
    n1,
    n2,
    n4,
    n8,
    n16,
    n32,
    ...
}

RadioResourceStatus ::= SEQUENCE {
    dL-GBR-PRB-usage,
    uL-GBR-PRB-usage,
    dL-non-GBR-PRB-usage,
    uL-non-GBR-PRB-usage,
    dL-Total-PRB-usage,
    uL-Total-PRB-usage,
    iE-Extensions
    ...
    DL-GBR-PRB-usage,
    UL-GBR-PRB-usage,
    DL-non-GBR-PRB-usage,
    UL-non-GBR-PRB-usage,
    DL-Total-PRB-usage,
    UL-Total-PRB-usage,
    ProtocolExtensionContainer { {RadioResourceStatus-ExtIEs} } OPTIONAL,
}
}

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

ReceiveStatusofULPDCPSDUs ::= BIT STRING (SIZE(4096))

ReceiveStatusOfULPDCPSDUsExtended ::= BIT STRING (SIZE(1..16384))

ReceiveStatusOfULPDCPSDUsPDCP-SNlength18 ::= BIT STRING (SIZE(1..131072))

Registration-Request ::= ENUMERATED {
    start,
    stop,
    ...,
    partial-stop,
    add
}

RelativeNarrowbandTxPower ::= SEQUENCE {

```

```

rNTP-PerPRB           BIT STRING (SIZE(6..110, ...)),
rNTP-Threshold        RNTP-Threshold,
numberOfCellSpecificAntennaPorts ENUMERATED {one, two, four, ...},
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.. maxCelllineNB)) OF ReplacingCellsList-Item

ReplacingCellsList-Item ::= SEQUENCE {
  eCGI          ECGI,
...
}

ReportAmountMDT ::= ENUMERATED{r1, r2, r4, r8, r16, r32, r64, rinfinity}

ReportArea ::= ENUMERATED{
  egci,
...
}

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

ReportingPeriodicityCSIR ::= ENUMERATED {
  ms5,
  ms10,
  ms20,
  ms40,
  ms80,
...
}

ReportingPeriodicityRSRPMR ::= ENUMERATED {
  one-hundred-20-ms,
  two-hundred-40-ms,
  four-hundred-80-ms,
  six-hundred-40-ms,
...
}

ReportIntervalMDT ::= ENUMERATED {ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, min1, min6, min12, min30, min60}

ResumeID    ::= CHOICE {
  non-truncated  BIT STRING(SIZE(40)),
  truncated     BIT STRING(SIZE(24)),
...
}

```

```

RNTP-Threshold ::= ENUMERATED {
    minusInfinity,
    minusEleven,
    minusTen,
    minusNine,
    minusEight,
    minusSeven,
    minusSix,
    minusFive,
    minusFour,
    minusThree,
    minusTwo,
    minusOne,
    zero,
    one,
    two,
    three,
    ...
}

RRC-Context ::= OCTET STRING

RRCCConnReestabIndicator ::= ENUMERATED {
    reconfigurationFailure, handoverFailure, otherFailure, ...
}
-- The values correspond to the values of ReestablishmentCause reported from the UE in the RRCCconnectionReestablishmentRequest, as defined in TS
36.331 [9]

RRCConnSetupIndicator ::= ENUMERATED {
    rrcConnSetup,
    ...
}

RSRPMeasurementResult ::= SEQUENCE (SIZE(1..maxCellReport)) OF
SEQUENCE {
    rSRPCellID                  ECGI,
    rSRPMeasured                INTEGER (0..97, ...),
    iE-Extensions               ProtocolExtensionContainer { { RSRPMeasurementResult-ExtIEs} } OPTIONAL,
    ...
}

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

RSRPMRList ::= SEQUENCE (SIZE(1..maxUEReport)) OF
SEQUENCE {
    rSRPMeasurementResult        RSRPMeasurementResult,
    iE-Extensions               ProtocolExtensionContainer { { RSRPMRList-ExtIEs} } OPTIONAL,
    ...
}

