

ETSI TS 138 423 V15.0.0 (2018-07)



**5G;
NG-RAN;
Xn Application Protocol (XnAP)
(3GPP TS 38.423 version 15.0.0 Release 15)**



Reference

DTS/TSGR-0338423vf00

Keywords

5G

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2018.

All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

3GPP™ and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

oneM2M logo is protected for the benefit of its Members.

GSM® and the GSM logo are trademarks registered and owned by the GSM Association.

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

Foreword

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

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

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 Abbreviations	11
4 General	12
4.1 Procedure specification principles.....	12
4.2 Forwards and backwards compatibility.....	12
4.3 Specification notations	13
5 XnAP services	13
5.1 XnAP procedure modules	13
5.2 Parallel transactions.....	13
6 Services expected from signalling transport.....	13
7 Functions of XnAP.....	13
8 XnAP procedures	13
8.1 Elementary procedures	13
8.2 Basic mobility procedures	15
8.2.1 Handover Preparation	15
8.2.1.1 General	15
8.2.1.2 Successful Operation.....	15
8.2.1.3 Unsuccessful Operation	17
8.2.1.4 Abnormal Conditions	17
8.2.2 SN Status Transfer	17
8.2.2.1 General	17
8.2.2.2 Successful Operation.....	18
8.2.2.3 Unsuccessful Operation	18
8.2.2.4 Abnormal Conditions	18
8.2.3 Handover Cancel	18
8.2.3.1 General	18
8.2.3.2 Successful Operation.....	18
8.2.3.3 Unsuccessful Operation	18
8.2.3.4 Abnormal Conditions	18
8.2.4 Retrieve UE Context.....	19
8.2.4.1 General	19
8.2.4.2 Successful Operation.....	19
8.2.4.3 Unsuccessful Operation	19
8.2.4.4 Abnormal Conditions	19
8.2.5 RAN Paging.....	20
8.2.5.1 General	20
8.2.5.2 Successful operation.....	20
8.2.5.3 Unsuccessful Operation	20
8.2.5.4 Abnormal Condition.....	20
8.2.6 Data Forwarding Address Indication	20
8.2.6.1 General	20
8.2.6.2 Successful Operation.....	21
8.2.6.3 Unsuccessful Operation	21
8.2.6.4 Abnormal Conditions	21
8.2.7 UE Context Release	21

8.2.7.1	General	21
8.2.7.2	Successful Operation.....	21
8.2.7.3	Unsuccessful Operation	22
8.2.7.4	Abnormal Conditions	22
8.3	Procedures for Dual Connectivity	22
8.3.1	S-NG-RAN node Addition Preparation	22
8.3.1.1	General	22
8.3.1.2	Successful Operation.....	22
8.3.1.3	Unsuccessful Operation	23
8.3.1.4	Abnormal Conditions	23
8.3.2	S-NG-RAN node Reconfiguration Completion	23
8.3.2.1	General	23
8.3.2.2	Successful Operation.....	24
8.3.2.3	Abnormal Conditions	24
8.3.3	M-NG-RAN node initiated S-NG-RAN node Modification Preparation	24
8.3.3.1	General	24
8.3.3.2	Successful Operation.....	24
8.3.3.3	Unsuccessful Operation	26
8.3.3.4	Abnormal Conditions	27
8.3.4	S-NG-RAN node initiated S-NG-RAN node Modification	27
8.3.4.1	General	27
8.3.4.2	Successful Operation.....	27
8.3.4.3	Unsuccessful Operation	28
8.3.4.4	Abnormal Conditions	28
8.3.5	S-NG-RAN node initiated S-NG-RAN node Change.....	28
8.3.5.1	General	28
8.3.5.2	Successful Operation.....	28
8.3.5.3	Unsuccessful Operation	29
8.3.5.4	Abnormal Conditions	29
8.3.6	M-NG-RAN node initiated S-NG-RAN node Release	29
8.3.6.1	General	29
8.3.6.2	Successful Operation.....	29
8.3.6.3	Unsuccessful Operation	30
8.3.6.4	Abnormal Conditions	30
8.3.7	S-NG-RAN node initiated S-NG-RAN node Release	30
8.3.7.1	General	30
8.3.7.2	Successful Operation.....	30
8.3.7.3	Unsuccessful Operation	31
8.3.7.4	Abnormal Conditions	31
8.3.8	S-NG-RAN node Counter Check.....	31
8.3.8.1	General	31
8.3.8.2	Successful Operation.....	31
8.3.8.3	Unsuccessful Operation	31
8.3.8.4	Abnormal Conditions	31
8.3.9	RRC Transfer.....	31
8.3.9.1	General	31
8.3.9.2	Successful Operation.....	32
8.3.8.3	Unsuccessful Operation	32
8.3.9.4	Abnormal Conditions	32
8.4	Global procedures.....	32
8.4.1	Xn Setup	32
8.4.1.1	General	32
8.4.1.2	Successful Operation.....	33
8.4.1.3	Unsuccessful Operation	33
8.4.1.4	Abnormal Conditions	33
8.4.2	NG-RAN node Configuration Update	33
8.4.2.1	General	33
8.4.2.2	Successful Operation.....	34
8.4.2.3	Unsuccessful Operation	35
8.4.2.4	Abnormal Conditions	35
8.4.3	Cell Activation.....	35
8.4.3.1	General	35

8.4.3.2	Successful Operation.....	35
8.4.3.3	Unsuccessful Operation	36
8.4.3.4	Abnormal Conditions	36
8.4.4	Reset	36
8.4.4.1	General	36
8.4.4.2	Successful Operation.....	36
8.4.4.3	Unsuccessful Operation	37
8.4.4.4	Abnormal Conditions	37
8.4.5	Error Indication.....	37
8.4.5.1	General	37
8.4.5.2	Successful Operation.....	37
8.4.5.3	Unsuccessful Operation	38
8.4.5.4	Abnormal Conditions	38
8.4.6	Xn Removal	38
8.4.6.1	General	38
8.4.6.2	Successful Operation.....	38
8.4.6.3	Unsuccessful Operation	38
8.4.6.4	Abnormal Conditions	39
9	Elements for XnAP Communication.....	39
9.0	General	39
9.1	Message Functional Definition and Content	39
9.1.1	Messages for Basic Mobility Procedures.....	39
9.1.1.1	HANDOVER REQUEST	39
9.1.1.2	HANDOVER REQUEST ACKNOWLEDGE.....	41
9.1.1.3	HANDOVER PREPARATION FAILURE	41
9.1.1.4	SN STATUS TRANSFER	41
9.1.1.5	UE CONTEXT RELEASE	42
9.1.1.6	HANDOVER CANCEL	42
9.1.1.7	RAN PAGING	42
9.1.1.8	RETRIEVE UE CONTEXT REQUEST.....	43
9.1.1.9	RETRIEVE UE CONTEXT RESPONSE.....	43
9.1.1.10	RETRIEVE UE CONTEXT FAILURE.....	44
9.1.1.11	DATA FORWARDING ADDRESS INDICATION	44
9.1.2	Messages for Dual Connectivity Procedures	45
9.1.2.1	S-NODE ADDITION REQUEST.....	45
9.1.2.2	S-NODE ADDITION REQUEST ACKNOWLEDGE.....	47
9.1.2.3	S-NODE ADDITION REQUEST REJECT.....	49
9.1.2.4	S-NODE RECONFIGURATION COMPLETE	49
9.1.2.5	S-NODE MODIFICATION REQUEST	49
9.1.2.6	S-NODE MODIFICATION REQUEST ACKNOWLEDGE	51
9.1.2.7	S-NODE MODIFICATION REQUEST REJECT	55
9.1.2.8	S-NODE MODIFICATION REQUIRED.....	55
9.1.2.9	S-NODE MODIFICATION CONFIRM.....	56
9.1.2.10	S-NODE MODIFICATION REFUSE	57
9.1.2.11	S-NODE CHANGE REQUIRED	57
9.1.2.12	S-NODE CHANGE CONFIRM	57
9.1.2.13	S-NODE MODIFICATION REFUSE	58
9.1.2.14	S-NODE RELEASE REQUEST.....	58
9.1.2.15	S-NODE RELEASE REQUEST ACKNOWLEDGE.....	59
9.1.2.16	S-NODE RELEASE REJECT	59
9.1.2.17	S-NODE RELEASE REQUIRED	59
9.1.2.18	S-NODE RELEASE CONFIRM	60
9.1.2.19	S-NODE COUNTER CHECK REQUEST.....	60
9.1.2.20	RRC TRANSFER	61
9.1.3	Messages for Global Procedures.....	62
9.1.3.1	XN SETUP REQUEST.....	62
9.1.3.2	XN SETUP RESPONSE.....	63
9.1.3.3	XN SETUP FAILURE.....	64
9.1.3.4	NG-RAN NODE CONFIGURATION UPDATE.....	64
9.1.3.5	NG-RAN NODE CONFIGURATION UPDATE ACKNOWLEDGE.....	65
9.1.3.6	NG-RAN NODE CONFIGURATION UPDATE FAILURE.....	65

9.1.3.7	CELL ACTIVATION REQUEST	66
9.1.3.8	CELL ACTIVATION RESPONSE	66
9.1.3.9	CELL ACTIVATION FAILURE	67
9.1.3.10	RESET REQUEST	67
9.1.3.11	RESET RESPONSE.....	67
9.1.3.12	ERROR INDICATION.....	68
9.1.3.13	XN REMOVAL REQUEST	68
9.1.3.14	XN REMOVAL RESPONSE	69
9.1.3.15	XN REMOVAL FAILURE	69
9.2	Information Element definitions.....	69
9.2.0	General.....	69
9.2.1	Container and List IE definitions.....	69
9.2.1.1	PDU Session Resources To Be Setup List	69
9.2.1.2	PDU Session Resources Admitted List.....	70
9.2.1.3	PDU Session Resources Not Admitted List.....	71
9.2.1.4	QoS Flow List with Cause	71
9.2.1.5	PDU Session Resource Setup Info – SN terminated.....	72
9.2.1.6	PDU Session Resource Setup Response Info – SN terminated.....	72
9.2.1.7	PDU Session Resource Setup Info – MN terminated.....	73
9.2.1.8	PDU Session Resource Setup Response Info – MN terminated	74
9.2.1.9	PDU Session Resource Modification Info – SN terminated	74
9.2.1.10	PDU Session Resource Modification Response Info – SN terminated	75
9.2.1.11	PDU Session Resource Modification Info – MN terminated.....	77
9.2.1.12	PDU Session Resource Modification Response Info – MN terminated.....	79
9.2.1.13	UE Context Information Retrieve UE Context Response	79
9.2.1.14	DRBs Subject To Status Transfer List	79
9.2.1.15	DRB to QoS Flow Mapping List.....	81
9.2.1.16	Data Forwarding Info from target NG-RAN node	81
9.2.2	NG-RAN Node and Cell Configuration related IE definitions	82
9.2.2.1	Global gNB ID	82
9.2.2.2	Global ng-eNB ID.....	82
9.2.2.3	Global NG-RAN Node ID	82
9.2.2.4	PLMN Identity	82
9.2.2.5	TAC.....	83
9.2.2.6	RAN Area Code	83
9.2.2.7	NR CGI	83
9.2.2.8	E-UTRA CGI	83
9.2.2.9	NG-RAN Cell Identity	83
9.2.2.10	NG-RAN Cell PCI	84
9.2.2.11	Served Cell Information NR	84
9.2.2.12	Served Cell Information E-UTRA	85
9.2.2.13	Neighbour Information NR.....	87
9.2.2.14	Neighbour Information E-UTRA	88
9.2.2.15	Served Cells To Update NR.....	88
9.2.2.16	Served Cells to Update E-UTRA	88
9.2.2.17	Cell Assistance Information NR	89
9.2.2.18	SUL Information	89
9.2.2.19	NR Frequency Info.....	90
9.2.2.20	NR Transmission Bandwidth	91
9.2.2.21	E-UTRA ARFCN.....	91
9.2.2.22	E-UTRA Transmission Bandwidth.....	91
9.2.2.23	Number of Antenna Ports E-UTRA	91
9.2.2.24	E-UTRA Multiband Info List.....	91
9.2.2.25	E-UTRA PRACH Configuration	92
9.2.2.26	MBSFN Subframe Allocation E-UTRA	92
9.2.3	General IE definitions.....	92
9.2.3.1	Message Type	92
9.2.3.2	Cause.....	92
9.2.3.3	Criticality Diagnostics.....	97
9.2.3.4	Bit Rate	98
9.2.3.5	QoS Flow Level QoS Parameters.....	98
9.2.3.6	GBR QoS Flow Information	99

9.2.3.7	Allocation and Retention Priority	99
9.2.3.8	Non dynamic 5QI Descriptor	100
9.2.3.9	Dynamic 5QI Descriptor	100
9.2.3.10	QoS Flow Indicator	101
9.2.3.11	Packet Loss Rate	101
9.2.3.12	Packet Delay Budget	101
9.2.3.13	Packet Error Rate	101
9.2.3.14	Averaging Window	101
9.2.3.15	Maximum Data Burst Volume	102
9.2.3.16	NG-RAN node UE XnAP ID	102
9.2.3.17	UE Aggregate Maximum Bit Rate	102
9.2.3.18	PDU Session ID	102
9.2.3.19	PDU Session Type	102
9.2.3.20	TAI Support List	102
9.2.3.21	S-NSSAI	103
9.2.3.22	Slice Support List.....	103
9.2.3.23	Index to RAT/Frequency Selection Priority.....	103
9.2.3.24	GUAMI	103
9.2.3.25	Target Cell Global ID.....	104
9.2.3.26	AMF UE NGAP ID.....	104
9.2.3.27	SCG Configuration Query.....	104
9.2.3.28	RLC Mode.....	104
9.2.3.29	Transport Layer Address.....	104
9.2.3.30	UP Transport Layer Information.....	104
9.2.3.31	CP Transport Layer Information	105
9.2.3.32	Masked IMEISV	105
9.2.3.33	DRB ID	105
9.2.3.34	DL Forwarding.....	105
9.2.3.35	Data Forwarding Accepted.....	105
9.2.3.36	COUNT Value for PDCP SN Length 12.....	106
9.2.3.37	COUNT Value for PDCP SN Length 18.....	106
9.2.3.38	RAN Paging Area	106
9.2.3.39	RAN Area ID	106
9.2.3.40	UE Context ID	107
9.2.3.41	Assistance Data for RAN Paging	107
9.2.3.42	RAN Paging Attempt Information	107
9.2.3.43	UE RAN Paging Identity	107
9.2.3.44	RAN Paging Priority	108
9.2.3.45	Delivery Status.....	108
9.2.3.46	I-RNTI.....	108
9.2.3.47	Location Reporting Information.....	108
9.2.3.48	Area of Interest.....	108
9.2.3.49	UE Security Capabilities	109
9.2.3.50	AS Security Information	110
9.2.3.51	S-NG-RAN node Security Key	111
9.2.3.52	Security Indication	111
9.2.3.53	Mobility Restriction List	111
9.2.3.54	Xn Benefit Value	112
9.2.3.55	Trace Activation.....	113
9.3	Message and Information Element Abstract Syntax (with ASN.1).....	114
9.3.1	General.....	114
9.3.2	Usage of Private Message Mechanism for Non-standard Use.....	114
9.3.3	Elementary Procedure Definitions	115
9.3.4	PDU Definitions	122
9.3.5	Information Element definitions	142
9.3.6	Common definitions	178
9.3.7	Constant definitions	179
9.3.8	Container definitions.....	182
9.4	Message transfer syntax	186
9.5	Timers	186
10	Handling of unknown, unforeseen and erroneous protocol data	186

Annex A (informative): **Change history**187
History188

Foreword

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

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

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document specifies the radio network layer signalling procedures of the control plane between NG-RAN nodes in NG-RAN. XnAP supports the functions of the Xn interface by signalling procedures defined in this document. XnAP is developed in accordance to the general principles stated in TS 38.401 [2] and TS 38.420 [3].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 38.401: "NG-RAN; Architecture Description".
- [3] 3GPP TS 38.420: "NG-RAN; Xn General Aspects and Principles".
- [4] 3GPP TS 38.422: "NG-RAN; Xn Signalling Transport".
- [5] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP) ".
- [6] 3GPP TS 25.921: "Guidelines and principles for protocol description and error handling".
- [7] 3GPP TS 23.501: "System Architecture for the 5G System".
- [8] 3GPP TS 37.340: "Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Multi-connectivity; Stage 2".
- [9] 3GPP TS 38.300: "NR; NR and NG-RAN Overall Description; Stage 2".
- [10] 3GPP TS 38.331: "NR; Radio Resource Control (RRC) Protocol specification".
- [11] 3GPP TS 38.323: "NR; Packet Data Convergence Protocol (PDCP) specification".
- [12] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".
- [13] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".
- [14] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC) protocol specification".
- [15] ITU-T Recommendation X.691 (2002-07): "Information technology - ASN.1 encoding rules - Specification of Packed Encoding Rules (PER) ".
- [16] ITU-T Recommendation X.680 (2002-07): "Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation".
- [17] ITU-T Recommendation X.681 (2002-07): "Information technology – Abstract Syntax Notation One (ASN.1): Information object specification".
- [18] 3GPP TS 29.281: "General Packet Radio Service (GPRS); Tunnelling Protocol User Plane (GTPv1-U)".
- [19] 3GPP TS 38.424: "NG-RAN; Xn data transport".

- [20] 3GPP TS 38.414: "NG-RAN; NG data transport".
- [21] 3GPP TS 38.412: "NG-RAN; NG Signalling Transport".
- [22] 3GPP TS 23.003: "Numbering, Addressing and Identification".
- [23] 3GPP TS 32.422: "Trace control and configuration management".
- [24] 3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".
- [25] 3GPP TS 36.104: "Base Station (BS) radio transmission and reception".
- [26] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation".
- [27] 3GPP TS 36.101: "User Equipment (UE) radio transmission and reception".
- [28] 3GPP TS 33.501: "Security architecture and procedures for 5G System".
- [29] 3GPP TS 33.401: "3GPP System Architecture Evolution (SAE); Security architecture".
- [30] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP 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 3GPP TR 21.905 [1].

Elementary Procedure: XnAP protocol consists of Elementary Procedures (EPs). An XnAP Elementary Procedure is a unit of interaction between two NG-RAN nodes. 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.

NG-RAN node: as defined in TS 38.300 [9].

PDU Session Resource: As defined in TS 38.401 [2].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP 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 3GPP TR 21.905 [1].