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

```

```

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

-- S

S1TNLLoadIndicator ::= SEQUENCE {
  dLS1TNLLoadIndicator          LoadIndicator,
  uLS1TNLLoadIndicator          LoadIndicator,
  iE-Extensions                 ProtocolExtensionContainer { { S1TNLLoadIndicator-ExtIEs} } OPTIONAL,
...
}

S1TNLLoadIndicator-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
...
}

SCGChangeIndication ::= ENUMERATED {pDCPCountWrapAround, pSCellChange, other, ...}

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 ::= {
...
}

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},
}

```

```

}

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

ShortMAC-I ::= BIT STRING (SIZE(16))

SourceOfUEActivityBehaviourInformation ::= ENUMERATED {
    subscription-information,
    statistics,
    ...
}

SpecialSubframe-Info ::= SEQUENCE {
    specialSubframePatterns      SpecialSubframePatterns,
    cyclicPrefixDL               CyclicPrefixDL,
    cyclicPrefixUL               CyclicPrefixUL,
    iE-Extensions                ProtocolExtensionContainer { { SpecialSubframe-Info-ExtIEs} } OPTIONAL,
    ...
}

SpecialSubframe-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

SpecialSubframePatterns ::= ENUMERATED {
    ssp0,
    ssp1,
    ssp2,
    ssp3,
    ssp4,
    ssp5,
    ssp6,
    ssp7,
    ssp8,
    ...
}

SubbandCQI ::= SEQUENCE {
    subbandCQICodeword0          SubbandCQICodeword0,
    subbandCQICodeword1          SubbandCQICodeword1 OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { { SubbandCQI-ExtIEs} } OPTIONAL,
    ...
}

SRVCCOperationPossible ::= ENUMERATED {
    possible,
    ...
}

SubbandCQI-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
}

```

```

}

SubbandCQICodeword0 ::= CHOICE {
    four-bitCQI           INTEGER (0..15, ...),
    two-bitSubbandDifferentialCQI  INTEGER (0..3, ...),
    two-bitDifferentialCQI        INTEGER (0..3, ...),
    ...
}
SubbandCQICodeword1 ::= CHOICE {
    four-bitCQI           INTEGER (0..15, ...),
    three-bitSpatialDifferentialCQI  INTEGER (0..7, ...),
    two-bitSubbandDifferentialCQI  INTEGER (0..3, ...),
    two-bitDifferentialCQI        INTEGER (0..3, ...),
    ...
}
SubbandCQIList ::= SEQUENCE (SIZE(1.. maxSubband)) OF SubbandCQIItem

SubbandCQIItem ::= SEQUENCE {
    subbandCQI          SubbandCQI,
    subbandIndex        INTEGER (0..27,...),
    iE-Extensions      ProtocolExtensionContainer { { SubbandCQIItem-ExtIEs} } OPTIONAL,
    ...
}
SubbandCQIItem-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

SubbandSize ::= ENUMERATED {
    size2,
    size3,
    size4,
    size6,
    size8,
    ...
}

SubscriberProfileIDforRFP ::= INTEGER (1..256)

SubframeAllocation ::= CHOICE {
    oneframe            Oneframe,
    fourframes          Fourframes,
    ...
}

SubframeAssignment ::= ENUMERATED {
    sa0,
    sa1,
    sa2,
    sa3,
    sa4,
    sa5,
    ...
}
```

```

sa6,
...
}

-- 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

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},
...
}

Threshold-RSRP ::= INTEGER(0..97)

Threshold-RSRQ ::= INTEGER(0..34)

TimeToWait ::= ENUMERATED {
  v1s,
  v2s,
  v5s,
  v10s,
  v20s,
  v60s,
  ...
}
Time-UE-StayedInCell ::= INTEGER (0..4095)

Time-UE-StayedInCell-EnhancedGranularity ::= INTEGER (0..40950)

TraceActivation ::= SEQUENCE {
  eUTRANTraceID,
  interfacesToTrace,
  traceDepth,
  traceCollectionEntityIPAddress,
  iE-Extensions
  ProtocolExtensionContainer { {TraceActivation-ExtIEs} } OPTIONAL,
  ...
}