5QI	5G QoS Identifier
AMF	Access and Mobility Management Function
ARFCN	Absolute Radio Frequency Channel Number
CG	Cell Group
CGI	Cell Global Identifier
CP	Control Plane
DRB	Data Radio Bearer
DRX	Discontinuous Reception
E-RAB	E-UTRAN Radio Access Bearer
GBR	Guaranteed Bit Rate
GTP	GPRS Tunnelling Protocol
GUAMI	Globally Unique AMF Identifier
IMEISV	International Mobile station Equipment Identity and Software Version number

MCG	Master Cell Group
M-NG-RAN node	Master NG-RAN node
NSSAI	Network Slice Selection Assistance Information
PDCP	Packet Data Convergence Protocol
QoS	Quality of Service
RANAC	RAN Area Code
RLC	Radio Link Control
RNTI	Radio Network Temporary Identifier
RRC	Radio Resource Control
SCG	Secondary Cell Group
S-NG-RAN node	Secondary NG-RAN node
SRB	Signalling Radio Bearer
SUL	Supplementary Uplink
TAC	Tracking Area Code
TAI	Tracking Area Identity
TNL	Transport Network Layer
UP	User Plane
UPF	User Plane Function

4 General

4.1 Procedure specification principles

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

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

- The procedure text discriminates between:

- 1) Functionality which “shall” be executed

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

- 2) Functionality which “shall, if supported” be executed

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

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

4.2 Forwards and backwards compatibility

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

4.3 Specification notations

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

Procedure	When referring to an elementary procedure in the specification the Procedure Name is written with the first letters in each word in upper case characters followed by the word “procedure”, e.g. Handover Preparation procedure.
Message	When referring to a message in the specification the MESSAGE NAME is written with all letters in upper case characters followed by the word “message”, e.g. HANDOVER REQUEST message.
IE	When referring to an information element (IE) in the specification the <i>Information Element Name</i> is written with the first letters in each word in upper case characters and all letters in Italic font followed by the abbreviation “IE”, e.g. <i>PDU Session 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 XnAP services

The present clause describes the services an NG-RAN node offers to its neighbours.

5.1 XnAP procedure modules

The Xn interface XnAP procedures are divided into two modules as follows:

1. XnAP Basic Mobility Procedures;
2. XnAP Global Procedures;

The XnAP 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 NG-RAN nodes.

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 XnAP procedure related to a certain UE.

6 Services expected from signalling transport

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

Xn signalling transport is specified in TS 38.422 [4].

7 Functions of XnAP

The functions of XnAP are specified in TS 38.420 [3].

8 XnAP procedures

8.1 Elementary procedures

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

Table 8.1-1: Class 1 Elementary Procedures

Elementary Procedure	Initiating Message	Successful Outcome	Unsuccessful Outcome
		Response message	Response message
Handover Preparation	HANDOVER REQUEST	HANDOVER REQUEST ACKNOWLEDGE	HANDOVER PREPARATION FAILURE
Retrieve UE Context	RETRIEVE UE CONTEXT REQUEST	RETRIEVE UE CONTEXT RESPONSE	RETRIEVE UE CONTEXT FAILURE
S-NG-RAN node Addition Preparation	S-NODE ADDITION REQUEST	S-NODE ADDITION REQUEST ACKNOWLEDGE	S-NODE ADDITION REQUEST REJECT
M-NG-RAN node initiated S-NG-RAN node Modification Preparation	S-NODE MODIFICATION REQUEST	S-NODE MODIFICATION REQUEST ACKNOWLEDGE	S-NODE MODIFICATION REQUEST REJECT
S-NG-RAN node initiated S-NG-RAN node Modification	S-NODE MODIFICATION REQUIRED	S-NODE MODIFICATION CONFIRM	S-NODE MODIFICATION REFUSE
S-NG-RAN node initiated S-NG-RAN node CHANGE	S-NODE CHANGE REQUIRED	S-NODE CHANGE CONFIRM	S-NODE CHANGE REFUSE
M-NG-RAN node initiated S-NG-RAN node Release	S-NODE RELEASE REQUEST	S-NODE RELEASE REQUEST ACKNOWLEDGE	S-NODE RELEASE REJECT
S-NG-RAN node initiated S-NG-RAN node Release	S-NODE RELEASE REQUIRED	S-NODE RELEASE CONFIRM	
Xn Setup	XN SETUP REQUEST	XN SETUP RESPONSE	XN SETUP FAILURE
NG-RAN node Configuration Update	NG-RAN NODE CONFIGURATION UPDATE	NG-RAN NODE CONFIGURATION UPDATE ACKNOWLEDGE	NG-RAN NODE CONFIGURATION UPDATE FAILURE
Cell Activation	CELL ACTIVATION REQUEST	CELL ACTIVATION RESPONSE	CELL ACTIVATION FAILURE
Reset	RESET REQUEST	RESET RESPONSE	
Xn Removal	Xn REMOVAL REQUEST	Xn REMOVAL RESPONSE	Xn REMOVAL FAILURE

Table 8.1-2: Class 2 Elementary Procedures

Elementary Procedure	Initiating Message
Handover Cancel	HANDOVER CANCEL
SN Status Transfer	SN STATUS TRANSFER
RAN Paging	RAN PAGING
Data Forwarding Address Indication	DATA FORWARDING ADDRESS INDICATION
S-NG-RAN node Reconfiguration Completion	S-NODE RECONFIGURATION COMPLETE
S-NG-RAN node Counter Check	S-NODE COUNTER CHECK REQUEST
UE Context Release	UE CONTEXT RELEASE
RRC Transfer	RRC TRANSFER
Error Indication	ERROR INDICATION

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 NG-RAN node for an incoming handover.

The procedure uses UE-associated signalling.

8.2.1.2 Successful Operation

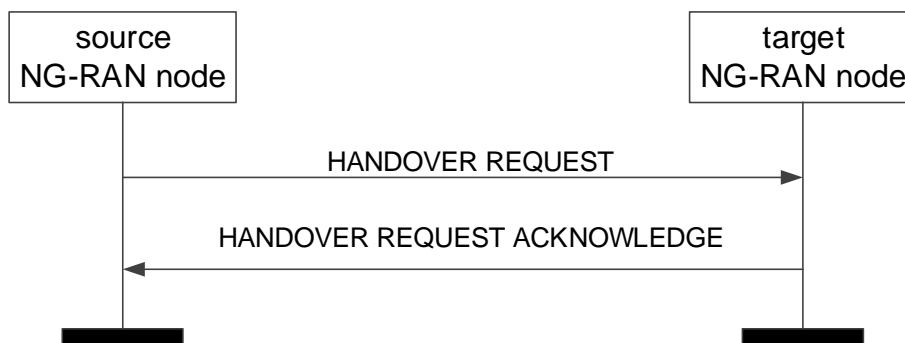


Figure 8.2.1.2-1: Handover Preparation, successful operation

The source NG-RAN node initiates the procedure by sending the HANOVER REQUEST message to the target NG-RAN node. When the source NG-RAN node sends the HANOVER REQUEST message, it shall start the timer $TX_{nRELOCprep}$.

If the *Signalling TNL association address at source NG-C side* IE is included in the HANOVER REQUEST message the target NG-RAN node shall behave as specified in TS 23.502 [13].

For each *E-RAB ID* IE included in the *QoS Flow To Be Setup List* IE in the HANOVER REQUEST message, the target NG-RAN node shall, if supported, store the content of the IE in the UE context and use it for subsequent inter-system handover.

If the *Masked IMEISV* IE is contained in the HANOVER REQUEST message the target NG-RAN node shall, if supported, use it to determine the characteristics of the UE for subsequent handling.

At reception of the HANOVER REQUEST message the target NG-RAN node shall prepare the configuration of the AS security relation between the UE and the target NG-RAN node by using the information in the *UE Security Capabilities* IE and the *AS Security Information* IE in the *UE Context Information* IE, as specified in TS 33.501 [28].

Upon reception of the *PDU Session Resource Setup List* IE, contained in the HANOVER REQUEST message, the target NG-RAN node shall behave the same as specified in TS 38.413 [5] for the PDU Session Resource Setup procedure. The target NG-RAN node shall report in the HANOVER REQUEST ACKNOWLEDGE message the successful establishment of the result for all the requested PDU session resources. When the target NG-RAN node reports the unsuccessful establishment of a PDU session resource, the cause value should be precise enough to enable the source NG-RAN node to know the reason for the unsuccessful establishment.

For each QoS flow for which the source NG-RAN node proposes to perform forwarding of downlink data, the source NG-RAN node shall include the *DL Forwarding* IE set to "DL forwarding proposed" within the *QoS Flows To Be Setup List* IE in the *PDU Session Resource To Be Setup List* IE in the HANOVER REQUEST message. For each PDU session that the target NG-RAN node decides to admit the data forwarding for at least one QoS flow, the target NG-RAN node includes the *PDU Session level DL data forwarding GTP-U Tunnel Endpoint* IE within the *Data Forwarding Info from target NG-RAN node* IE in the *PDU Session Admitted Response Transfer* IE contained in the *PDU Sessions Admitted List* IE in the HANOVER REQUEST ACKNOWLEDGE message.

For each DRB for which the source NG-RAN node proposes to perform forwarding of downlink data, the source NG-RAN node shall include the *DRB ID* IE and the mapped *QoS Flows List* IE within the *Source DRB to QoS Flow Mapping List* IE contained in the *PDU Session Resources To Be Setup List* IE in the HANOVER REQUEST message.

If the target NG-RAN node decides to use the same DRB configuration and to map the same QoS flows as the source NG-RAN node, the target NG-RAN node includes the *DL Forwarding GTP Tunnel Endpoint IE* within the *Data Forwarding Response DRB List IE* in the HANOVER REQUEST ACKNOWLEDGE message to indicate that it accepts the proposed forwarding of downlink data for this DRB.

If the HANOVER REQUEST ACKNOWLEDGE message contains the *UL Forwarding GTP Tunnel Endpoint IE* for a given DRB in the *Data Forwarding Response DRB List IE* within *Data Forwarding Info from target NG-RAN node IE* in the *PDU Session Resources Admitted List IE* and the source NG-RAN node accepts the data forwarding proposed by the target NG-RAN node, the source NG-RAN node shall perform forwarding of uplink data for the DRB.

If the HANOVER REQUEST includes PDU session resources for PDU sessions associated to S-NSSAIs not supported by target NG-RAN, the target NG-RAN shall reject such PDU session resources. In this case, and if at least one *PDU Session Resource To Be Setup Item IE* is admitted, the target NG-RAN shall send the HANOVER REQUEST ACKNOWLEDGE message including the *PDU Session Resources Not Admitted List IE* listing corresponding PDU sessions rejected at the target NG-RAN.

If the *Mobility Restriction List IE* is

- contained in the HANOVER REQUEST message, the target NG-RAN node shall
 - store the information received in the *Mobility Restriction List IE* in the UE context;
 - use this information to determine a target for the UE during subsequent mobility action for which the NG-RAN node provides information about the target of the mobility action towards the UE, except when one of the PDU sessions has a particular ARP value (TS 23.501 [7]) in which case the information shall not apply;
 - use this information to select a proper SCG during dual connectivity operation.
 - use this information to select proper RNA(s) for the UE when moving the UE to RRC_INACTIVE.
- not contained in the HANOVER REQUEST message, the target NG-RAN node shall
 - consider that no roaming and no access restriction apply to the UE.

If the *Trace Activation IE* is included in the HANOVER REQUEST message the target NG-RAN node shall, if supported, initiate the requested trace function as specified in TS 32.422 [23].

If the *Index to RAT/Frequency Selection Priority IE* is contained in the HANOVER REQUEST message, the target NG-RAN node shall store this information and use it as defined in TS 23.501 [7].

If the *UE Context Reference at the S-NG-RAN IE* is contained in the HANOVER REQUEST message the target NG-RAN node may use it as specified in TS 37.340 [8]. In this case, the source NG-RAN node may expect the target NG-RAN node to include the *UE Context Kept Indicator IE* set to "True" in the HANOVER REQUEST ACKNOWLEDGE message, which shall use this information as specified in TS 37.340 [8].

For each PDU session for which the *Security Indication IE* is included in the *PDU Session Resource To Be Setup List IE* and the *Integrity Protection Indication IE* or *Confidentiality Protection Indication IE* is set to "required", the target NG-RAN node shall perform user plane integrity protection or ciphering, respectively. If the NG-RAN node is not able to perform the user plane integrity protection or ciphering, it shall reject the setup of the PDU Session Resources with an appropriate cause value.

If the NG-RAN node is an ng-eNB, it shall reject all PDU sessions for which the *Integrity Protection Indication IE* is set to "required".

For each PDU session for which the *Security Indication IE* is included in the *PDU Session Resource To Be Setup List IE* and the *Integrity Protection Indication IE* or *Confidentiality Protection Indication IE* is set to "preferred", the target NG-RAN node should, if supported, perform user plane integrity protection or ciphering, respectively and shall notify the SMF whether it succeeded the user plane integrity protection or ciphering or not for the concerned security policy.

For each PDU session for which the *Security Indication IE* is included in the *PDU Session Resource To Be Setup List IE* and the *Integrity Protection Indication IE* or *Confidentiality Protection Indication IE* is set to "not needed", the target NG-RAN node shall not perform user plane integrity protection nor ciphering for the concerned PDU session

If the *Location Reporting Information IE* is included in the HANOVER REQUEST message, then the target NG-RAN node should initiate the requested location reporting functionality as defined in TS 38.413 [5].

8.2.1.3 Unsuccessful Operation

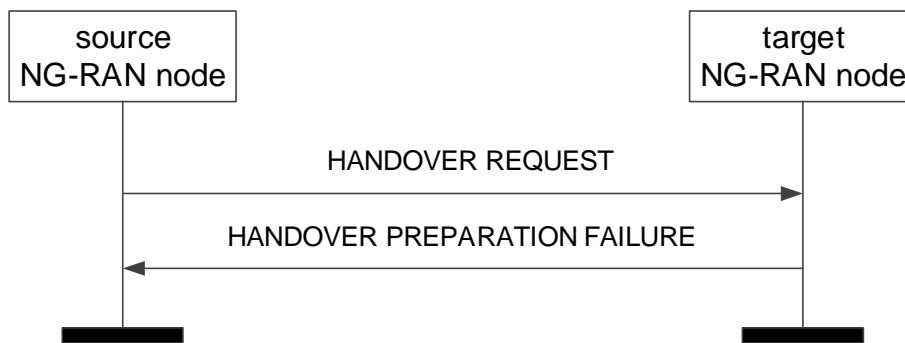


Figure 8.2.1.3-1: Handover Preparation, unsuccessful operation

If the target NG-RAN node does not admit at least one PDU session resource, or a failure occurs during the Handover Preparation, the target NG-RAN node shall send the HANOVER PREPARATION FAILURE message to the source NG-RAN node. The message shall contain the *Cause* IE with an appropriate value.

Interactions with Handover Cancel procedure:

If there is no response from the target NG-RAN node to the HANOVER REQUEST message before timer $TX_{nRELOC_{prep}}$ expires in the source NG-RAN node, the source NG-RAN node should cancel the Handover Preparation procedure towards the target NG-RAN node by initiating the Handover Cancel procedure with the appropriate value for the *Cause* IE. The source NG-RAN node 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 Xn UE-associated signalling.

8.2.1.4 Abnormal Conditions

If the supported algorithms for encryption defined in the *UE Security Capabilities* IE in the *UE Context Information* IE, plus the mandated support of the EEA0 and NEA0 algorithms in all UEs (TS 33.501 [28]), do not match any allowed algorithms defined in the configured list of allowed encryption algorithms in the NG-RAN node (TS 33.501 [28]), the NG-RAN node shall reject the procedure using the HANOVER PREPARATION FAILURE message.

If the supported algorithms for integrity defined in the *UE Security Capabilities* IE in the *UE Context Information* IE, plus the mandated support of the EIA0 and NIA0 algorithms in all UEs (TS 33.501 [28]), do not match any allowed algorithms defined in the configured list of allowed integrity protection algorithms in the NG-RAN node (TS 33.501 [28]), the NG-RAN node 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 NG-RAN node during an Xn handover, for each respective DRB of the source DRB configuration for which PDCP SN and HFN status preservation applies.

The procedure uses UE-associated signalling.

8.2.2.2 Successful Operation

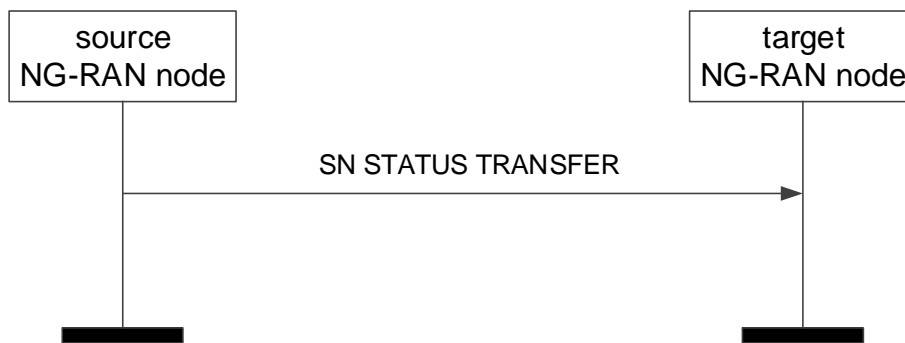


Figure 8.2.2.2-1: SN Status Transfer, successful operation

8.2.2.3 Unsuccessful Operation

Not applicable.

8.2.2.4 Abnormal Conditions

If the target NG-RAN node receives this message for a UE for which no prepared handover exists at the target NG-RAN node, the target NG-RAN node shall ignore the message.

8.2.3 Handover Cancel

8.2.3.1 General

The Handover Cancel procedure is used to enable a source NG-RAN node to cancel an ongoing handover preparation or an already prepared handover.

The procedure uses UE-associated signalling.

8.2.3.2 Successful Operation



Figure 8.2.4.2-1: Handover Cancel, successful operation

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

8.2.3.3 Unsuccessful Operation

Not applicable.

8.2.3.4 Abnormal Conditions

If the HANDOVER CANCEL message refers to a context that does not exist, the target NG-RAN node shall ignore the message.

8.2.4 Retrieve UE Context

8.2.4.1 General

The purpose of the Retrieve UE Context procedure is to retrieve the UE context from the old NG-RAN node and transfer it to the NG-RAN node where the UE RRC Connection has been requested to be established.

The procedure uses UE-associated signalling.

8.2.4.2 Successful Operation

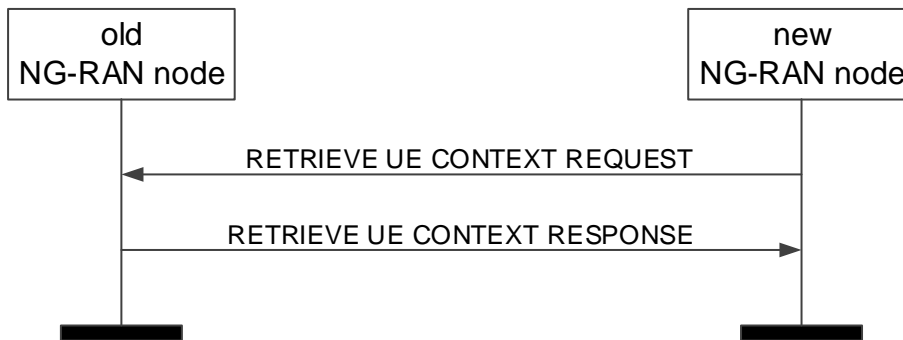


Figure 8.2.4.2-1: Retrieve UE Context, successful operation

The new NG-RAN node initiates the procedure by sending the RETRIEVE UE CONTEXT REQUEST message to the old NG-RAN node.

If the old NG-RAN node is able to identify the UE context by means of the UE Context ID, and to successfully verify the UE by means of the integrity protection contained in the RETRIEVE UE CONTEXT REQUEST message, it shall respond to the new NG-RAN node with the RETRIEVE UE CONTEXT RESPONSE message.

If the *Index to RAT/Frequency Selection Priority* IE is contained in the RETRIEVE UE CONTEXT RESPONSE message, the new NG-RAN node shall store this information and use it as defined in TS 23.501 [7].

If the *Location Reporting Information* IE is included in the RETRIEVE UE CONTEXT RESPONSE message, then the new NG-RAN node should initiate the requested location reporting functionality as defined in TS 38.413 [5].

8.2.4.3 Unsuccessful Operation

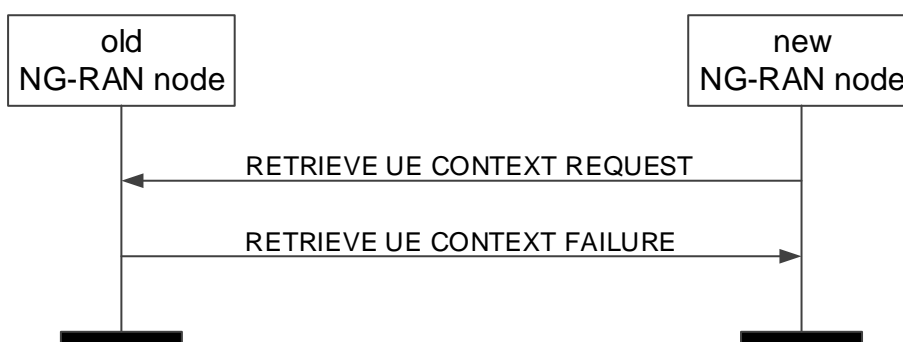


Figure 8.2.4.3-1: Retrieve UE Context, unsuccessful operation

If the old NG-RAN node is not able to identify the UE context by means of the I-RNTI, or if the integrity protection contained in the RETRIEVE UE CONTEXT REQUEST message is not valid, it shall respond to the new NG-RAN node with the RETRIEVE UE CONTEXT FAILURE message.

8.2.4.4 Abnormal Conditions

Void.

8.2.5 RAN Paging

8.2.5.1 General

The purpose of the RAN Paging procedure is to enable the NG-RAN node₁ to request paging of a UE in the NG-RAN node₂.

The procedure uses non UE-associated signalling.

8.2.5.2 Successful operation



Figure 8.2.5.2-1: RAN Paging: successful operation

The RAN Paging procedure is triggered by the NG-RAN node₁ by sending the PAGING message to the NG-RAN node₂, in which the necessary information e.g. UE RAN Paging Identity should be provided.

If the *RAN Paging Priority* IE may be included in the RAN PAGING message, the NG-RAN node₂ may use it to prioritize paging.

The *Assistance Data for Paging* IE may be included in the RAN PAGING message, and if present the NG-RAN node₂ may use it according to TS 38.300 [9].

If the *Assistance Data for Paging* IE is included in the RAN PAGING message, the NG-RAN node₂ may use it according to TS 38.300 [9].

8.2.5.3 Unsuccessful Operation

Not applicable.

8.2.5.4 Abnormal Condition

Void.

8.2.6 Data Forwarding Address Indication

8.2.6.1 General

For the retrieval of a UE context, the Data Forwarding Address Indication procedure is used to provide forwarding addresses from the new NG-RAN node to the old NG-RAN node for all PDU session resources successfully established at the new NG-RAN node for which forwarding was requested.

The procedure uses UE-associated signalling.

8.2.6.2 Successful Operation



Figure 8.2.6.2-1: Data Forwarding Address Indication, successful operation

The Data Forwarding Address Indication procedure is initiated by the new NG-RAN node. Sending the DATA FORWARDING ADDRESS INDICATION message, the new NG-RAN node informs the old NG-RAN node of successfully established PDU Session Resource contexts to which DL user data pending at the old NG-RAN node can be forwarded.

Upon reception of the DATA FORWARDING ADDRESS INDICATION message, the old NG-RAN node should forward pending DL user data to the indicated TNL addresses.

8.2.6.3 Unsuccessful Operation

Not applicable.

8.2.6.4 Abnormal Conditions

Void.

8.2.7 UE Context Release

8.2.7.1 General

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

The procedure uses UE-associated signalling.

8.2.7.2 Successful Operation



Figure 8.2.7.2-1: UE Context Release, successful operation for handover

Handover

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

8.2.7.3 Unsuccessful Operation

Not applicable.

8.2.7.4 Abnormal Conditions

If the UE Context Release procedure is not initiated towards the source NG-RAN node from any prepared NG-RAN node before the expiry of the timer $TX_{nRELOCoverall}$, the source NG-RAN node shall request the AMF to release the UE context.

If the UE returns to source NG-RAN node before the reception of the UE CONTEXT RELEASE message or the expiry of the timer $TX_{nRELOCoverall}$, the source NG-RAN node shall stop the $TX_{nRELOCoverall}$ and continue to serve the UE.

8.3 Procedures for Dual Connectivity

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, all the text of section 8.3 is FFS.

8.3.1 S-NG-RAN node Addition Preparation

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, all the text of section 8.3.1 is FFS.

8.3.1.1 General

The purpose of the S-NG-RAN node Addition Preparation procedure is to request the S-NG-RAN node to allocate resources for dual connectivity operation for a specific UE.

The procedure uses UE-associated signalling.

8.3.1.2 Successful Operation

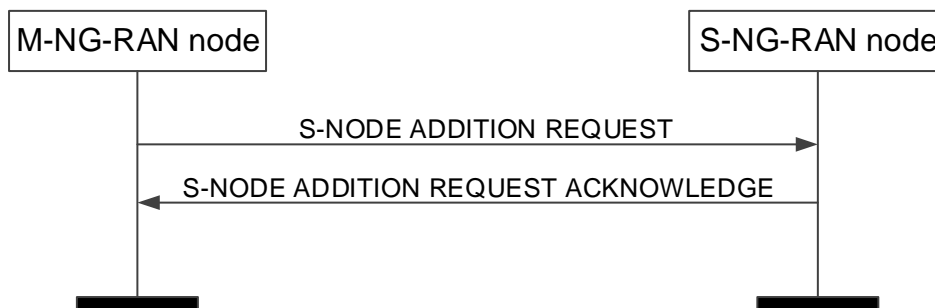


Figure 8.3.1.2-1: S-NG-RAN node Addition Preparation, successful operation

The M-NG-RAN node initiates the procedure by sending the S-NODE ADDITION REQUEST message to the S-NG-RAN node.

When the M-NG-RAN node sends the S-NODE ADDITION REQUEST message, it shall start the timer $TX_{nDCprep}$.

The allocation of resources according to the values of the *Allocation and Retention Priority* IE included in the *PDU Session Level QoS Parameters* IE shall follow the principles specified for the PDU Session Resource Setup procedure in TS 38.413 [5].

The S-NG-RAN node 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 *S-NG-RAN node Security Key* IE as specified in TS 33.501 [28].

If the *Additional QoS Flow Information* IE is included in the S-NODE ADDITION REQUEST message, the S-NG-RAN node shall behave the same as the NG-RAN node in the PDU Session Resource Setup procedure, specified in TS 38.413 [5].

If the S-NODE ADDITION REQUEST message contains the *Selected PLMN* IE, the S-NG-RAN node may use it for RRM purposes.

If the S-NODE ADDITION REQUEST message contains the *Expected UE Behaviour* IE, the S-NG-RAN node shall, if supported, store this information and may use it to optimize resource allocation.

If the S-NODE ADDITION REQUEST message contains the *Handover Restriction List* IE, the S-NG-RAN node, if supported, shall store this information and use it to select an appropriate SCG.

If the S-NODE ADDITION REQUEST message contains the *Index to RAT/Frequency Selection Priority* IE, the S-NG-RAN node may use it for RRM purposes.

The S-NG-RAN node shall report to the M-NG-RAN node, in the S-NODE ADDITION REQUEST ACKNOWLEDGE message, the result for all the requested PDU session resources in the following way:

- A list of PDU session resources which are successfully established shall be included in the *PDU Session Resources Admitted To Be Added List* IE.
- A list of PDU session resources which failed to be established shall be included in the *PDU Session Resources Not Admitted List* IE.

Upon reception of the S-NODE ADDITION REQUEST ACKNOWLEDGE message the M-NG-RAN node shall stop the timer $TX_{nDCprep}$.

If the *S-NG-RAN node UE XnAP ID* IE is contained in the S-NODE ADDITION REQUEST message, the S-NG-RAN node shall, if supported, store this information and use it as defined in TS 37.340 [8].

Interactions with the S-NG-RAN node Reconfiguration Completion procedure:

If the S-NG-RAN node admits at least one PDU session resource, the S-NG-RAN node shall start the timer $TX_{nDCoverall}$ when sending the S-NODE ADDITION REQUEST ACKNOWLEDGE message to the M-NG-RAN node. The reception of the S-NODE RECONFIGURATION COMPLETE message shall stop the timer $TX_{nDCoverall}$.

8.3.1.3 Unsuccessful Operation

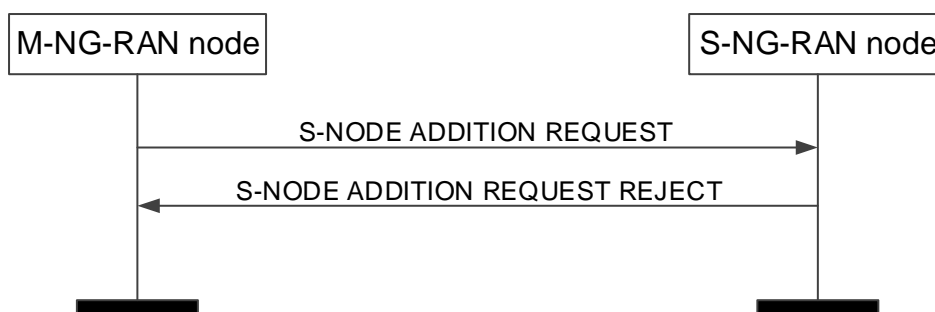


Figure 8.3.1.3-1: S-NG-RAN node Addition Preparation, unsuccessful operation

If the S-NG-RAN node is not able to accept any of the bearers or a failure occurs during the S-NG-RAN node Addition Preparation, the S-NG-RAN node sends the S-NODE ADDITION REQUEST REJECT message with an appropriate cause value to the M-NG-RAN node.

8.3.1.4 Abnormal Conditions

Void.

8.3.2 S-NG-RAN node Reconfiguration Completion

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, all the text of section 8.3.2 is FFS.

8.3.2.1 General

The purpose of the S-NG-RAN node Reconfiguration Completion procedure is to provide information to the S-NG-RAN node whether the requested configuration was successfully applied by the UE.

The procedure uses UE-associated signalling.

8.3.2.2 Successful Operation



Figure 8.3.2.2-1: S-NG-RAN node Reconfiguration Complete procedure, successful operation.

The M-NG-RAN node initiates the procedure by sending the S-NODE RECONFIGURATION COMPLETE message to the S-NG-RAN node.

The S-NODE RECONFIGURATION COMPLETE message may contain information that

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

Upon reception of the S-NODE RECONFIGURATION COMPLETE message the S-NG-RAN node shall stop the timer $TX_{ND\text{Coverall}}$.

8.3.2.3 Abnormal Conditions

Void.

8.3.3 M-NG-RAN node initiated S-NG-RAN node Modification Preparation

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, all the text of section 8.3.3 is FFS.

8.3.3.1 General

This procedure is used to enable an M-NG-RAN node to request an S-NG-RAN node to modify the UE context at the S-NG-RAN node or to query the current SCG configuration for supporting delta signalling in M-NG-RAN node initiated S-NG-RAN node change.

The procedure uses UE-associated signalling.

8.3.3.2 Successful Operation



Figure 8.3.3.2-1: M-NG-RAN node initiated S-NG-RAN node Modification Preparation, successful operation

The M-NG-RAN node initiates the procedure by sending the S-NODE MODIFICATION REQUEST message to the S-NG-RAN node.

When the M-NG-RAN node sends the S-NODE MODIFICATION REQUEST message, it shall start the timer $TX_{nDCprep}$.

The S-NODE MODIFICATION REQUEST message may contain

- within the *UE Context Information IE*;
- PDU session resources to be added within the *PDU Session Resources To Be Added Item IE*;
- PDU session resources to be modified within the *PDU Session Resources To Be Modified Item IE*;
- PDU session resources to be released within the *PDU Session Resources To Be Released Item IE*;
- the *S-NG-RAN node Security Key IE*;
- the *S-NG-RAN node UE Aggregate Maximum Bit Rate IE*;
- the *M-NG-RAN node to S-NG-RAN node Container IE*;
- the *SCG Change Indication IE*;
- the *SCG Configuration Query IE*;
- the *Requested split SRBs IE*;
- the *Requested split SRBs release IE*.

If the S-NODE MODIFICATION REQUEST message contains the *Selected PLMN IE*, the S-NG-RAN node may use it for RRM purposes.

If the S-NODE MODIFICATION REQUEST message contains the *Handover Restriction List IE*, the S-NG-RAN node shall

- replace the previously provided Handover Restriction List by the received Handover Restriction List in the UE context;
- use this information to select an appropriate SCG.

If the *S-NG-RAN node UE Aggregate Maximum Bit Rate IE* is included in the S-NODE MODIFICATION REQUEST message, the S-NG-RAN node shall:

- replace the previously provided S-NG-RAN node UE Aggregate Maximum Bit Rate by the received S-NG-RAN node UE Aggregate Maximum Bit Rate in the UE context;
- use the received S-NG-RAN node UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE as defined in TS 37.340 [8].

If the S-NODE MODIFICATION REQUEST message contains the *Index to RAT/Frequency Selection Priority IE*, the S-NG-RAN node may use it for RRM purposes.

The allocation of resources according to the values of the *Allocation and Retention Priority IE* included in the *PDU Session Level QoS Parameters IE* shall follow the principles specified for the PDU Session Resource Setup procedure in TS 38.413 [5].

If the *Additional QoS Flow Information IE* is included in the S-NODE MODIFICATION REQUEST message, the S-NG-RAN node shall behave the same as the NG-RAN node in the PDU Session Resource Setup procedure, specified in TS 38.413 [5].

If at least one of the requested modifications is admitted by the S-NG-RAN node, the S-NG-RAN node shall modify the related part of the UE context accordingly and send the S-NODE MODIFICATION REQUEST ACKNOWLEDGE message back to the M-NG-RAN node.

The S-NG-RAN node shall include the PDU sessions for which resources have been either added or modified or released at the S-NG-RAN node either in the *PDU Session Resources Admitted To Be Added List IE* or the *PDU*

Session Resources Admitted To Be Modified List IE or the *PDU Session Resources Admitted To Be Released List IE*. The S-NG-RAN node shall include the PDU sessions that have not been admitted in the *PDU Session Resources Not Admitted List IE* with an appropriate cause value.

If the *PDU Session level QoS parameter IE* is included in the S-NODE MODIFICATION REQUEST message for an PDU session resource to be modified the S-NG-RAN node shall allocate respective resources and provide corresponding radio configuration information within the *S-NG-RAN node to M-NG-RAN node Container IE* as specified in TS 37.340 [8].

If the S-NODE MODIFICATION REQUEST message contains for an PDU session resource to be modified which is configured with the SCG bearer option, the *NG UL UP Address IE* the S-NG-RAN node shall use it as the new UL NG-U address.

If the S-NODE MODIFICATION REQUEST message contains for an PDU session resource to be modified which is configured with the split bearer option, the *M-NG-RAN node UP Address IE* the S-NG-RAN node shall use it as the new UL Xn-U address.

For an PDU session resource to be modified which is configured with the SCG bearer option the S-NG-RAN node may include in the S-NODE MODIFICATION REQUEST ACKNOWLEDGE message the *NG DL UP Address IE*.

For an PDU session resource to be modified which is configured with the split bearer option the S-NG-RAN node may include in the S-NODE MODIFICATION REQUEST ACKNOWLEDGE message the *S-NG-RAN node UP Address IE*.

If the *SCG Change Indication IE* is included in the S-NODE MODIFICATION REQUEST message, the S-NG-RAN node shall act as specified in TS 37.340 [8].

Upon reception of the S-NODE MODIFICATION REQUEST ACKNOWLEDGE message the M-NG-RAN node shall stop the timer $TX_{nDCprep}$. If the S-NODE MODIFICATION REQUEST ACKNOWLEDGE message has included the *S-NG-RAN node to M-NG-RAN node Container IE* the M-NG-RAN node is then defined to have a Prepared S-NG-RAN node Modification for that Xn UE-associated signalling.

If the *SCG Configuration Query IE* is included in the S-NODE MODIFICATION REQUEST message, the S-NG-RAN node shall provide corresponding radio configuration information within the *S-NG-RAN node to M-NG-RAN node Container IE* as specified in TS 37.340 [8].

If the S-NODE MODIFICATION REQUEST message contains the *Requested Split SRBs IE*, the S-NG-RAN node may use it to add split SRBs. If the S-NODE MODIFICATION REQUEST message contains the *Requested Split SRBs release IE*, the S-NG-RAN node may use it to release split SRBs.

Interactions with the S-NG-RAN node Reconfiguration Completion procedure:

If the S-NG-RAN node admits a modification of the UE context requiring the M-NG-RAN node to report about the success of the RRC connection reconfiguration procedure, the S-NG-RAN node shall start the timer $TX_{nDCoverall}$ when sending the S-NODE MODIFICATION REQUEST ACKNOWLEDGE message to the M-NG-RAN node. The reception of the S-NG-RAN node RECONFIGURATION COMPLETE message shall stop the timer $TX_{nDCoverall}$.

8.3.3.3 Unsuccessful Operation

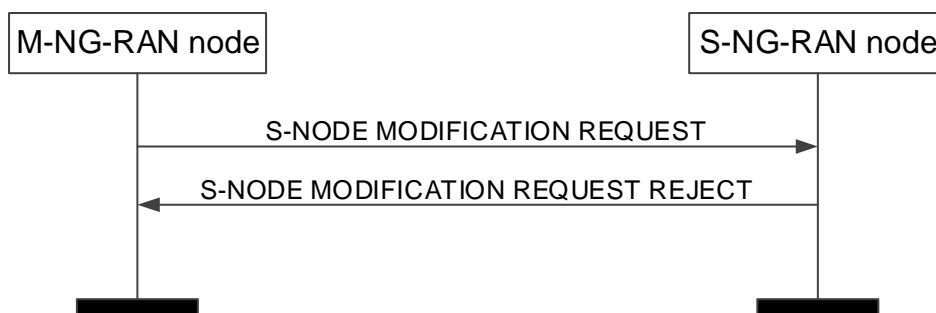


Figure 8.3.3.3-1: M-NG-RAN node initiated S-NG-RAN node Modification Preparation, unsuccessful operation

If the S-NG-RAN node does not admit any modification requested by the M-NG-RAN node, or a failure occurs during the M-NG-RAN node initiated S-NG-RAN node Modification Preparation, the S-NG-RAN node shall send the S-NODE MODIFICATION REQUEST REJECT message to the M-NG-RAN node. The message shall contain the *Cause* IE with an appropriate value.

If the S-NG-RAN node receives a S-NODE MODIFICATION REQUEST message containing the *M-NG-RAN node to S-NG-RAN node Container* IE that does not include required information as specified in TS 37.340 [8], the S-NG-RAN node shall send the S-NODE MODIFICATION REQUEST REJECT message to the M-NG-RAN node.