TraceActivation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
{ ID id-MDTConfiguration CRITICALITY ignore EXTENSION MDT-Configuration PRESENCE optional},
...
}

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

TraceDepth ::= ENUMERATED {
  minimum,
  medium,
  maximum,
  minimumWithoutVendorSpecificExtension,
  mediumWithoutVendorSpecificExtension,
  maximumWithoutVendorSpecificExtension,
  ...
}

```

```

Transmission-Bandwidth ::= ENUMERATED {
    bw6,
    bw15,
    bw25,
    bw50,
    bw75,
    bw100,
    ...,
    bw1
}

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

TunnelInformation ::= SEQUENCE {
    transportLayerAddress    TransportLayerAddress,
    uDP-Port-Number         Port-Number          OPTIONAL,
    iE-Extensions           ProtocolExtensionContainer { {Tunnel-Information-ExtIEs} } OPTIONAL,
    ...
}

Tunnel-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

TypeOfError ::= ENUMERATED {
    not-understood,
    missing,
    ...
}

-- U

UEAggregateMaximumBitRate ::= SEQUENCE {
    uEaggregateMaximumBitRateDownlink   BitRate,
    uEaggregateMaximumBitRateUplink    BitRate,
    iE-Extensions                     ProtocolExtensionContainer { {UEAggregate-MaximumBitrate-ExtIEs} } OPTIONAL,
    ...
}

UEAggregate-MaximumBitrate-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

UE-ContextKeptIndicator ::= ENUMERATED {
    true,
    ...
}

UEID ::= BIT STRING (SIZE (16))

UE-HistoryInformation ::= SEQUENCE (SIZE(1..maxnoofCells)) OF LastVisitedCell-Item

UE-HistoryInformationFromTheUE ::= OCTET STRING

```

```
-- This IE is a transparent container and shall be encoded as the VisitedCellInfoList field contained in the UEInformationResponse message as
defined in TS 36.331 [9]

UE-S1AP-ID ::= INTEGER (0.. 4294967295)

UE-X2AP-ID ::= INTEGER (0..4095)

UE-X2AP-ID-Extension ::= INTEGER (0..4095, ...)

UE-RLF-Report-Container ::= OCTET STRING
-- This IE is a transparent container and shall be encoded as the RLF-Report-r9 field contained in the UEInformationResponse message as defined in
TS 36.331 [9]

UE-RLF-Report-Container-for-extended-bands ::= OCTET STRING
-- This IE is a transparent container and shall be encoded as the RLF-Report-v9e0 field contained in the UEInformationResponse message as defined
in TS 36.331 [9]

UESecurityCapabilities ::= SEQUENCE {
    encryptionAlgorithms           EncryptionAlgorithms,
    integrityProtectionAlgorithms IntegrityProtectionAlgorithms,
    iE-Extensions                  ProtocolExtensionContainer { { UESecurityCapabilities-ExtIEs} } OPTIONAL,
    ...
}

UESecurityCapabilities-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {

}

UESidelinkAggregateMaximumBitRate ::= SEQUENCE {
    uESidelinkAggregateMaximumBitRate   BitRate,
    iE-Extensions                      ProtocolExtensionContainer { {UE-Sidelink-Aggregate-MaximumBitRate-ExtIEs} } OPTIONAL,
    ...
}

UE-Sidelink-Aggregate-MaximumBitRate-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {

}

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)

UL-Total-PRB-usage ::= INTEGER (0..100)

UsableABSInformation ::= CHOICE {
    fdd          UsableABSInformationFDD,
    tdd          UsableABSInformationTDD,
    ...
}

UsableABSInformationFDD ::= SEQUENCE {
    usable-abs-pattern-info      BIT STRING (SIZE(40)),
    iE-Extensions                ProtocolExtensionContainer { { UsableABSInformationFDD-ExtIEs} } OPTIONAL,
    ...
}

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

UsableABSInformationTDD ::= SEQUENCE {
    usaable-abs-pattern-info     BIT STRING (SIZE(1..70, ...)),
    iE-Extensions                ProtocolExtensionContainer { { UsableABSInformationTDD-ExtIEs} } OPTIONAL,
    ...
}