8.3.3.4 Abnormal Conditions

Void.

8.3.4 S-NG-RAN node initiated S-NG-RAN node Modification

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, all the text of section 8.3.4 is FFS.

8.3.4.1 General

This procedure is used by the S-NG-RAN node to modify the UE context in the S-NG-RAN node.

The procedure uses UE-associated signalling.

8.3.4.2 Successful Operation

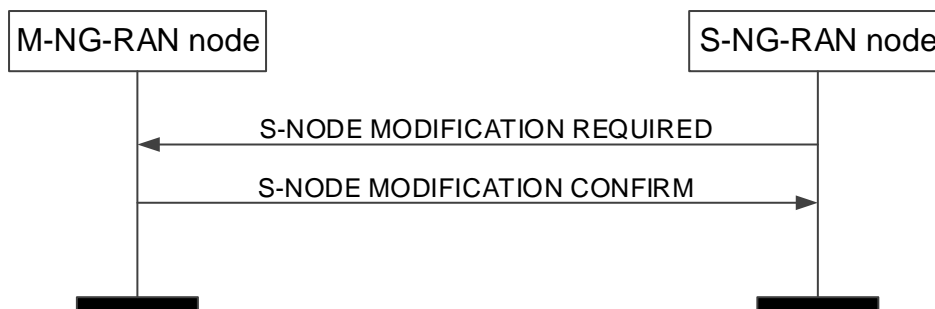


Figure 8.3.4.2-1: S-NG-RAN node initiated S-NG-RAN node Modification, successful operation.

The S-NG-RAN node initiates the procedure by sending the S-NODE MODIFICATION REQUIRED message to the M-NG-RAN node.

When the S-NG-RAN node sends the S-NODE MODIFICATION REQUIRED message, it shall start the timer $TX_{nD}Coverall$.

The S-NODE MODIFICATION REQUIRED message may contain

- the *S-NG-RAN node to M-NG-RAN node Container* IE.
- PDU session resources to be released within the *PDU Session Resources To Be Released Item* IE;
- the *SCG Change Indication* IE.

If the M-NG-RAN node receives a S-NODE MODIFICATION REQUIRED message containing the *SCG Change Indication* IE, the M-NG-RAN node shall act as specified in TS 37.340 [8].

If the M-NG-RAN node is able to perform the modifications requested by the S-NG-RAN node, the M-NG-RAN node shall send the S-NODE MODIFICATION CONFIRM message to the S-NG-RAN node. The S-NODE MODIFICATION CONFIRM message may contain the *M-NG-RAN node to S-NG-RAN node Container* IE.

Upon reception of the S-NODE MODIFICATION CONFIRM message the S-NG-RAN node shall stop the timer $TX_{nD}Coverall$.

8.3.4.3 Unsuccessful Operation

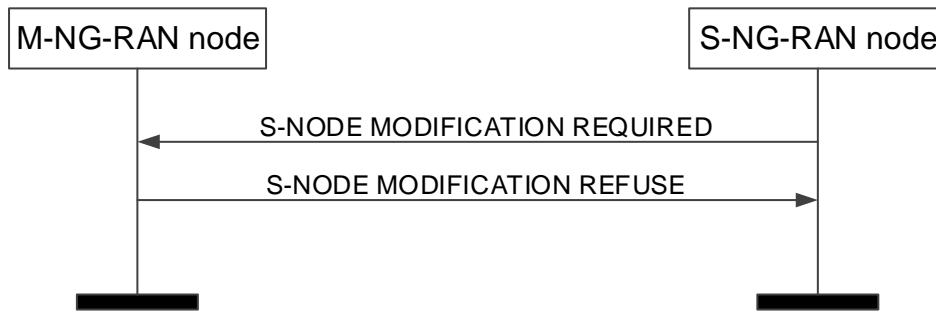


Figure 8.3.4.3-1: S-NG-RAN node initiated S-NG-RAN node Modification, unsuccessful operation.

In case the request modification cannot be performed successfully the M-NG-RAN node shall respond with the S-NODE MODIFICATION REFUSE message to the S-NG-RAN node with an appropriate cause value in the *Cause* IE.

The M-NG-RAN node may also provide configuration information in the *M-NG-RAN node to S-NG-RAN node Container* IE.

8.3.4.4 Abnormal Conditions

Void.

8.3.5 S-NG-RAN node initiated S-NG-RAN node Change

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, all the text of section 8.3.5 is FFS.

8.3.5.1 General

This procedure is used by the S-NG-RAN node to trigger the change of the S-NG-RAN node.

The procedure uses UE-associated signalling.

8.3.5.2 Successful Operation

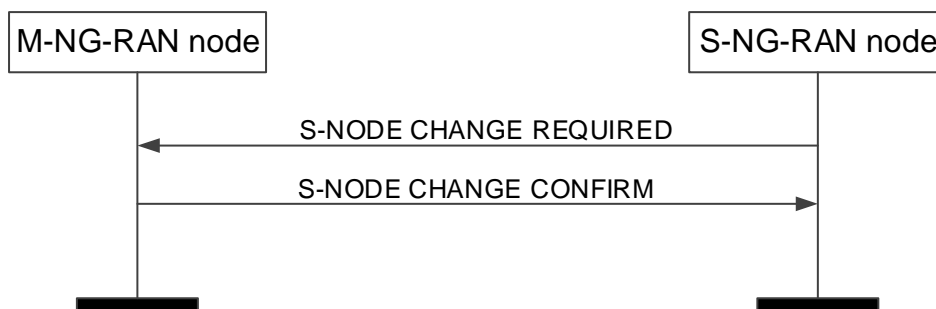


Figure 8.3.5.2-1: S-NG-RAN node initiated S-NG-RAN node Change, successful operation.

The S-NG-RAN node initiates the procedure by sending the S-NODE CHANGE REQUIRED message to the M-NG-RAN node.

8.3.5.3 Unsuccessful Operation

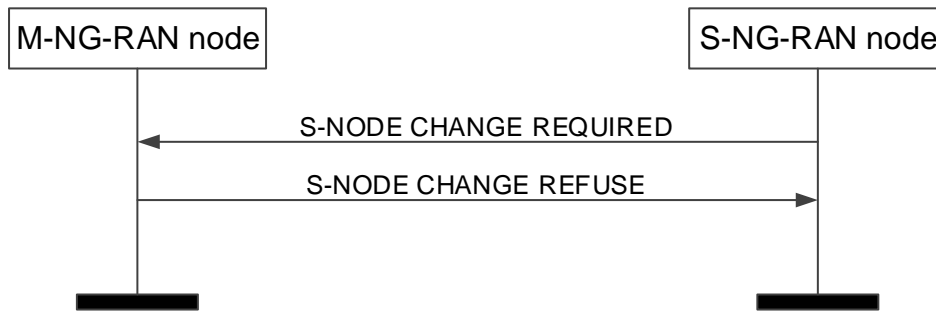


Figure 8.3.5.3-1: S-NG-RAN node initiated S-NG-RAN node Change, unsuccessful operation.

In case the request modification cannot accept the request to change the S-NG-RAN node the the M-NG-RAN node shall respond with the S-NODE CHANGE REFUSE message to the S-NG-RAN node with an appropriate cause value in the *Cause* IE.

8.3.5.4 Abnormal Conditions

Void.

8.3.6 M-NG-RAN node initiated S-NG-RAN node Release

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, all the text of section 8.3.6 is FFS.

8.3.6.1 General

The M-NG-RAN node initiated S-NG-RAN node Release procedure is triggered by the M-NG-RAN node to initiate the release of the resources for a specific UE.

The procedure uses UE-associated signalling.

8.3.6.2 Successful Operation

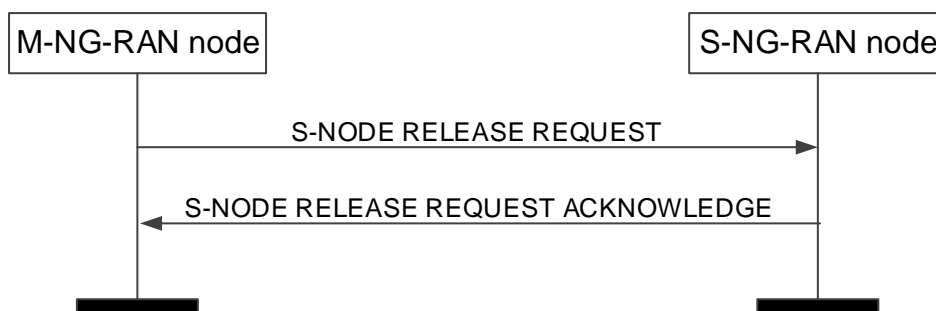


Figure 8.3.6.2-1: M-NG-RAN node initiated S-NG-RAN node Release, successful operation

The M-NG-RAN node initiates the procedure by sending the S-NODE RELEASE REQUEST message. Upon reception of the S-NODE RELEASE REQUEST message the S-NG-RAN node shall stop providing user data to the UE.

The *S-NG-RAN node UE XnAP ID* IE shall be included if it has been obtained from the S-NG-RAN node. The M-NG-RAN node shall provide appropriate information within the *Cause* IE.

If the PDU session resource context in the S-NG-RAN node was configured with the SCG bearer option, for each SCG bearer for which the M-NG-RAN node requests forwarding of uplink/downlink data, the M-NG-RAN node includes the *UL Forwarding UP address/ DL Forwarding UP Address* IE within the *PDU Session Resources To Be Released Item* IE of the S-NODE RELEASE REQUEST message to indicate that the S-NG-RAN node should perform data forwarding of uplink/downlink packets for that SCG bearer.

Upon reception of the S-NODE RELEASE REQUEST message containing *UE Context Kept Indicator* IE set to “True”, the S-NG-RAN node shall, if supported, only initiate the release of the resources related to the UE-associated signalling connection between the M-NG-RAN node and the S-NG-RAN node.

If the S-NG-RAN node confirms the request to release S-NG-RAN node resources it shall send the S-NODE RELEASE REQUEST ACKNOWLEDGE message to the M-NG-RAN node.

8.3.6.3 Unsuccessful Operation

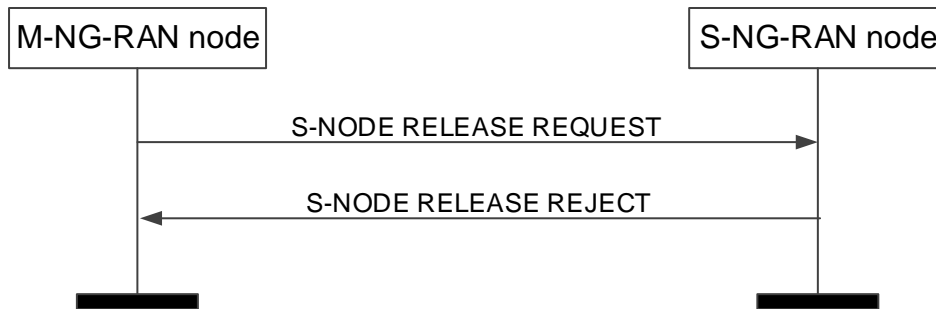


Figure 8.3.6.3-1: M-NG-RAN node initiated S-NG-RAN node Release, unsuccessful operation

If the S-NG-RAN node cannot confirm the request to release S-NG-RAN node resources it shall send the S-NODE RELEASE REJECT message to the M-NG-RAN node with an appropriate cause indicated in the *Cause* IE.

8.3.6.4 Abnormal Conditions

Void.

8.3.7 S-NG-RAN node initiated S-NG-RAN node Release

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, all the text of section 8.3.7 is FFS.

8.3.7.1 General

This procedure is triggered by the S-NG-RAN node to initiate the release of the resources for a specific UE.

The procedure uses UE-associated signalling.

8.3.7.2 Successful Operation

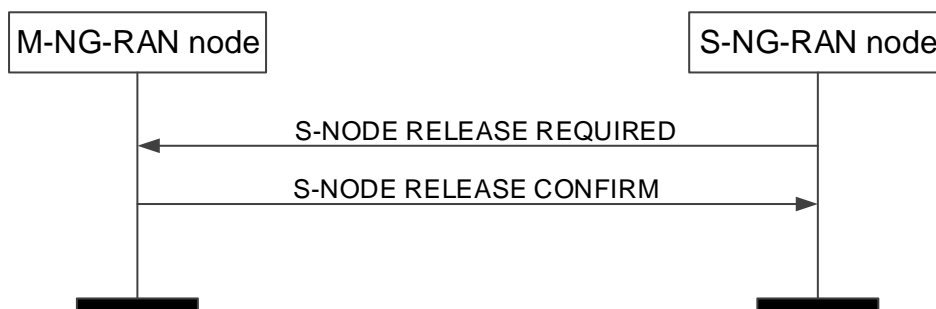


Figure 8.3.7.2-1: S-NG-RAN node initiated S-NG-RAN node Release, successful operation.

The S-NG-RAN node initiates the procedure by sending the S-NODE RELEASE REQUIRED message to the M-NG-RAN node.

Upon reception of the S-NODE RELEASE REQUIRED message, the M-NG-RAN node replies with the S-NODE RELEASE CONFIRM message.

For each PDU session resource configured with the SCG bearer option, the M-NG-RAN node may include the *DL Forwarding UP Address* IE and the *UL Forwarding UP Address* IE within the *PDU Session Resources To Be Released Item* IE to indicate that it requests data forwarding of uplink and downlink packets to be performed for that bearer.

The S-NG-RAN node may start data forwarding and stop providing user data to the UE upon reception of the S-NODE RELEASE CONFIRM message,

8.3.7.3 Unsuccessful Operation

Not applicable.

8.3.7.4 Abnormal Conditions

Void.

8.3.8 S-NG-RAN node Counter Check

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, all the text of section 8.3.8 is FFS.

8.3.8.1 General

This procedure is initiated by the S-NG-RAN node to request the M-NG-RAN node to execute a counter check procedure to verify the value of the PDCP COUNTs associated with SCG bearers established in the S-NG-RAN node.

The procedure uses UE-associated signalling.

8.3.8.2 Successful Operation



Figure 8.3.8.2-1: S-NG-RAN node Counter Check procedure, successful operation.

The S-NG-RAN node initiates the procedure by sending the S-NODE COUNTER CHECK REQUEST message to the M-NG-RAN node.

Upon reception of the S-NODE COUNTER CHECK REQUEST message, the M-NG-RAN node may perform the RRC counter check procedure as specified in TS 38.331 [10].

8.3.8.3 Unsuccessful Operation

Not applicable.

8.3.8.4 Abnormal Conditions

Void.

8.3.9 RRC Transfer

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, all the text of section 8.3.9 is FFS.

8.3.9.1 General

The purpose of the RRC Transfer procedure is to deliver an LTE RRC message encapsulated in a PDCP-C PDU to the S-NG-RAN-NODE that it may then be forwarded to the UE, or from the S-NG-RAN-NODE, if it was received from the UE. The delivery status may also be provided from the S-NG-RAN-NODE to the M-NG-RAN-NODE using the RRC Transfer.

The procedure is also used to enable transfer of the NR RRC message container with the NR measurements from the M-NG-RAN-NODE to the S-NG-RAN-NODE, when received from the UE.

The procedure uses UE-associated signalling.

8.3.9.2 Successful Operation

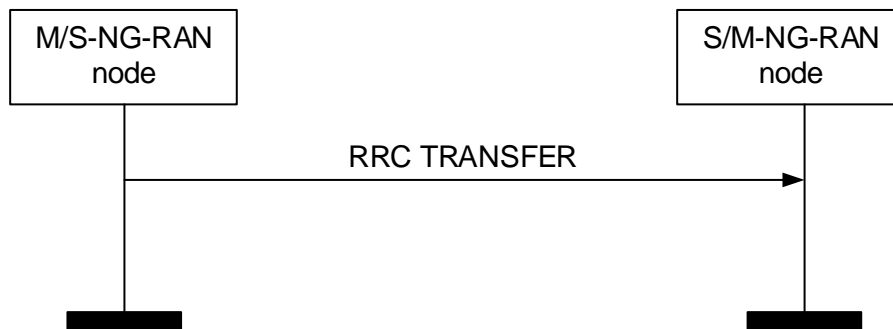


Figure 8.3.9.2-1: RRC Transfer procedure, successful operation.

The M-NG-RAN-NODE initiates the procedure by sending the RRC TRANSFER message to the S-NG-RAN-NODE or the S-NG-RAN-NODE initiates the procedure by sending the RRC TRANSFER message to the M-NG-RAN-NODE.

If the S-NG-RAN-NODE receives a RRC TRANSFER message without the RRC Container IE in the *Split SRB* IE, or with the *Delivery Status* IE in the *Split SRB* IE, it shall ignore the message. If the S-NG-RAN-NODE receives the *RRC Container* IE in the *Split SRB* IE, it shall deliver the contained RRC message to the UE.

If the M-NG-RAN-NODE receives the *Delivery Status* IE in the *Split SRB* IE the M-NG-RAN-NODE shall consider RRC messages up to the indicated NR PDCP SN as having been successfully delivered to UE by S-NG-RAN-NODE.

8.3.8.3 Unsuccessful Operation

Not applicable.

8.3.9.4 Abnormal Conditions

In case of the split SRBs, the receiving node may ignore the message, if the M-NG-RAN-NODE has not indicated possibility of RRC transfer at the bearer setup.

8.4 Global procedures

8.4.1 Xn Setup

8.4.1.1 General

The purpose of the Xn Setup procedure is to exchange application level configuration data needed for two NG-RAN nodes to interoperate correctly over the Xn-C interface.

The procedure uses non UE-associated signalling.

8.4.1.2 Successful Operation

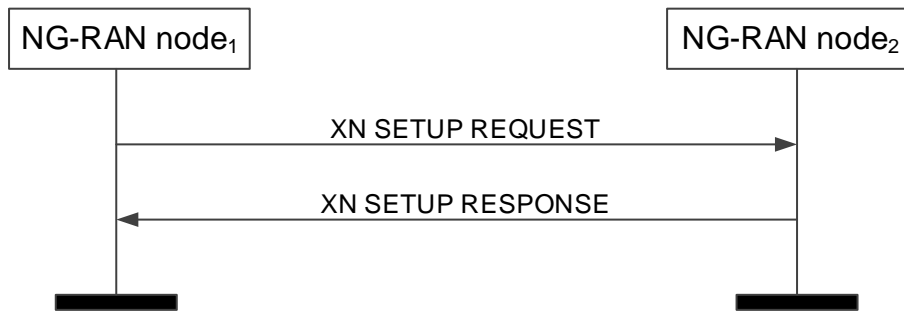


Figure 8.4.1.2: Xn Setup, successful operation

The NG-RAN node₁ initiates the procedure by sending the XN SETUP REQUEST message to the candidate NG-RAN node₂. The candidate NG-RAN node₂ replies with the XN SETUP RESPONSE message.

If Supplementary Uplink is configured at the NG-RAN node₁, the NG-RAN node₁ shall include in the XN SETUP REQUEST message the *SUL Information IE* and the *Supported SUL band List IE* for each served cell where supplementary uplink is configured.

If Supplementary Uplink is configured at the NG-RAN node₂, the candidate NG-RAN node₂ shall include in the XN SETUP RESPONSE message the *SUL Information IE* and the *Supported SUL band List IE* for each served cell where supplementary uplink is configured.

The NG-RAN node₁ may include the *TAI Slice Support List IE* in the XN SETUP REQUEST message. The candidate NG-RAN node₂ may also include *TAI Slice Support List IE* in the XN SETUP RESPONSE message. The NG-RAN node receiving the IE may use it accordingly.

8.4.1.3 Unsuccessful Operation

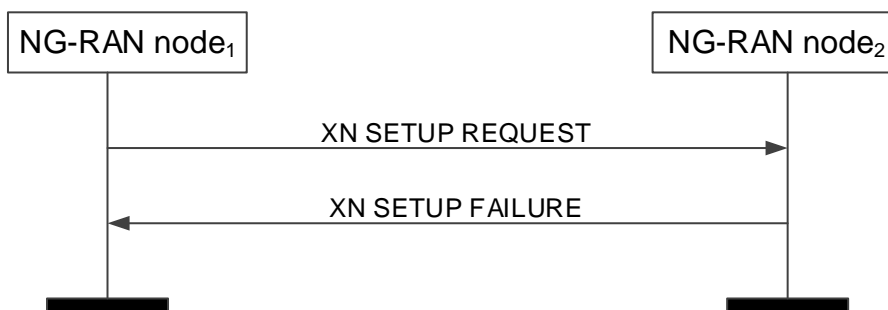


Figure 8.4.1.3-1: Xn Setup, unsuccessful operation

If the candidate NG-RAN node₂ cannot accept the setup it shall respond with an XN SETUP FAILURE message with appropriate cause value.

8.4.1.4 Abnormal Conditions

Void.

8.4.2 NG-RAN node Configuration Update

8.4.2.1 General

The purpose of the NG-RAN node Configuration Update procedure is to update application level configuration data needed for two NG-RAN nodes to interoperate correctly over the Xn-C interface.

The procedure uses non UE-associated signalling.

8.4.2.2 Successful Operation

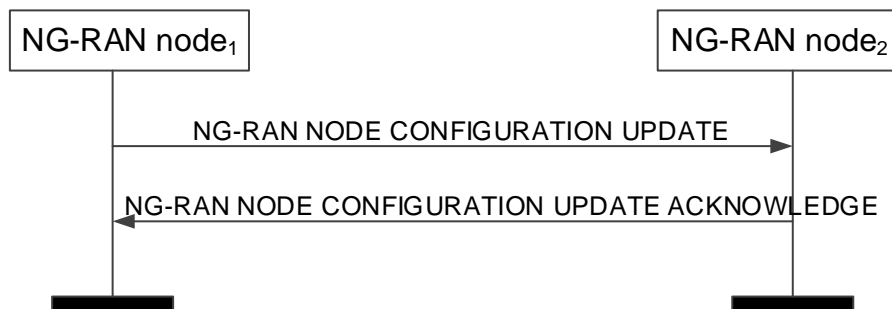


Figure 8.4.2.2-1: NG-RAN node Configuration Update, successful operation

The NG-RAN node₁ initiates the procedure by sending an NG-RAN NODE CONFIGURATION UPDATE message to a peer NG-RAN node₂.

If Supplementary Uplink is configured at the NG-RAN node₁, the NG-RAN node₁ shall include in the NG-RAN NODE CONFIGURATION UPDATE message the *SUL Information* IE and the *Supported SUL band List* IE for each cell added in the *Served NR Cells To Add* IE and in the *Served NR Cells To Modify* IE.

NOTE: The text above on Supplementary Uplink may need to be refined once details on NG-RAN NODE CONFIGURATION UPDATE ACKNOWLEDGE message are available.

If the *TAI Support List* IE is included in the NG-RAN NODE CONFIGURATION UPDATE message, the receiving node shall, if supported, replace any previously provided *TAI Support List* IE by the received *TAI Support List* IE.

If the *Cell Assistance Information NR* IE is present, the NG-RAN node₂ may use it to generate the *Served NR Cells* IE and include the list in the NG-RAN NODE CONFIGURATION UPDATE ACKNOWLEDGE message.

Upon reception of an NG-RAN NODE CONFIGURATION UPDATE message, NG-RAN node₂ shall update the information for NG-RAN node₁ as follows:

Update of Served Cell Information NR:

- If *Served Cells NR To Add* IE is contained in the NG-RAN NODE CONFIGURATION UPDATE message, NG-RAN node₂ shall add cell information according to the information in the *Served Cell Information NR* IE.
- If *Served Cells NR To Modify* IE is contained in the NG-RAN NODE CONFIGURATION UPDATE message, NG-RAN node₂ shall modify information of cell indicated by *Old NR-CGI* IE according to the information in the *Served Cell Information NR* IE.
- If *Served Cells NR To Delete* IE is contained in the NG-RAN NODE CONFIGURATION UPDATE message, NG-RAN node₂ shall delete information of cell indicated by *Old NR-CGI* IE.

Update of Served Cell Information E-UTRA:

- If *Served Cells E-UTRA To Add* IE is contained in the NG-RAN NODE CONFIGURATION UPDATE message, NG-RAN node₂ shall add cell information according to the information in the *Served Cell Information E-UTRA* IE.
- If *Served Cells E-UTRA To Modify* IE is contained in the NG-RAN NODE CONFIGURATION UPDATE message, NG-RAN node₂ shall modify information of cell indicated by *Old ECGI* IE according to the information in the *Served Cell Information E-UTRA* IE.
- If *Served Cells E-UTRA To Delete* IE is contained in the NG-RAN NODE CONFIGURATION UPDATE message, NG-RAN node₂ shall delete information of cell indicated by *Old ECGI* IE.

NOTE: The following alignment with Energy saving should be considered when details available (tabular not yet available) and may need to be refined: If the *Deactivation Indication* IE is contained in *Served NR Cells To Modify* IE, it indicates that the concerned NR cell was switched off to lower energy consumption, and is available for activation on request from the eNB

8.4.2.3 Unsuccessful Operation

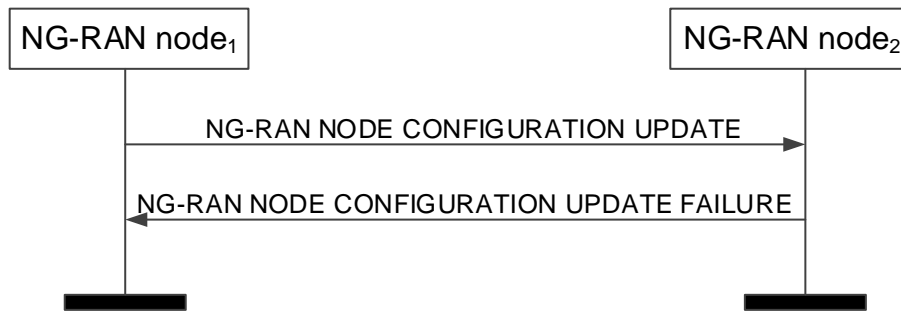


Figure 8.4.2.3-1: NG-RAN node Configuration Update, unsuccessful operation

If the NG-RAN node₂ cannot accept the update it shall respond with an NG-RAN NODE CONFIGURATION UPDATE FAILURE message and appropriate cause value.

8.4.2.4 Abnormal Conditions

Void.

8.4.3 Cell Activation

8.4.3.1 General

The purpose of the Cell Activation procedure is to enable an NG-RAN node to request a neighbouring NG-RAN node to switch on one or more cells, previously reported as inactive due to energy saving.

The procedure uses non UE-associated signalling.

8.4.3.2 Successful Operation

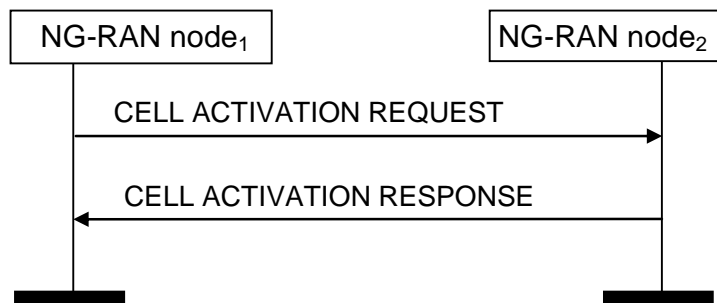


Figure 8.4.3.2-1: EN-DC Cell Activation, successful operation

The NG-RAN node₁ initiates the procedure by sending a CELL ACTIVATION REQUEST message to the peer NG-RAN node₂.

Upon receipt of this message, the NG-RAN node₂ 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 NG-RAN Configuration Update procedure:

The NG-RAN node₂ shall not send an NG-RAN CONFIGURATION UPDATE message to the NG-RAN node₁ just for the reason of the cell/s indicated in the CELL ACTIVATION REQUEST message changing cell activation state, as the receipt of the CELL ACTIVATION RESPONSE message by the NG-RAN node₁ is used to update the information about the activation state of NG-RAN node₂ cells in the NG-RAN node₁.

8.4.3.3 Unsuccessful Operation

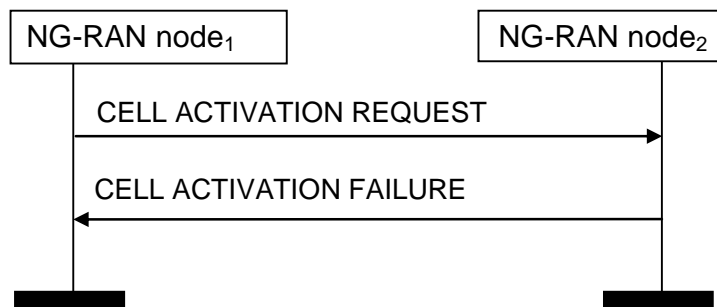


Figure 8.4.3.3-1: EN-DC Cell Activation, unsuccessful operation

If the NG-RAN node₂ 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.

8.4.3.4 Abnormal Conditions

Void.

8.4.4 Reset

8.4.4.1 General

The purpose of the Reset procedure is to align the resources in the NG-RAN node₁ and the NG-RAN node₂ in the event of an abnormal failure. The procedure either resets the Xn interface or selected UE contexts. This procedure doesn't affect the application level configuration data exchanged during, e.g., the Xn Setup procedure.

The procedure uses non UE-associated signalling.

8.4.4.2 Successful Operation

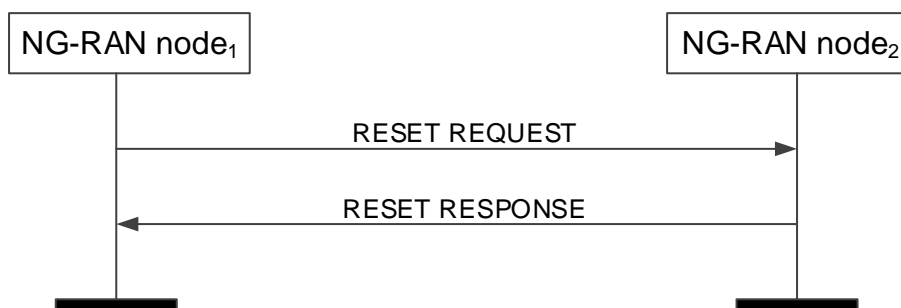


Figure 8.4.4.2-1: Reset, successful operation

The procedure is initiated with a RESET REQUEST message sent from the NG-RAN node₁ to the NG-RAN node₂. Upon receipt of this message,

- if the RESET REQUEST message indicates full reset the NG-RAN node₂ shall abort any other ongoing procedures over Xn between the NG-RAN node₁ and the NG-RAN node₂. The NG-RAN node₂ shall delete all the context information related to the NG-RAN node₁, except the application level configuration data exchanged during the Xn Setup or the NG-RAN node Configuration Update procedures and release the corresponding resources. After completion of release of the resources, the NG-RAN node₂ shall respond with a RESET RESPONSE message.
- if the RESET REQUEST message indicates partial reset, the NG-RAN node₂ shall abort any other ongoing procedures only for the indicated UE associated signalling connections identified either by the *NG-RAN node1 UE XnAP ID IE* or the *NG-RAN node1 UE XnAP ID IE* or both, for which the NG-RAN node₂ shall delete all the context information related to the NG-RAN node₁ and release the corresponding resources. After completion of release of the resources, the NG-RAN node₂ shall respond with a RESET RESPONSE message indicating the UE contexts admitted to be released. The NG-RAN node₂ receiving the request for partial reset does not need to

wait for the release or reconfiguration of radio resources to be completed before returning the RESET RESPONSE message. The NG-RAN node₂ receiving the request for partial reset shall include in the RESET RESPONSE message, for each UE association to be released, the same list of UE-associated logical Xn-connections over Xn. The list shall be in the same order as received in the RESET REQUEST message and shall include also unknown UE-associated logical Xn-connections.

Interactions with other procedures:

If the RESET REQUEST message indicates full reset, the NG-RAN node₂ shall abort any other ongoing procedure (except for a Reset procedures).

If the RESET REQUEST message indicates partial reset, the NG-RAN node₂ shall abort any other ongoing procedure (except for a Reset procedures) on the same Xn interface related to a UE associated signalling connection indicated in the RESET REQUEST message.

8.4.4.3 Unsuccessful Operation

Void.

8.4.4.4 Abnormal Conditions

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

If Reset procedure is ongoing and the responding node receives the RESET REQUEST message from the peer entity on the same Xn interface, it shall respond with the RESET RESPONSE message as specified in 8.4.4.2.

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

8.4.5 Error Indication

8.4.5.1 General

The Error Indication procedure is initiated by an NG-RAN node 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.

8.4.5.2 Successful Operation

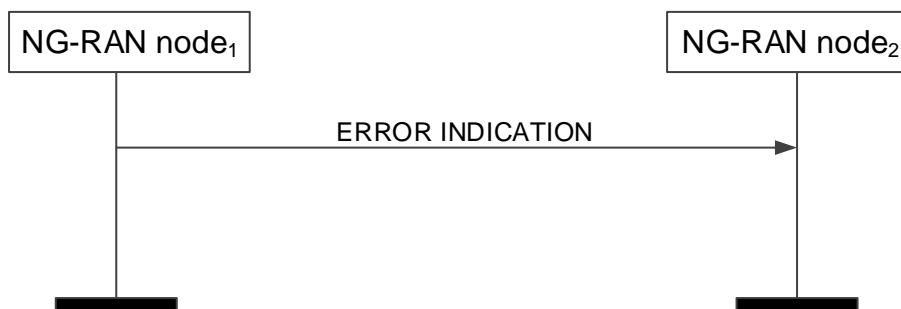


Figure 8.4.5.2-1: Error Indication, successful operation.

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 NG-RAN node UE XnAP ID IE* and the *New NG-RAN node UE XnAP ID IE*

shall be included in the ERROR INDICATION message. If any of *Old NG-RAN node UE XnAP ID IE* and *New NG-RAN node UE XnAP ID IE* is not correct, the cause shall be set to an appropriate value.

8.4.5.3 Unsuccessful Operation

Not applicable.

8.4.5.4 Abnormal Conditions

Void.

8.4.6 Xn Removal

8.4.6.1 General

The purpose of the Xn Removal procedure is to remove the signaling connection between two NG-RAN nodes 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.

8.4.6.2 Successful Operation

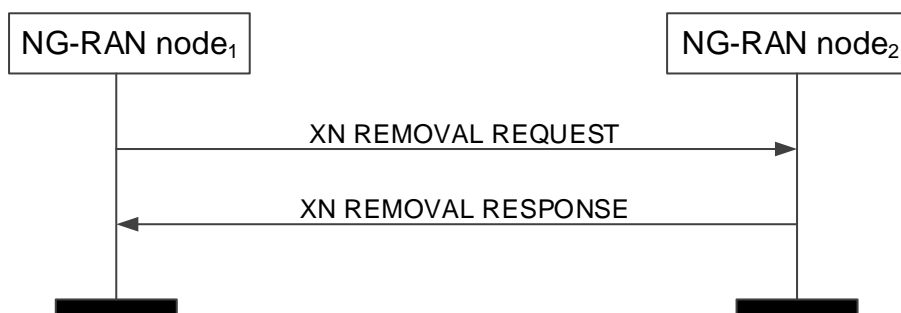


Figure 8.4.6.2-1: Xn Removal, successful operation

An NG-RAN node₁ initiates the procedure by sending the XN REMOVAL REQUEST message to a candidate NG-RAN node₂. Upon reception of the XN REMOVAL REQUEST message the candidate NG-RAN node₂ shall reply with the XN REMOVAL RESPONSE message. After receiving the XN REMOVAL RESPONSE message, the initiating NG-RAN node₁ shall initiate removal of the TNL association towards NG-RAN node₂ and may remove all resources associated with that signaling connection. The candidate NG-RAN node₂ may then remove all resources associated with that signaling connection.

If the *Xn Removal Threshold IE* is included in the XN REMOVAL REQUEST message, the candidate NG-RAN node₂ shall, if supported, accept to remove the signalling connection with NG-RAN node₁ if the Xn Benefit Value of the signalling connection determined at the candidate NG-RAN node₂ is lower than the value of the *Xn Removal Threshold IE*.

8.4.6.3 Unsuccessful Operation

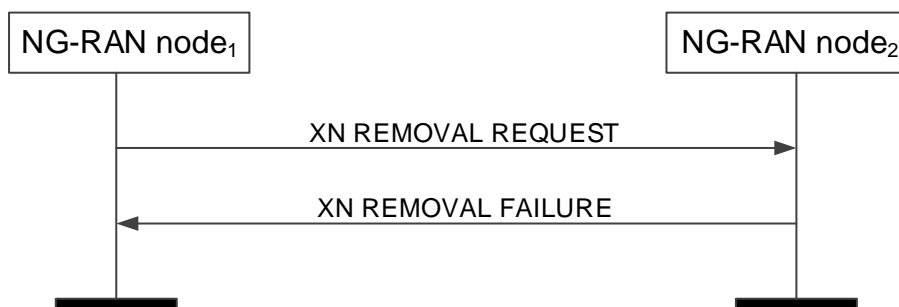


Figure 8.4.6.3-1: Xn Removal, unsuccessful operation

If the candidate NG-RAN node₂ cannot accept to remove the signaling connection with NG-RAN node₁ it shall respond with an XN REMOVAL FAILURE message with an appropriate cause value.

8.4.6.4 Abnormal Conditions

Void.

9 Elements for XnAP Communication

9.0 General

Sub clauses 9.1 and 9.2 describe the structure of the messages and information elements required for the XnAP 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 38.413 [5].

NOTE: The messages have been defined in accordance to the guidelines specified in TR 25.921 [6].

9.1 Message Functional Definition and Content

9.1.1 Messages for Basic Mobility Procedures

9.1.1.1 HANDOVER REQUEST

This message is sent by the source NG-RAN node to the target NG-RAN node to request the preparation of resources for a handover.