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

-- 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, ...),
    ...
}

WTID ::= CHOICE {
    wTID-Type1                 WTID-Type1,
    wTID-Type2                 WTID-Long-Type2,
    ...
}

WTID-Type1 ::= SEQUENCE {
    pLMN-Identity,
    shortWTID                  PLMN-Identity,
    ...
}

WTID-Long-Type2 ::= BIT STRING (SIZE(48))

WT-UE-XwAP-ID ::= OCTET STRING (SIZE (3))

-- X

X2BenefitValue ::= INTEGER (1..8, ...)
-- Y
-- Z

```

END

### 9.3.6 Common definitions

```
-- ****
-- Common definitions
-- ****

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

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- ****
-- Extension constants
-- ****

maxPrivateIEs          INTEGER ::= 65535
maxProtocolExtensions  INTEGER ::= 65535
maxProtocolIEs          INTEGER ::= 65535

-- ****
-- Common Data Types
-- ****

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
```

### 9.3.7 Constant definitions

```
-- ****
-- Constant definitions
--
-- ****

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

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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-rLFIIndication                     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-seNBRerconfigurationCompletion    ProcedureCode ::= 20
id-meNBinitiatedSeNBModificationPreparation
id-seNBinitiatedSeNBModification      ProcedureCode ::= 21
id-meNBinitiatedSeNBRelease           ProcedureCode ::= 22
id-seNBinitiatedSeNBRelease           ProcedureCode ::= 23
id-seNBinitiatedSeNBRelease           ProcedureCode ::= 24
id-seNBCounterCheck                   ProcedureCode ::= 25
```

```

id-retrieveUEContext                               ProcedureCode ::= 26

-- ****
-- Lists
--
-- ****

maxEARFCN                                     INTEGER ::= 65535
maxEARFCNPlusOne                             INTEGER ::= 65536
newmaxEARFCN                                  INTEGER ::= 262143
maxInterfaces                                 INTEGER ::= 16
maxCelllineNB                                INTEGER ::= 256
maxnofBands                                   INTEGER ::= 16
maxnofBearers                                 INTEGER ::= 256
maxNrOfErrors                                 INTEGER ::= 256
maxnofPDCP-SN                                INTEGER ::= 16
maxnofEPLMNs                                  INTEGER ::= 15
maxnofEPLMNsPlusOne                          INTEGER ::= 16
maxnofForbLACs                                INTEGER ::= 4096
maxnofForbTACs                                INTEGER ::= 4096
maxnofBPLMNs                                  INTEGER ::= 6
maxnofNeighbours                            INTEGER ::= 512
maxnofPRBs                                    INTEGER ::= 110
maxPools                                      INTEGER ::= 16
maxnofCells                                   INTEGER ::= 16
maxnofMBSFN                                    INTEGER ::= 8
maxFailedMeasObjects                         INTEGER ::= 32
maxnofCellIDforMDT                           INTEGER ::= 32
maxnofTAforMDT                                INTEGER ::= 8
maxnofMBMSServiceAreaIdentities             INTEGER ::= 256
maxnofMDTPLMNs                                INTEGER ::= 16
maxnofCoMPHypothesisSet                      INTEGER ::= 256
maxnofCoMPCells                               INTEGER ::= 32
maxUEReport                                  INTEGER ::= 128
maxCellReport                                INTEGER ::= 9
maxnofPA                                      INTEGER ::= 3
maxCSIProcess                                INTEGER ::= 4
maxCSIReport                                 INTEGER ::= 2
maxSubband                                    INTEGER ::= 14