Direction: source NG-RAN node → target NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
Source NG-RAN node UE XnAP ID reference	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the source NG-RAN node	YES	reject
Cause	M		9.2.3.2		YES	reject
Target Cell Global ID	M		9.2.3.25	Includes either an E-UTRA CGI or an NR CGI	YES	reject
GUAMI	M		9.2.3.24		YES	reject
UE Context Information	M	1			YES	reject
>NG-C UE associated Signalling reference	M		AMF UE NGAP ID 9.2.3.26	Allocated at the AMF on the source NG-C connection.	–	
>Signalling TNL association address at source NG-C side	M		CP Transport Layer Information 9.2.3.31	This IE indicates the AMF's IP address of the SCTP association used at the source NG-C interface instance.	–	
>UE Security Capabilities	M		9.2.3.49			
>AS Security Information	M		9.2.3.50		–	
>Index to RAT/Frequency Selection Priority	O		9.2.3.23		–	
>UE Aggregate Maximum Bit Rate	M		9.2.3.17		–	
>PDU Session Resources To Be Setup List		1	9.2.1.1	Similar to NG-C signalling, containing UL tunnel information per PDU Session Resource; and in addition, the source side QoS flow ↔ DRB mapping	–	
>RRC Context	M		OCTET STRING	Either includes the <i>HandoverPreparationInformation</i> message as defined in subclause 10.2.2. of TS 36.331 [14], if the target NG-RAN node is an ng-eNB, or the <i>HandoverPreparationInformation</i> message as defined in subclause 11.2.2 of TS 38.331 [10], if the target NG-RAN node is a gNB.	–	
>Location Reporting Information	O		9.2.3.47	Includes the necessary parameters for location reporting.	–	
>Mobility Restriction List	O		9.2.3.53		–	
Trace Activation	O		9.2.3.55		YES	ignore
Masked IMEISV	O		9.2.3.32		YES	ignore

9.1.1.2 HANDOVER REQUEST ACKNOWLEDGE

This message is sent by the target NG-RAN node to inform the source NG-RAN node about the prepared resources at the target.

Direction: target NG-RAN node → source NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
Source NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the source NG-RAN node	YES	ignore
Target NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the target NG-RAN node	YES	ignore
PDU Session Resources Admitted List	M		9.2.1.2		YES	ignore
PDU Session Resources Not Admitted List	O		9.2.1.3		YES	ignore
Target NG-RAN node To Source NG-RAN node Transparent Container	M		OCTET STRING	Either includes the <i>HandoverCommand</i> message as defined in subclause 10.2.2 of TS 36.331 [14], if the target NG-RAN node is an ng-eNB, or the <i>HandoverCommand</i> message as defined in subclause 11.2.2 of TS 38.331 [10], if the target NG-RAN node is a gNB.	YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.1.3 HANDOVER PREPARATION FAILURE

This message is sent by the target NG-RAN node to inform the source NG-RAN node that the Handover Preparation has failed.

Direction: target NG-RAN node → source NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
Source NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the source NG-RAN node	YES	ignore
Cause	M		9.2.3.2		YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.1.4 SN STATUS TRANSFER

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

Direction: source NG-RAN node → target NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	ignore
Source NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated for handover at the source NG-RAN node	YES	reject
Target NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated for handover at the target NG-RAN node	YES	reject
DRBs Subject To Status Transfer List	M	1	9.2.1.14		YES	ignore

9.1.1.5 UE CONTEXT RELEASE

This message is sent by the target NG-RAN node to the source NG-RAN node to indicate that resources can be released.

Direction: target NG-RAN node → source NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	ignore
Source NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated for handover at the source NG-RAN node.	YES	reject
Target NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated for handover at the target NG-RAN node.	YES	reject

9.1.1.6 HANDOVER CANCEL

This message is sent by the source NG-RAN node to the target NG-RAN node to cancel an ongoing handover.

Direction: source NG-RAN node → target NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	ignore
Source NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the source NG-RAN node	YES	reject
Target NG-RAN node UE XnAP ID	O		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the target NG-RAN node	YES	ignore
Cause	M		9.2.3.2		YES	ignore

9.1.1.7 RAN PAGING

This message is sent by the NG-RAN node₁ to NG-RAN node₂ to page a UE.

Direction: NG-RAN node₁ → NG-RAN node₂.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
UE Identity Index Value	M		INTEGER (0..63)	This IE may need to be refined	YES	reject
UE RAN Paging Identity	M		9.2.3.43		YES	ignore
Paging DRX	M		INTEGER (0..63)	This IE may need to be refined	YES	ignore
RAN Paging Area	M		9.2.3.38		YES	reject
RAN Paging Priority	O		9.2.3.44		YES	ignore
Assistance Data for Paging	O		9.2.3.41		YES	ignore

9.1.1.8 RETRIEVE UE CONTEXT REQUEST

This message is sent by the new NG-RAN node to request the old NG-RAN node to transfer the UE Context to the new NG-RAN.

Direction: new NG-RAN node → old NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	ignore
New NG-RAN node UE XnAP ID reference	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the new NG-RAN node	YES	reject
UE Context ID	M		9.2.3.40		YES	reject
Integrity protection	M		BIT STRING (SIZE (16))	<i>ShortMAC-I</i> either contained in the <i>RRCConnectionResumeRequest</i> message as defined in TS 38.331 [10] or in the <i>RRCConnectionResumeRequest</i> message as defined in TS 36.331 [14])	YES	reject
New Cell Identifier	M		NG-RAN Cell Identity 9.2.2.9	The Cell Identifier of the cell where the RRC connection has been requested to be resumed or to be re-established.	YES	reject

9.1.1.9 RETRIEVE UE CONTEXT RESPONSE

This message is sent by the old NG-RAN node to transfer the UE context to the new NG-RAN node.

Direction: old NG-RAN node → new NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	ignore
New NG-RAN node UE XnAP ID reference	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the new NG-RAN node	YES	ignore
Old NG-RAN node UE XnAP ID reference	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the old NG-RAN node	YES	ignore
GUAMI	M		9.2.3.24		YES	reject
UE Context Information Retrieve UE Context Response	M		9.2.1.13		YES	reject
Trace Activation	O		9.2.3.55		YES	ignore
Masked IMEISV	O		9.2.3.32		YES	ignore
Location Reporting Information	O		9.2.3.47	Includes the necessary parameters for location reporting.	YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.1.10 RETRIEVE UE CONTEXT FAILURE

This message is sent by the old NG-RAN node to inform the new NG-RAN node that the Retrieve UE Context procedure has failed.

Direction: old NG-RAN node → new NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	ignore
New NG-RAN node UE XnAP ID reference	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the new NG-RAN node	YES	ignore
Cause	M		9.2.3.2		YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.1.11 DATA FORWARDING ADDRESS INDICATION

This message is sent by the new NG-RAN node to transfer data forwarding information to the new NG-RAN node.

Direction: new NG-RAN node → old NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	ignore
New NG-RAN node UE XnAP ID reference	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the new NG-RAN node	YES	ignore
Old NG-RAN node UE XnAP ID reference	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the old NG-RAN node	YES	ignore
Data Forwarding Info per PDU Session Resources		1			YES	reject
>Data Forwarding Info per PDU Session Resources Item IEs		1..<max noofPDUSessions>			EACH	reject
>>PDU Session ID	M		9.2.3.18		–	
>>DL Forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30		–	

Range bound	Explanation
maxnoofPDUSessions	Maximum no. of PDU sessions. Value is 256

9.1.2 Messages for Dual Connectivity Procedures

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, all the text of section 9.1.2 is FFS.

9.1.2.1 S-NODE ADDITION REQUEST

This message is sent by the M-NG-RAN node to the S-NG-RAN node to request the preparation of resources for dual connectivity operation for a specific UE.

Direction: M-NG-RAN node → S-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	reject
UE Security Capabilities	M		9.2.3.49	This IE may need to be refined.	YES	reject
S-NG-RAN node Security Key	M		9.2.3.51		YES	reject
S-NG-RAN node UE Aggregate Maximum Bit Rate	M		UE Aggregate Maximum Bit Rate 9.2.3.17	The UE Aggregate Maximum Bit Rate is split into M-NG-RAN node UE Aggregate Maximum Bit Rate and S-NG-RAN node UE Aggregate Maximum Bit Rate which are enforced by M-NG-RAN node and S-NG-RAN node respectively.	YES	reject
Selected PLMN	O		PLMN Identity 9.2.2.4	The selected PLMN of the SCG in the S-NG-RAN node.	YES	ignore
Mobility Restriction List	O		9.2.3.53	This IE may need to be refined.	YES	ignore
Index to RAT/Frequency Selection Priority	O		9.2.3.23		YES	reject
PDU Session Resources To Be Added List		1			YES	reject
>PDU Session Resources To Be Added Item		1 .. <maxnoofPDUsessions>			EACH	reject
>>PDU Session ID	M		9.2.3.18		–	
>>S-NSSAI	M		9.2.3.21		–	
>>Bearer Configurations To Be Added		1 .. <maxnoofBearerConfigs>			EACH	reject
>>>CHOICE Bearer Configuration	M				–	
>>>>SN terminated Bearer					–	
>>>>PDU Session Resource Setup Info – SN terminated	M		9.2.1.5		–	
>>>>MN terminated Bearer					–	
>>>>PDU Session Resource Setup Info – MN terminated	M		9.2.1.7		–	

M-NG-RAN node to S-NG-RAN node Container	M		OCTET STRING	Includes the CG-ConfigInfo message as defined in subclause 11.2.2 of TS 38.331 [10].	YES	reject
S-NG-RAN node UE XnAP ID	O		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	reject
Expected UE Behaviour	O		OCTET STRING	This IE may need to be revised	YES	ignore
Requested Split SRBs	O		ENUMERATED (srb1, srb2, srb1&2, ...)	Indicates that resources for Split SRBs are requested.	YES	reject

Range bound	Explanation
maxnoofPDUSessions	Maximum no. of PDU sessions. Value is 256
maxnoofBearerConfigs	Maximum no. of BearerConfigurations Value is 2. The value may need to be refined. So far, only MN- and SN-terminated bearer configurations are considered.

9.1.2.2 S-NODE ADDITION REQUEST ACKNOWLEDGE

This message is sent by the S-NG-RAN node to confirm the M-NG-RAN node about the S-NG-RAN node addition preparation.

Direction: S-NG-RAN node → M-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	reject
S-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	reject
PDU Session Resources Admitted To Be Added List		1			YES	ignore
>PDU Session Resources Admitted To Be Added Item		1 .. <maxnoofPDU Sessions>			EACH	ignore
>>PDU Session ID	M		9.2.3.18		–	
>>Bearer Configurations Admitted To Be Added		1 .. <maxnoofBearerConfigs>			EACH	ignore
>>>CHOICE Bearer Configuration	M				–	
>>>>SN terminated Bearer					–	
>>>>>PDU Session Resource Setup Response Info – SN terminated	M		9.2.1.6		–	
>>>>>MN terminated Bearer					–	
>>>>>PDU Session Resource Setup Response Info – MN terminated	M		9.2.1.8		–	
PDU Session Resources Not Admitted List	O				YES	ignore
>PDU Session Resources Not Admitted List – SN terminated	O		PDU Session Resources Not Admitted List 9.2.1.3	A value for <i>PDU Session ID</i> shall only be present once in <i>PDU Session Resources Admitted List</i> IE and in <i>PDU Session Resources Not Admitted List</i> IE.	–	
>PDU Session Resources Not Admitted List – MN terminated	O		PDU Session Resources Not Admitted List 9.2.1.3	A value for <i>PDU Session ID</i> shall only be present once in <i>PDU Session Resources Admitted List</i> IE and in <i>PDU Session Resources Not Admitted List</i> IE.	–	
S-NG-RAN node to M-NG-RAN node Container	M		OCTET STRING	Includes the <i>CG-Config</i> message as defined in subclause 11.2.2 of TS 38.331 [10].	YES	reject
Admitted Split SRBs	O		ENUMERATE D (srb1, srb2, srb1&2, ...)	Indicates admitted SRBs	YES	reject
Criticality Diagnostics	O		9.2.3.3		YES	ignore

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions. Value is 256
maxnoofBearerConfigs	Maximum no. of BearerConfigurations Value is 2.

	This value may need to be refined. So far, only MN- and SN-terminated bearer configurations are considered.
--	---

9.1.2.3 S-NODE ADDITION REQUEST REJECT

This message is sent by the S-NG-RAN node to inform the M-NG-RAN node that the S-NG-RAN node Addition Preparation has failed.

Direction: S-NG-RAN node → M-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	reject
S-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	reject
Cause	M		9.2.3.2		YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.2.4 S-NODE RECONFIGURATION COMPLETE

This message is sent by the M-NG-RAN node to the S-NG-RAN node to indicate whether the configuration requested by the S-NG-RAN node was applied by the UE.

Direction: M-NG-RAN node → S-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	ignore
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	reject
S-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	reject
Response Information	M				YES	ignore
>CHOICE <i>Response Type</i>	M				–	
>> <i>Configuration successfully applied</i>					–	
>>>M-NG-RAN node to S-NG-RAN node Container	O		OCTET STRING	Includes the <i>RRCReconfiguration Complete</i> message as defined in subclause 6.2.2 of TS 38.331 [10].	–	
>> <i>Configuration rejected by the M-NG-RAN node</i>					–	
>>>Cause	M		9.2.3.2		–	
>>>M-NG-RAN node to S-NG-RAN node Container	O		OCTET STRING	Includes the <i>CG-ConfigInfo</i> message as defined in as defined in subclause 11.2.2 of TS 38.331.	–	

9.1.2.5 S-NODE MODIFICATION REQUEST

This message is sent by the M-NG-RAN node to the S-NG-RAN node to request the preparation to modify S-NG-RAN node resources for a specific UE.

Direction: M-NG-RAN node → S-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	reject
S-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	reject
Cause	M		9.2.3.2		YES	ignore
SCG Change Indication	O		ENUMERATED (true, ...)	This IE may need to be refined.	YES	ignore
Selected PLMN	O		PLMN Identity 9.2.2.4	The selected PLMN of the SCG in the S-NG-RAN node.	YES	ignore
Mobility Restriction List	O		9.2.3.53	This IE may need to be refined.	YES	ignore
SCG Configuration Query	O		9.2.3.27		YES	ignore
UE Context Information		0..1			YES	reject
>UE Security Capabilities	O		9.2.3.49	This IE may need to be refined.	–	
>S-NG-RAN node Security Key	O		9.2.3.51		–	
>S-NG-RAN node UE Aggregate Maximum Bit Rate	O		UE Aggregate Maximum Bit Rate 9.2.3.17		–	
>Index to RAT/Frequency Selection Priority	O		9.2.3.23		–	
>PDU Session Resources To Be Added List		0..1			–	
>>PDU Session Resources To Be Added Item		1.. <maxnoofPDUSessions>			EACH	ignore
>>>PDU Session ID	M		9.2.3.18		–	
>>>S-NSSAI	M		9.2.3.21		–	
>>>Bearer Configurations To Be Added		1.. <maxnoofBearerConfigs>			EACH	reject
>>>>CHOICE Bearer Configuration	M				–	
>>>>SN terminated Bearer					–	
>>>>PDU Session Resource Setup Info – SN terminated	M		9.2.1.5		–	
>>>>MN terminated Bearer					–	
>>>>>PDU Session Resource Setup Info – MN terminated			9.2.1.7		–	
>PDU Session Resources To Be Modified List		0..1			–	
>>PDU Session Resources To Be Modified Item		1.. <maxnoofPDUSessions>			EACH	ignore
>>>PDU Session ID	M		9.2.3.18		–	
>>>Bearer Configurations To Be Modified		1.. <maxnoofBearerConfigs>			EACH	reject
>>>>CHOICE Bearer Configuration	M				–	

>>>>>SN terminated Bearer					–	
>>>>>PDU Session Resource Modification Info – SN terminated			9.2.1.9		–	
>>>>>MN terminated Bearer					–	
>>>>>PDU Session Resource Modification Info – MN terminated			9.2.1.11		–	
> PDU Session Resources To Be Released List		0..1			–	
>>PDU Session Resources To Be Released List – SN terminated	O		OCTET STRING	A value for <i>PDU Session ID</i> shall only be present once in <i>PDU Session Resources Admitted List</i> IE and in <i>PDU Session Resources Not Admitted List</i> IE. This IE may need to be refined.	–	
>>PDU Session Resources To Be Released List – MN terminated	O		OCTET STRING	A value for <i>PDU Session ID</i> shall only be present once in <i>PDU Session Resources Admitted List</i> IE and in <i>PDU Session Resources Not Admitted List</i> IE. This IE may need to be refined.	–	
M-NG-RAN node to S-NG-RAN node Container	O		OCTET STRING	Includes the <i>CG-ConfigInfo</i> message as defined in subclause 11.2.2. of TS 38.331 [10]	YES	ignore
Requested Split SRBs	O		ENUMERATED (srb1, srb2, srb1&2, ...)	Indicates that resources for Split SRBs are requested.	YES	ignore
Requested Split SRBs release	O		ENUMERATED (srb1, srb2, srb1&2, ...)	Indicates that resources for Split SRBs are requested to be released.	YES	ignore

Range bound	Explanation
maxnoofPDUSessions	Maximum no. of PDU sessions. Value is 256
maxnoofBearerConfigs	Maximum no. of BearerConfigurations Value is 2. This value may need to be refined. So far, only MN- and SN-terminated bearer configurations are considered.

9.1.2.6 S-NODE MODIFICATION REQUEST ACKNOWLEDGE

This message is sent by the S-NG-RAN node to confirm the M-NG-RAN node's request to modify the S-NG-RAN node resources for a specific UE.

Direction: S-NG-RAN node → M-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	ignore
S-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	ignore
PDU Session Resources Admitted List		0..1			YES	ignore
>PDU Session Resources Admitted To Be Added List		1			–	
>>PDU Session Resources Admitted To Be Added Item		1 .. <maxnoofPDUSe ssions>			EACH	ignore
>>>PDU Session ID	M		9.2.3.18		–	
>>>>Bearer Configurations Admitted To Be Added		1 .. <maxnoofBearerC onfigs>			EACH	ignore
>>>>>CHOICE Bearer Configuration	M				–	
>>>>>>SN terminated Bearer					–	
>>>>>>>PDU Session Resource Setup Response Info – SN terminated	M		9.2.1.6		–	
>>>>>>>MN terminated Bearer					–	
>>>>>>>PDU Session Resource Setup Response Info – MN terminated	M		9.2.1.8		–	
>PDU Session Resources Admitted To Be Modified List		0..1			–	
>>PDU Session Resources Admitted To Be Modified Item		1 .. <maxnoofPDUSe ssions>			EACH	ignore
>>>PDU Session ID	M		9.2.3.18		–	
>>>>Bearer Configurations Admitted To Be Modified		1 .. <maxnoofBearerC onfigs>			EACH	ignore
>>>>>CHOICE Bearer Configuration	M				–	
>>>>>>SN terminated Bearer					–	
>>>>>>>PDU Session Resource Modification Response Info – SN terminated	M		9.2.1.10		–	
>>>>>>>MN terminated Bearer					–	
>>>>>>>PDU Session Resource Modification Response Info – MN terminated	M		9.2.1.12		–	
>PDU Session Resources Admitted To Be Released List		0..1			–	

>>PDU Session Resources admitted to be released List – SN terminated	O		OCTET STRING	A value for <i>PDU Session ID</i> shall only be present once in <i>PDU Session Resources Admitted List</i> IE and in <i>PDU Session Resources Not Admitted List</i> IE. This IE may need to be refined.	–	
>>PDU Session Resources admitted to be released List – MN terminated	O		OCTET STRING	A value for <i>PDU Session ID</i> shall only be present once in <i>PDU Session Resources Admitted List</i> IE and in <i>PDU Session Resources Not Admitted List</i> IE. This IE may need to be refined.	–	
PDU Session Resources Not Admitted to be Added List	O				YES	ignore
>PDU Session Resources Not Admitted List – SN terminated	M		PDU Session Resources Not Admitted List 9.2.1.3	A value for <i>PDU Session ID</i> shall only be present once in <i>PDU Session Resources Admitted List</i> IE and in <i>PDU Session Resources Not Admitted List</i> IE.	–	

>PDU Session Resources Not Admitted List – MN terminated	M		PDU Session Resources Not Admitted List 9.2.1.3	A value for <i>PDU Session ID</i> shall only be present once in <i>PDU Session Resources Admitted List</i> IE and in <i>PDU Session Resources Not Admitted List</i> IE.	–	
S-NG-RAN node to M-NG-RAN node Container	O		OCTET STRING	Includes the <i>CG-Config</i> message as defined in subclause 11.2.2 of TS 38.331 [10].	YES	ignore
Admitted Split SRBs	O		ENUMERATED (srb1, srb2, srb1&2, ...)	Indicates admitted SRBs	YES	ignore
Admitted Split SRBs release	O		ENUMERATED (srb1, srb2, srb1&2, ...)	Indicates admitted SRBs release	YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

Range bound	Explanation
maxnoofPDUSessions	Maximum no. of PDU sessions. Value is 256

9.1.2.7 S-NODE MODIFICATION REQUEST REJECT

This message is sent by the S-NG-RAN node to inform the M-NG-RAN node that the M-NG-RAN node initiated S-NG-RAN node Modification Preparation has failed.

Direction: S-NG-RAN node → M-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	ignore
S-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	ignore
Cause	M		9.2.3.2		YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.2.8 S-NODE MODIFICATION REQUIRED

This message is sent by the S-NG-RAN node to the M-NG-RAN node to request the modification of S-NG-RAN node resources for a specific UE.

Direction: S-NG-RAN node → M-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	reject
S-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	reject
Cause	M		9.2.3.2		YES	ignore
SCG Change Indication	O		ENUMERATED (true, ...)	This IE may need to be refined.	YES	ignore
PDU Session Resources To Be Modified List		0..1			YES	ignore
>PDU Session Resources To Be Modified Item		1 .. <maxnoofPDUsessions>			EACH	ignore
>>PDU Session ID	M		9.2.3.18		–	
>>NG-U DL UP TNL Information at NG-RAN	O		UP Transport Layer Information 9.2.3.30	S-NG-RAN node endpoint of the NG transport bearer. For delivery of DL PDUs.	–	
PDU Session Resources To Be Released List		0..1			YES	ignore
>PDU Session Resources To Be Released Item		1 .. <maxnoofPDUsessions>			EACH	ignore
>>PDU Session ID	M		9.2.3.18		–	
>>Cause	M		9.2.3.2		–	
S-NG-RAN node to M-NG-RAN node Container	O		OCTET STRING	Includes the CG-Config message as defined in subclause 11.2.2 of TS 38.331 [10].	YES	ignore

Range bound	Explanation
maxnoofPDUsessions	Maximum no. of PDU sessions. Value is 256

9.1.2.9 S-NODE MODIFICATION CONFIRM

This message is sent by the M-NG-RAN node to inform the S-NG-RAN node about the successful modification.

Direction: M-NG-RAN node → S-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	ignore
S-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	ignore
M-NG-RAN node to S-NG-RAN node Container	O		OCTET STRING	Includes the <i>CG-ConfigInfo</i> message as defined in subclause 11.2.2 of TS 38.331 [10].	YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

Range bound	Explanation
maxnoofPDUSessions	Maximum no. of PDU sessions. Value is 256

9.1.2.10 S-NODE MODIFICATION REFUSE

This message is sent by the M-NG-RAN node to inform the S-NG-RAN node that the S-NG-RAN node initiated S-NG-RAN node Modification has failed.

Direction: M-NG-RAN node → S-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	ignore
S-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	ignore
Cause	M		9.2.3.2		YES	ignore
M-NG-RAN node to S-NG-RAN node Container	O		OCTET STRING	Includes the <i>CG-ConfigInfo</i> message as defined in subclause 11.2.2 of TS 38.331 [10].	YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.2.11 S-NODE CHANGE REQUIRED

This message is sent by the S-NG-RAN node to the M-NG-RAN node to trigger the change of the S-NG-RAN node.

Direction: S-NG-RAN node → M-NG-RAN node.

9.1.2.12 S-NODE CHANGE CONFIRM

This message is sent by the M-NG-RAN node to inform the S-NG-RAN node that the preparation of the S-NG-RAN node initiated S-NG-RAN node Modification was successful.

Direction: M-NG-RAN node → S-NG-RAN node.

9.1.2.13 S-NODE MODIFICATION REFUSE

This message is sent by the M-NG-RAN node to inform the S-NG-RAN node that the preparation of the S-NG-RAN node initiated S-NG-RAN node Modification has failed.

Direction: M-NG-RAN node → S-NG-RAN node.

9.1.2.14 S-NODE RELEASE REQUEST

This message is sent by the M-NG-RAN node to the S-NG-RAN node to request the release of resources.

Direction: M-NG-RAN node → S-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	ignore
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	reject
S-NG-RAN node UE XnAP ID	O		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	reject
Cause	M		9.2.3.2		YES	ignore
PDU Session Resources To Be Released List		0..1			YES	ignore
>PDU Session Resources To Be Released Item		1 .. <maxnoofPDUsessions>			EACH	ignore
>>CHOICE <i>Bearer Option</i>	M				–	
>>>SCG <i>Bearer</i>					–	
>>>>PDU Session ID	M		9.2.3.18		–	
>>>>UL Forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30	Identifies the Xn transport bearer used for forwarding of UL PDUs	–	
>>>>DL Forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30	Identifies the Xn transport bearer. used for forwarding of DL PDUs	–	
>>>Split <i>Bearer</i>					–	
>>>>PDU Session ID	M		9.2.3.18		–	
>>>>DL Forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30	Identifies the Xn transport bearer. used for forwarding of DL PDUs	–	
UE Context Kept Indicator	O		ENUMERATED (true, ...)	This IE may need to be refined.	YES	ignore
M-NG-RAN node to S-NG-RAN node Container	O		OCTET STRING	Includes the CG-ConfigInfo message as defined in subclause 11.2.2 of TS 38.331 [10].	YES	ignore

Range bound	Explanation
maxnoofPDUSessions	Maximum no. of PDU sessions. Value is 256

9.1.2.15 S-NODE RELEASE REQUEST ACKNOWLEDGE

This message is sent by the S-NG-RAN node to the M-NG-RAN node to confirm the request to release S-NG-RAN node resources.

Direction: S-NG-RAN node → M-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	ignore
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	reject
S-NG-RAN node UE XnAP ID	O		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	reject
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.2.16 S-NODE RELEASE REJECT

This message is sent by the S-NG-RAN node to the M-NG-RAN node to reject the request to release S-NG-RAN node resources.

Direction: S-NG-RAN node → M-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	ignore
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	reject
S-NG-RAN node UE XnAP ID	O		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	reject
Cause	M		9.2.3.2		YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.2.17 S-NODE RELEASE REQUIRED

This message is sent by the S-NG-RAN node to request the release of all resources for a specific UE at the S-NG-RAN node.

Direction: S-NG-RAN node → M-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	reject
S-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	reject
Cause	M		9.2.3.2		YES	ignore

9.1.2.18 S-NODE RELEASE CONFIRM

This message is sent by the M-NG-RAN node to confirm the release of all resources for a specific UE at the S-NG-RAN node.

Direction: M-NG-RAN node → S-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	ignore
S-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	ignore
PDU Session Resources to be Released List		0..1			YES	ignore
>PDU Session Resources To Be Released Item		1 .. <maxnoofPDUSe ssions>			–	
>>CHOICE <i>Bearer Option</i>	M				–	
>>>SCG <i>Bearer</i>					–	
>>>>PDU Session ID	M		9.2.3.18		–	
>>>>DL Forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30	Identifies the Xn transport bearer used for forwarding of DL PDUs	–	
>>>>UL Forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30	Identifies the Xn transport bearer used for forwarding of UL PDUs	–	
>>>Split <i>Bearer</i>					–	
>>>>PDU Session ID	M		9.2.3.18		–	
>>>>DL Forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30	Identifies the Xn transport bearer used for forwarding of DL PDUs	–	
Criticality Diagnostics	O		9.2.3.3		YES	ignore

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions. Value is 256

9.1.2.19 S-NODE COUNTER CHECK REQUEST

This message is sent by the S-NG-RAN node to request the verification of the value of the PDCP COUNTs associated with SN terminated bearers established in the S-NG-RAN node.

Direction: S-NG-RAN node → M-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	ignore
S-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	ignore
Bearers Subject to Counter Check List		1			YES	ignore
>Bearers Subject to Counter Check Item		1 .. <maxnoofDRBs>			EACH	ignore
>>DRB ID	M		9.2.3.33		–	
>>UL COUNT	M	INTEGER (0..4294967295)		Indicates the value of uplink COUNT associated to this DRB.	–	
>>DL COUNT	M	INTEGER (0..4294967295)		Indicates the value of downlink COUNT associated to this DRB.	–	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs. Value is 32

9.1.2.20 RRC TRANSFER

This message is sent by the M-NG-RAN-NODE to the S-NG-RAN-NODE to transfer an RRC message.

Direction: M-NG-RAN node → S-NG-RAN node or S-NG-RAN node → M-NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
M-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the M-NG-RAN node	YES	reject
S-NG-RAN node UE XnAP ID	M		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the S-NG-RAN node	YES	reject
Split SRB		0..1			YES	reject
>RRC Container	O		OCTET STRING	RRC message encapsulated in a PDCP-C PDU and ciphered with the key of the M-NG-RAN node		
>SRB Type	M		ENUMERATED (srb1, srb2, ...)	The SRB type to be used	–	
>Delivery Status	O		9.2.3.45	DL RRC delivery status of split SRB	–	
NR UE Measurement Report		0..1			YES	reject
>RRC Container	M		OCTET STRING	Contains the <i>MeasurementReport</i> message as defined in subclause 6.2.2 of TS 38.331 [10].	–	

9.1.3 Messages for Global Procedures

9.1.3.1 XN SETUP REQUEST

This message is sent by a NG-RAN node to a neighbouring NG-RAN node to transfer application data for an Xn-C interface instance.

Direction: NG-RAN node₁ → NG-RAN node₂.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
Global NG-RAN Node ID	M		9.2.2.3		YES	reject
TAI Support List	O		9.2.3.20	List of supported TAs and associated characteristics.	GLOBAL	reject
AMF Pool information	M		OCTET STRING	List of all the AMF pools to which the NG-RAN node belongs. This IE may need to be refined.	GLOBAL	reject
List of Served Cells NR		<i>0 .. <maxnoofCellsinN G-RAN node></i>		Complete list of cells served by the gNB	YES	reject
>Served Cell Information NR	M		9.2.2.11		–	
>Neighbour Information NR	O		9.2.2.13		–	
>Neighbour Information E-UTRA	O		9.2.2.14		–	
List of Served Cells E-UTRA	O	<i>0 .. <maxnoofCellsinN G-RAN node></i>		Complete list of cells served by the ng-eNB.	YES	reject
>Served Cell Information E-UTRA	M		9.2.2.12		–	
>Neighbour Information NR	O		9.2.2.13		–	
>Neighbour Information E-UTRA	O		9.2.2.14		–	

Range bound	Explanation
maxnoofCellsinNG-RAN node	Maximum no. cells that can be served by a NG-RAN node. Value is 16384.

9.1.3.2 XN SETUP RESPONSE

This message is sent by a NG-RAN node to a neighbouring NG-RAN node to transfer application data for an Xn-C interface instance.

Direction: NG-RAN node₂ → NG-RAN node₁.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
Global NG-RAN Node ID	M		9.2.2.3		YES	reject
TAI Support List	O		9.2.3.20	List of supported TAs and associated characteristics.	GLOBAL	reject
List of Served Cells NR		0 .. <maxnoofCellsinN G-RAN node>		Complete list of cells served by the gNB	YES	reject
>Served Cell Information NR	M		9.2.2.11		–	
>Neighbour Information NR	O		9.2.2.13		–	
>Neighbour Information E-UTRA	O		9.2.2.14		–	
List of Served Cells E-UTRA		0 .. <maxnoofCellsinN G-RAN node>		Complete list of cells served by the ng-eNB	YES	reject
>Served Cell Information E-UTRA	M		9.2.2.12		–	
>Neighbour Information NR	O		9.2.2.13		–	
>Neighbour Information E-UTRA	O		9.2.2.14		–	
Criticality Diagnostics	O		9.2.3.3		YES	ignore

Range bound	Explanation
<i>maxnoofCellsinNG-RAN node</i>	Maximum no. cells that can be served by a NG-RAN node. Value is 16384.

9.1.3.3 XN SETUP FAILURE

This message is sent by the neighbouring NG-RAN node to indicate Xn Setup failure.

Direction: NG-RAN node₂ → NG-RAN node₁.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
Cause	M		9.2.3.2		YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.3.4 NG-RAN NODE CONFIGURATION UPDATE

This message is sent by a NG-RAN node to a neighbouring NG-RAN node to transfer updated information for an Xn-C interface instance.

Direction: NG-RAN node₁ → NG-RAN node₂.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
TAI Support List	O		9.2.3.20	List of supported TAs and associated characteristics.	GLOBAL	reject
<i>CHOICE Initiating NodeType</i>	M				YES	ignore
<i>>gNB</i>						
<i>>>Served Cells to Update NR</i>	O		9.2.2.15		YES	ignore
<i>>>Cell Assistance Information NR</i>	O		9.2.2.17		YES	ignore
<i>>ng-eNB</i>						
<i>>>Served Cells to Update E-UTRA</i>	O		9.2.2.16		YES	ignore
<i>>>Cell Assistance Information NR</i>	O		9.2.2.17		YES	ignore

9.1.3.5 NG-RAN NODE CONFIGURATION UPDATE ACKNOWLEDGE

This message is sent by a neighbouring NG-RAN node to a peer node to acknowledge update of information for a TNL association.

Direction: NG-RAN node₂ → NG-RAN node₁.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
<i>CHOICE Responding NodeType</i>	M				YES	ignore
<i>>ng-eNB</i>						
<i>>gNB</i>						
>>Served NR Cells		0 .. < <i>maxCellinNG-RAN node</i> >		Complete or limited list of cells served by a gNB, if requested by an NG-RAN node.	–	
<i>>>>Served Cell Information NR</i>	M		9.2.2.11		–	
<i>>>>Neighbour Information NR</i>	O		9.2.2.13	NR neighbours.	–	
<i>>>>Neighbour Information E-UTRA</i>	O		9.2.2.14	E-UTRA neighbours	–	
Criticality Diagnostics	O		9.2.3.3		YES	ignore

Range bound	Explanation
maxCellinNG-RAN node	Maximum no. cells that can be served by an NG-RAN node. Value is FFS.

9.1.3.6 NG-RAN NODE CONFIGURATION UPDATE FAILURE

This message is sent by the neighbouring NG-RAN node to indicate NG-RAN node Configuration Update failure.

Direction: NG-RAN node₂ → NG-RAN node₁.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
Cause	M		9.2.3.2		YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.3.7 CELL ACTIVATION REQUEST

This message is sent by the NG-RAN node₁ to the peer NG-RAN node₂ to request a previously switched-off cell/s to be re-activated.

Direction: NG-RAN node₁ → NG-RAN node₂.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
CHOICE <i>Served Cells To Activate</i>	M				YES	reject
>NR Cells						
>>NR Cells List		1			–	
>>>NR Cells item		1 .. < maxnoofCellsinNG-RANnode>			–	
>>>>NR CGI	M		9.2.2.7		–	
>E-UTRA Cells						
>>E-UTRA Cells List		1			–	
>>>E-UTRA Cells item		1 .. < maxnoofCellsinNG-RANnode>			–	
>>>>E-UTRA CGI	M		9.2.2.8		–	
Activation ID	M		INTEGER (0..255)	Allocated by the NG-RAN node ₁	YES	reject

Range bound	Explanation
maxnoofCellsinNG-RANnode	Maximum no. cells that can be served by an NG-RAN node. Value is 16384.

9.1.3.8 CELL ACTIVATION RESPONSE

This message is sent by an NG-RAN node₂ to a peer NG-RAN node₁ to indicate that one or more cell(s) previously switched-off has (have) been activated.

Direction: NG-RAN node₂ → NG-RAN node₁.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
CHOICE <i>Activated Served Cells</i>	M				YES	reject
>NR Cells						
>>NR Cells List		1			–	
>>>NR Cells Item		1 .. < maxnoofCellsinNG-RANnode>			–	
>>>>NR CGI	M		9.2.2.7		–	
>E-UTRA Cells						
>>E-UTRA Cells List		1			–	
>>>E-UTRA Cells Item		1 .. < maxnoofCellsinNG-RANnode>			–	
>>>>E-UTRA CGI	M		9.2.2.8		–	
Activation ID	M		INTEGER (0..255)	Allocated by the NG-RAN node ₁	YES	reject
Criticality Diagnostics	O		9.2.3.3		YES	ignore

Range bound	Explanation
maxnoofCellsinNG-RANnode	Maximum no. cells that can be served by an NG-RAN node. Value is 16384.

9.1.3.9 CELL ACTIVATION FAILURE

This message is sent by an NG-RAN node₂ to a peer NG-RAN node₁ to indicate cell activation failure.

Direction: NG-RAN node₂ → NG-RAN node₁.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
Activation ID	M		INTEGER (0..255)	Allocated by the NG-RAN node ₁	YES	reject
Cause	M		9.2.3.2		YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.3.10 RESET REQUEST

This message is sent from one NG-RAN node to another NG-RAN node and is used to request the Xn interface to be reset.

Direction: NG-RAN node₁ → NG-RAN node₂.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
CHOICE <i>Reset Request TypeInfo</i>	M				YES	reject
> <i>Full Reset</i>						
> <i>Partial Reset</i>						
>>UE contexts to be released List		1			–	
>>>UE Contexts to be released Item		1 .. <maxnoof UE contexts>			EACH	reject
>>>>NG-RAN node1 UE XnAP ID	O		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the NG-RAN node ₁	–	
>>>>NG-RAN node2 UE XnAP ID	O		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the NG-RAN node ₂	–	
Cause	M		9.2.3.2		YES	ignore

Range bound	Explanation
maxnoofUEContexts	Maximum no. of UE Contexts. Value is 8192.

9.1.3.11 RESET RESPONSE

This message is sent by an NG-RAN node as a response to a RESET REQUEST message.

Direction: NG-RAN node₂ → NG-RAN node₁.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
CHOICE <i>Reset Response Type Info</i>	M				YES	ignore
> <i>Full Reset</i>						
> <i>Partial Reset</i>						
>> Admitted UE contexts to be released List		1			–	
>>> Admitted UE Contexts to be released Item		1 .. <maxnoof UE contexts>			EACH	ignore
>>>>NG-RAN node1 UE XnAP ID	O		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the NG-RAN node ₁	–	
>>>>NG-RAN node2 UE XnAP ID	O		NG-RAN node UE XnAP ID 9.2.3.16	Allocated at the NG-RAN node ₂	–	
Criticality Diagnostics	O		9.2.3.3		YES	ignore

Range bound	Explanation
maxnoofUEContexts	Maximum no. of UE Contexts. Value is 8192.