-- ****
-- IEs
--
-- ****

id-E-RABs-Admitted-Item                      ProtocolIE-ID ::= 0
id-E-RABs-Admitted-List                      ProtocolIE-ID ::= 1
id-E-RAB-Item                                 ProtocolIE-ID ::= 2
id-E-RABs-NotAdmitted-List                  ProtocolIE-ID ::= 3
id-E-RABs-ToBeSetup-Item                   ProtocolIE-ID ::= 4
id-Cause                                     ProtocolIE-ID ::= 5

```

id-CellInformation  
 id-CellInformation-Item  
 id-New-eNB-UE-X2AP-ID  
 id-Old-eNB-UE-X2AP-ID  
 id-TargetCell-ID  
 id-TargeteNBtoSource-eNBTransparentContainer  
 id-TraceActivation  
 id-UE-ContextInformation  
 id-UE-HistoryInformation  
 id-UE-X2AP-ID  
 id-CriticalityDiagnostics  
 id-E-RABs-SubjectToStatusTransfer-List  
 id-E-RABs-SubjectToStatusTransfer-Item  
 id-ServedCells  
 id-GlobalENB-ID  
 id-TimeToWait  
 id-GUMMEI-ID  
 id-GUGroupIDList  
 id-ServedCellsToAdd  
 id-ServedCellsToModify  
 id-ServedCellsToDelete  
 id-Registration-Request  
 id-CellToReport  
 id-ReportingPeriodicity  
 id-CellToReport-Item  
 id-CellMeasurementResult  
 id-CellMeasurementResult-Item  
 id-GUGroupIDToAddList  
 id-GUGroupIDToDeleteList  
 id-SRVCCOperationPossible  
 id-Measurement-ID  
 id-ReportCharacteristics  
 id-ENB1-Measurement-ID  
 id-ENB2-Measurement-ID  
 id-Number-of-Antennaports  
 id-CompositeAvailableCapacityGroup  
 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-PRACH-Configuration  
 id-MBSFN-Subframe-Info  
 id-ServedCellsToActivate  
 id-ActivatedCellList  
 id-DeactivationIndication  
 id-UE-RLF-Report-Container

ProtocolIE-ID ::= 6  
 ProtocolIE-ID ::= 7  
 ProtocolIE-ID ::= 9  
 ProtocolIE-ID ::= 10  
 ProtocolIE-ID ::= 11  
 ProtocolIE-ID ::= 12  
 ProtocolIE-ID ::= 13  
 ProtocolIE-ID ::= 14  
 ProtocolIE-ID ::= 15  
 ProtocolIE-ID ::= 16  
 ProtocolIE-ID ::= 17  
 ProtocolIE-ID ::= 18  
 ProtocolIE-ID ::= 19  
 ProtocolIE-ID ::= 20  
 ProtocolIE-ID ::= 21  
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 ProtocolIE-ID ::= 36  
 ProtocolIE-ID ::= 37  
 ProtocolIE-ID ::= 38  
 ProtocolIE-ID ::= 39  
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 ProtocolIE-ID ::= 48  
 ProtocolIE-ID ::= 49  
 ProtocolIE-ID ::= 50  
 ProtocolIE-ID ::= 51  
 ProtocolIE-ID ::= 52  
 ProtocolIE-ID ::= 53  
 ProtocolIE-ID ::= 54  
 ProtocolIE-ID ::= 55  
 ProtocolIE-ID ::= 56  
 ProtocolIE-ID ::= 57  
 ProtocolIE-ID ::= 58  
 ProtocolIE-ID ::= 59  
 ProtocolIE-ID ::= 60

```

id-ABSIInformation
id-InvokeIndication
id-ABS-Status
id-PartialSuccessIndicator
id-MeasurementInitiationResult-List
id-MeasurementInitiationResult-Item
id-MeasurementFailureCause-Item
id-CompleteFailureCauseInformation-List
id-CompleteFailureCauseInformation-Item
id-CSG-Id
id-CSGMembershipStatus
id-MDTConfiguration
id-ManagementBasedMDTallowed
id-RRCConnSetupIndicator
id-NeighbourTAC
id-Time-UE-StayedInCell-EnhancedGranularity
id-RRCConnReestabIndicator
id-MBMS-Service-Area-List
id-HO-cause
id-TargetCellInUTRAN
id-MobilityInformation
id-SourceCellCRNTI
id-MultibandInfoList
id-M3Configuration
id-M4Configuration
id-M5Configuration
id-MDT-Location-Info
id-ManagementBasedMDTPLMNList
id-SignallingBasedMDTPLMNList
id-ReceiveStatusOfULPDCPSDUsExtended
id-ULCOUNTValueExtended
id-DLCOUNTValueExtended
id-eARFCNExtension
id-UL-EARFCNExtension
id-DL-EARFCNExtension
id-AdditionalSpecialSubframe-Info
id-Masked-IMEISV
id-IntendedULDLConfiguration
id-ExtendedULInterferenceOverloadInfo
id-RNL-Header
id-x2APMessage
id-ProSeAuthorized
id-ExpectedUEBehaviour
id-UE-HistoryInformationFromTheUE
id-DynamicDLTransmissionInformation
id-UE-RLF-Report-Container-for-extended-bands
id-COMPInformation
id-ReportingPeriodicityRSRPMR
id-RSRPMRList
id-MeNB-UE-X2AP-ID
id-SeNB-UE-X2AP-ID
id-UE-SecurityCapabilities
id-SeNBSecurityKey
id-SeNBUEAggregateMaximumBitRate

```

```

ProtocolIE-ID ::= 61
ProtocolIE-ID ::= 62
ProtocolIE-ID ::= 63
ProtocolIE-ID ::= 64
ProtocolIE-ID ::= 65
ProtocolIE-ID ::= 66
ProtocolIE-ID ::= 67
ProtocolIE-ID ::= 68
ProtocolIE-ID ::= 69
ProtocolIE-ID ::= 70
ProtocolIE-ID ::= 71
ProtocolIE-ID ::= 72
ProtocolIE-ID ::= 74
ProtocolIE-ID ::= 75
ProtocolIE-ID ::= 76
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ProtocolIE-ID ::= 78
ProtocolIE-ID ::= 79
ProtocolIE-ID ::= 80
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ProtocolIE-ID ::= 102
ProtocolIE-ID ::= 103
ProtocolIE-ID ::= 104
ProtocolIE-ID ::= 105
ProtocolIE-ID ::= 106
ProtocolIE-ID ::= 107
ProtocolIE-ID ::= 108
ProtocolIE-ID ::= 109
ProtocolIE-ID ::= 110
ProtocolIE-ID ::= 111
ProtocolIE-ID ::= 112
ProtocolIE-ID ::= 113
ProtocolIE-ID ::= 114
ProtocolIE-ID ::= 115

```

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-E-RABs-ToBeReleased-ModReqd  
 id-E-RABs-ToBeReleased-ModReqdItem  
 id-SCGChangeIndication  
 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-CoverageModificationList  
 id-ReportingPeriodicityCSIR  
 id-CSIReportList  
 id-UEID  
 id-enhancedRNTP  
 id-ProSeUEtoNetworkRelaying  
 id-ReceiveStatusOfULPDCPSDUsPDCP-SNlength18  
 id-ULCOUNTValuePDCP-SNlength18  
 id-DLCOUNTValuePDCP-SNlength18  
 id-UE-ContextReferenceAtSeNB  
 id-UE-ContextKeptIndicator  
 id-New-eNB-UE-X2AP-ID-Extension  
 id-Old-eNB-UE-X2AP-ID-Extension  
 id-MeNB-UE-X2AP-ID-Extension  
 id-SeNB-UE-X2AP-ID-Extension  
 id-LHN-ID  
 id-FreqBandIndicatorPriority  
 id-M6Configuration  
 id-M7Configuration  
 id-Tunnel-Information-for-BBF  
 id-SIPTO-BearerDeactivationIndication  
 id-GW-TransportLayerAddress  
 id-Correlation-ID  
 id-SIPTO-Correlation-ID  
 id-SIPTO-L-GW-TransportLayerAddress  
 id-X2RemovalThreshold  
 id-CellReportingIndicator

ProtocolIE-ID ::= 116  
 ProtocolIE-ID ::= 117  
 ProtocolIE-ID ::= 118  
 ProtocolIE-ID ::= 119  
 ProtocolIE-ID ::= 120  
 ProtocolIE-ID ::= 121  
 ProtocolIE-ID ::= 122  
 ProtocolIE-ID ::= 123  
 ProtocolIE-ID ::= 124  
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 ProtocolIE-ID ::= 159  
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 ProtocolIE-ID ::= 161  
 ProtocolIE-ID ::= 162  
 ProtocolIE-ID ::= 163  
 ProtocolIE-ID ::= 164  
 ProtocolIE-ID ::= 165  
 ProtocolIE-ID ::= 166  
 ProtocolIE-ID ::= 167  
 ProtocolIE-ID ::= 168  
 ProtocolIE-ID ::= 169  
 ProtocolIE-ID ::= 170

```

id-BearerType
id-resumeID
id-UE-ContextInformationRetrieve
id-E-RABs-ToBeSetupRetrieve-Item
id-NewEUTRANCellIdentifier
id-V2XServicesAuthorized
id-OffsetOfNbIotChannelNumberToDL-EARFCN
id-OffsetOfNbIotChannelNumberToUL-EARFCN
id-AdditionalSpecialSubframeExtension-Info
id-BandwidthReducedSI
id-MakeBeforeBreakIndicator
id-UE-ContextReferenceAtWT
id-WT-UE-ContextKeptIndicator
id-UESidelinkAggregateMaximumBitRate
id-uL-GTPtunnelEndpoint

END

```

### 9.3.8 Container definitions

```

-- ****
-- 
-- Container definitions
-- 
-- ****

X2AP-Containers {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) x2ap (2) version1 (1) x2ap-Containers (5) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
  maxPrivateIEs,
  maxProtocolExtensions,
  maxProtocolIEs,
  Criticality,
  Presence,
  PrivateIE-ID,
  ProtocolIE-ID
FROM X2AP-CommonDataTypes;

-- ****
-- 
-- Class Definition for Protocol IEs

```

```

ProtocolIE-ID ::= 171
ProtocolIE-ID ::= 172
ProtocolIE-ID ::= 173
ProtocolIE-ID ::= 174
ProtocolIE-ID ::= 175
ProtocolIE-ID ::= 176
ProtocolIE-ID ::= 177
ProtocolIE-ID ::= 178
ProtocolIE-ID ::= 179
ProtocolIE-ID ::= 180
ProtocolIE-ID ::= 181
ProtocolIE-ID ::= 182
ProtocolIE-ID ::= 183
ProtocolIE-ID ::= 184
ProtocolIE-ID ::= 185

```

```

-- ****
-- ****
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

```

## 9.4 Message transfer syntax

X2AP shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax, as specified in ITU-T Rec. X.691 [5].

## 9.5 Timers

$T_{RELOCprep}$

- Specifies the maximum time for the Handover Preparation procedure in the source eNB.

$TX2_{RELOCoverall}$

- Specifies the maximum time for the protection of the overall handover procedure in the source eNB.

$T_{DCprep}$

- Specifies the maximum time for the SeNB Addition Preparation or MeNB initiated SeNB Modification Preparation procedure in the MeNB.

$T_{DCoverall}$

- Specifies the maximum time in the SeNB for either the SeNB initiated SeNB Modification procedure or the protection of the E-UTRAN actions necessary to configure UE resources at SeNB Addition or MeNB initiated SeNB Modification.

---

## 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.

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## 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	102 3		B	X2AP Support for Inter-eNB Mobility without WT Change	14.2.0
03/2017	RP-75	RP-170537	100 5	3	B	Introduction of a new special subframe configuration	14.2.0
03/2017	RP-75	RP-170538	102 5		B	Support of V2X over X2	14.2.0
03/2017	RP-75	RP-170542	102 6		B	Introduction of New types of eNB ID	14.2.0
03/2017	RP-75	RP-170536	102 4	1	B	Introduction of eMOB Stage3	14.2.0
06/2017	RP-75	RP-171329	103 3	1	A	Introduction of UL TNL address in CloT UP Solution	14.3.0
06/2017	RP-77	RP-171974	103 5	1	F	Correction on NB-IoT UP mobility	14.4.0
06/2017	RP-77	RP-171974	103 7	1	F	Correction of SeNB Release Confirm	14.4.0

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## History

Document history		
V14.1.0	June 2017	Publication
V14.2.0	April 2017	Publication
V14.3.0	August 2017	Publication
V14.4.0	October 2017	Publication