9.1.3.12 ERROR INDICATION

This message is used to indicate that some error has been detected in the NG-RAN node.

Direction: NG-RAN node₁ → NG-RAN node₂.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	ignore
Old NG-RAN node UE XnAP ID	O		NG-RAN node UE XnAP ID 9.2.3.16	Allocated for handover at the source NG-RAN node and for dual connectivity at the S-NG-RAN node or at the NG-RAN node from which a DRB is offloaded.	YES	ignore
New NG-RAN node UE XnAP ID	O		NG-RAN node UE XnAP ID 9.2.3.16	Allocated for handover at the target NG-RAN node and for dual connectivity at the M-NG-RAN node or the NG-RAN node to which a DRB is offloaded.	YES	ignore
Cause	O		9.2.3.2		YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.3.13 XN REMOVAL REQUEST

This message is sent by a NG-RAN node to a neighbouring NG-RAN node to initiate the removal of the signaling connection.

Direction: NG-RAN node₁ → NG-RAN node₂.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
Global NG-RAN Node ID	M		9.2.2.3		YES	reject
Xn Removal Threshold	O		Xn Benefit Value 9.2.3.54		YES	reject

9.1.3.14 XN REMOVAL RESPONSE

This message is sent by a NG-RAN node to a neighbouring NG-RAN node to acknowledge the initiation of removal of the signaling connection.

Direction: NG-RAN node₂ → NG-RAN node₁.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
Global NG-RAN Node ID	M		9.2.2.3		YES	reject
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.1.3.15 XN REMOVAL FAILURE

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

Direction: NG-RAN node₂ → NG-RAN node₁.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3.1		YES	reject
Cause	M		9.2.3.2		YES	ignore
Criticality Diagnostics	O		9.2.3.3		YES	ignore

9.2 Information Element definitions

9.2.0 General

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

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

9.2.1 Container and List IE definitions

9.2.1.1 PDU Session Resources To Be Setup List

This IE contains PDU session resource related information used at UE context transfer between NG-RAN nodes.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDU Session Resources To Be Setup List		1			YES	reject
>PDU Session Resources To Be Setup Item IEs		1 .. <maxno of PDU sessions >			EACH	reject
>>PDU Session ID	M		9.2.3.18		–	
>>S-NSSAI	M		9.2.3.21		–	
>>PDU Session Resource Aggregate Maximum Bitrate	M		OCTET STRING	This IE may need to be refined.	–	
>>UL NG-U UP TNL Information at UPF	M		UP Transport Layer Information 9.2.3.30	UPF endpoint of the NG-U transport bearer. For delivery of UL PDUs	–	
>>Security Indication	O		9.2.3.52		–	
>>PDU Session Type	M		9.2.3.19		–	
>>QoS Flows To Be Setup List		1			–	
>>>QoS Flows To Be Setup Item IEs		1 .. <maxno of QoS Flows>			EACH	reject
>>>>QoS Flow Indicator	M		9.2.3.10		–	
>>>>DL data Forwarding	O		9.2.3.34		–	
>>>>QoS Flow Level QoS Parameters	M		9.2.3.5		–	
>>>>E-RAB ID	O		INTEGER (0..15, ...)		–	
>>Source DRB to QoS Flow Mapping List	O		DRB to QoS Flow Mapping List 9.2.1.15		–	

Range bound	Explanation
maxnoofPDUSessions	Maximum no. of PDU sessions. Value is 256
maxnoofQoSFlows	Maximum no. of QoS flows allowed within one PDU session. Value is 64.

9.2.1.2 PDU Session Resources Admitted List

This IE contains PDU session resource related information to report success of the establishment of PDU session resources.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDU Session Resources Admitted List		1			–	
>PDU Session Resources Admitted Item IEs		1..<maxnoofPDU Sessions>			EACH	reject
>>PDU Session ID	M		9.2.3.18		–	
>>QoS Flows Admitted List		0..1			–	
>>>QoS Flows Admitted Item IEs		1..<maxnoofQoS Flows>			EACH	reject
>>>>QoS Flow Indicator	M		9.2.3.10			
>>>>Data Forwarding Accepted	O		9.2.3.35		–	
>>QoS Flows not Admitted List		0..1			–	
>>>QoS Flows not Admitted Item IEs	O	1..<maxnoofQoS Flows>			EACH	Reject
>>>>QoS Flow Indicator	M		9.2.3.10		–	
>>>>Cause	M		9.2.3.2		–	
>>Data Forwarding Info from target NG-RAN node	O		9.2.1.16		–	

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions. Value is 256
maxnoofQoS Flows	Maximum no. of QoS flows allowed within one PDU session. Value is 64.

9.2.1.3 PDU Session Resources Not Admitted List

This IE contains a list of PDU session resources which were not admitted to be added or modified.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDU Session Resources Not Admitted List		1			–	
>PDU Session Resources Not Admitted Item IEs		1..<maxnoofPDU Sessions>			EACH	reject
>>PDU Session ID	M		9.2.3.18		–	
>>Cause	O		9.2.3.2		–	

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions. Value is 256

9.2.1.4 QoS Flow List with Cause

This IE contains a list of QoS flows with a cause value.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
QoS Flow Item IEs		1..<maxno ofQoSFlows>			EACH	reject
>QoS Flow Indicator	M		9.2.3.10		–	
>Cause	O		9.2.3.2		–	

Range bound	Explanation
maxnoofQoSFlows	Maximum no. of QoS flows allowed within one PDU session. Value is 64.

9.2.1.5 PDU Session Resource Setup Info – SN terminated

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, the content of this section is FFS.

This IE contains information for the addition of S-NG-RAN node resources related to a PDU session for DRBs configured with an SN terminated bearer option.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
UL NG-U UP TNL Information at UPF	M		UP Transport Layer Information 9.2.3.30	UPF endpoint of the NG-U transport bearer. For delivery of UL PDUs	–	
PDU Session Type	M		9.2.3.19		–	
QoS Flows To Be Setup List		1			–	
>QoS Flows To Be Setup Item IEs		1 .. <maxno ofQoSFlows>			EACH	reject
>>QoS Flow Indicator	M		9.2.3.10		–	
>>QoS Flow Level QoS Parameters	M		9.2.3.5	For GBR QoS flows, this IE contains GBR QoS flow information as received at NG-C	–	
>>Offered GBR QoS Flow Information	O		GBR QoS Flow Information 9.2.3.6	This IE contains M-Node offered GBR QoS Flow Information.	–	
DL Forwarding	O		9.2.3.34	This IE may need to be refined. Placeholder IE only.	–	
Security Indication	O		9.2.3.52		–	

Range bound	Explanation
maxnoofQoSFlows	Maximum no. of QoS flows. Value is 64

9.2.1.6 PDU Session Resource Setup Response Info – SN terminated

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, the content of this section is FFS.

This IE contains the result of the addition of S-NG-RAN node resources related to a PDU session for DRBs configured with an SN terminated bearer option.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
NG-U DL UP TNL Information at NG-RAN	M		UP Transport Layer Information 9.2.3.30	S-NG-RAN node endpoint of the NG transport bearer. For delivery of DL PDUs.	–	
DRBs To Be Setup List		1			–	
>DRBS to Be Setup Item IEs		1 .. <maxno of DRBs>			EACH	reject
>>DRB ID	M		9.2.3.33		–	
>>SN UL PDCP UP TNL Information	M		UP Transport Layer Information 9.2.3.30	S-NG-RAN node endpoint of a DRB's Xn transport bearer at its PDCP resource. For delivery of UL PDUs.	–	
>>QoS Flows To Be Setup List		1		Editor's Note: It is FFS whether the corresponding node decides the "overall" QoS based on information of QoS flows mapped to it and whether mapping info is needed at all.	–	
>>>QoS Flows To Be Setup Item IEs		1 .. <maxno of QoS Flows>			EACH	reject
>>>>QoS Flow Indicator	M		9.2.3.10		–	
>>>>MCG requested GBR QoS Flow Information	O		GBR QoS Flow Information 9.2.3.6	This IE contains GBR QoS Flow Information necessary for the MCG part.	–	
QoS Flows Not Admitted List	O		QoS Flow List with Cause 9.2.1.4		–	
DL Forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30	Identifies the Xn transport bearer used for forwarding of DL PDUs This IE may need to be refined. Placeholder only.	–	
UL Forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30	Identifies the Xn transport bearer used for forwarding of UL PDUs This IE may need to be refined. Placeholder only.	–	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs allowed towards one UE. Value is 32.
maxnoofQoSFlows	Maximum no. of QoS flows. Value is 64

9.2.1.7 PDU Session Resource Setup Info – MN terminated

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, the content of this section is FFS.

This IE contains information for the addition of S-NG-RAN node resources related to a PDU session for DRBs configured with an MN terminated bearer option.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDU Session Type	M		9.2.3.19		–	
DRBs To Be Setup List		1			–	
>DRBS To Be Setup Item IEs		1 .. <maxno of DRBs>			EACH	reject
>>MN UL PDCP UP TNL Information	M		UP Transport Layer Information 9.2.3.30	M-NG-RAN node endpoint of a DRB's Xn transport bearer at its PDCP resource. For delivery of UL PDUs.	–	
>>RLC Mode			9.2.3.28		–	
>>QoS Flows To Be Setup List		1		Editor's Note: It is FFS whether the corresponding node decides the "overall" QoS based on information of QoS flows mapped to it and whether mapping info is needed at all.	–	
>>>QoS Flows To Be Setup Item IEs		1 .. <maxno of QoS Flows>			EACH	reject
>>>>QoS Flow Indicator	M		9.2.3.10		–	
>>>>QoS Flow Level QoS Parameters	M		9.2.3.5		–	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs allowed towards one UE. Value is 32.
maxnoofQoSFlows	Maximum no. of QoS flows allowed within one PDU session. Value is 64.

9.2.1.8 PDU Session Resource Setup Response Info – MN terminated

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, the content of this section is FFS.

This IE contains the result of the addition of S-NG-RAN node resources related to a PDU session for DRBs configured with an MN terminated bearer option.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
DRBs Admitted List		1			–	
>DRBS Admitted Item IEs		1 .. <maxno of DRBs>			EACH	reject
>>S-Node DL SCG UP TNL Information	M		UP Transport Layer Information 9.2.3.30	S-NG-RAN node GTP-U tunnel endpoint of the DRB's Xn transport at its Lower Layer SCG resource. For delivery of DL PDUs.	–	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs allowed towards one UE. Value is 32.

9.2.1.9 PDU Session Resource Modification Info – SN terminated

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, the content of this section is FFS.

This IE contains information related to a PDU session resource for an M-NG-RAN node initiated request to modify DRBs configured with an SN terminated bearer option.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
UL NG-U UP TNL Information at UPF	O		UP Transport Layer Information 9.2.3.30	UPF endpoint of the NG-U transport bearer. For delivery of UL PDUs	–	
QoS Flows To Be Setup List		0..1			–	
>QoS Flows To Be Setup Item IEs		1 .. <maxno of QoSFlows>			EACH	reject
>>QoS Flow Indicator	M		9.2.3.10		–	
>>QoS Flow Level QoS Parameters	M		9.2.3.5	For GBR QoS flows, this IE contains GBR QoS flow information as received at NG-C	–	
>>Offered GBR QoS Flow Information	O		GBR QoS Flow Information 9.2.3.6	This IE contains M-Node offered GBR QoS Flow Information.	–	
DL Forwarding	O		9.2.3.34	This IE may need to be refined. Placeholder only.	–	
QoS Flows To Be Modified List		0..1			–	
>QoS Flows To Be Modified Item IEs		1 .. <maxno of QoSFlows>			EACH	reject
>>QoS Flow Indicator	M		9.2.3.10		–	
>>QoS Flow Level QoS Parameters	O		9.2.3.5	For GBR QoS flows, this IE contains GBR QoS flow information as received at NG-C	–	
>>Offered GBR QoS Flow Information	O		GBR QoS Flow Information 9.2.3.6	This IE contains M-Node offered GBR QoS Flow Information.	–	
QoS Flows To Be Released List		0..1	QoS Flow List with Cause 9.2.1.4		–	

Range bound	Explanation
maxnoofQoSFlows	Maximum no. of QoS flows. Value is 64.

9.2.1.10 PDU Session Resource Modification Response Info – SN terminated

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, the content of this section is FFS.

This IE contains the PDU session resource related result of an M-NG-RAN node initiated request to modify DRBs configured with an SN terminated bearer option.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDU Sessions Level QoS Parameters			OCTET STRING	Includes QoS parameters to be modified. This IE may need to be refined.	–	
NG-U DL UP TNL Information at NG-RAN	O		UP Transport Layer Information 9.2.3.30	S-NG-RAN node endpoint of the NG transport bearer. For delivery of DL PDUs.	–	
DRBs To Be Setup List		0..1			–	
>DRBS to Be Setup Item IEs		1 .. <maxno of DRBs>			EACH	reject
>>DRB ID	M		9.2.3.33		–	
>>SN UL PDCP UP TNL Information	M		UP Transport Layer Information 9.2.3.30	S-NG-RAN node endpoint of a DRB's Xn transport bearer at its PDCP resource. For delivery of UL PDUs.	–	
>>QoS Flows To Be Setup List		1		Editor's Note: It is FFS whether the corresponding node decides the "overall" QoS based on information of QoS flows mapped to it and whether mapping info is needed at all.	–	
>>>QoS Flows To Be Setup Item IEs		1 .. <maxno of QoS Flows>			EACH	reject
>>>>QoS Flow Indicator	M		9.2.3.10		–	
>>>>MCG requested GBR QoS Flow Information	O		GBR QoS Flow Information 9.2.3.6	This IE contains GBR QoS Flow Information necessary for the MCG part.	–	
DRBs To Be Modified List		0..1			–	
>DRBS to Be Modified Item IEs		1 .. <maxno of DRBs>			EACH	reject
>>DRB ID	M		9.2.3.33		–	
>>SN UL PDCP UP TNL Information	O		UP Transport Layer Information 9.2.3.30	S-NG-RAN node endpoint of a DRB's Xn transport bearer at its PDCP resource. For delivery of UL PDUs.	–	
>>QoS Flows List		1		Overwriting the existing QoS Flow List	–	
>>>QoS Flows Item IEs		1 .. <maxno of QoS Flows>		Editor's Note: It is FFS whether the corresponding node decides the "overall" QoS based on information of QoS flows mapped to it and whether mapping info is needed at all.	EACH	reject
>>>>QoS Flow Indicator	M		9.2.3.10		–	
>>>>MCG requested GBR QoS Flow Information	O		GBR QoS Flow Information 9.2.3.6	This IE contains GBR QoS Flow Information necessary for the MCG part.	–	
DRBs To Be Released List		0..1			–	

>DRBS to Be Released Item IEs		1 .. <maxno of DRBs>			EACH	reject
>>DRB ID	M		9.2.3.33		–	
>>Cause	O		9.2.3.2		–	
QoS Flows Not Admitted to be Added List	O		QoS Flow List with Cause 9.2.1.4		–	
QoS Flows Admitted to be Modified List	O		QoS Flow List with Cause 9.2.1.4		–	
QoS Flows Not Admitted to be Modified List	O		QoS Flow List with Cause 9.2.1.4		–	
QoS Flows Admitted to be Released List	O		QoS Flow List with Cause 9.2.1.4		–	
DL Forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30	Identifies the Xn transport bearer used for forwarding of DL PDUs. This IE may need to be refined. Placeholder only.	–	
UL Forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30	Identifies the Xn transport bearer used for forwarding of UL PDUs. This IE may need to be refined. Placeholder only.	–	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs allowed towards one UE. Value is 32.
maxnoofQoSFlows	Maximum no. of QoS flows. Value is 64.

9.2.1.11 PDU Session Resource Modification Info – MN terminated

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, the content of this section is FFS.

This IE contains information related to PDU session resource for an M-NG-RAN node initiated request to modify DRBs configured with an MN terminated bearer option.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDU Session Type	M		9.2.3.19		–	
DRBs To Be Setup List		1			–	
>DRBS to Be Setup Item IEs		1 .. <maxno of DRBs>			EACH	reject
>>MN UL PDCP UP TNL Information	M		UP Transport Layer Information 9.2.3.30	M-NG-RAN node endpoint of a DRB's Xn transport bearer at its PDCP resource. For delivery of UL PDUs.	–	
>>RLC Mode			9.2.3.28		–	
>>>QoS Flows To Be Setup List		1		This IE may need to be refined, especially, whether the corresponding node decides the "overall" QoS based on information of QoS flows mapped to it and whether mapping info is needed at all.	–	
>>>>QoS Flows To Be Setup Item IEs		1 .. <maxno of QoS Flows>			EACH	reject
>>>>QoS Flow Indicator	M		9.2.3.10		–	
>>>>QoS Flow Level QoS Parameters	M		9.2.3.5		–	
DRBs To Be Modified List		0..1			–	
>DRBS to Be Modified Item IEs		1 .. <maxno of DRBs>			EACH	reject
>>DRB ID	M		9.2.3.33		–	
>>SN UL PDCP UP TNL Information	O		UP Transport Layer Information 9.2.3.30	S-NG-RAN node endpoint of a DRB's Xn transport bearer at its PDCP resource. For delivery of UL PDUs.	–	
>>QoS Flows List		1		Overwriting the existing QoS Flow List	–	
>>>>QoS Flows Item IEs		1 .. <maxno of QoS Flows>		This IE may need to be refined, especially, whether the corresponding node decides the "overall" QoS based on information of QoS flows mapped to it and whether mapping info is needed at all.	EACH	reject
>>>>QoS Flow Indicator	M		9.2.3.10		–	
>>>>MCG requested GBR QoS Flow Information	O		GBR QoS Flow Information 9.2.3.6	This IE contains GBR QoS Flow Information necessary for the MCG part.	–	
DRBs To Be Released List	O		OCTET STRING	This IE may need to be refined.	–	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs allowed towards one UE. Value is 32.
maxnoofQoSFlows	Maximum no. of QoS flows allowed within one PDU session. Value is 64.

9.2.1.12 PDU Session Resource Modification Response Info – MN terminated

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, the content of this section is FFS.

This IE contains the PDU session resource related result of an M-NG-RAN node initiated modification of DRBs configured with an MN terminated bearer option.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
DRBs Admitted to be Setup or Modified List		1			–	
>DRBs Admitted to be Setup or Modified Item IEs		1 .. <maxno of DRBs>			EACH	reject
>>S-Node DL SCG UP TNL Information	O		UP Transport Layer Information 9.2.3.30	S-NG-RAN node GTP-U tunnel endpoint of the DRB's Xn transport at its Lower Layer SCG resource. For delivery of DL PDUs.	–	
DRBs Admitted To Be Released List	O		OCTET STRING	This IE may need to be refined.	–	
DRBs Not Admitted To Be Setup or Modified List	O		OCTET STRING	This IE may need to be refined.	–	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs allowed towards one UE. Value is 32.

9.2.1.13 UE Context Information Retrieve UE Context Response

This IE contains the UE context information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NG-C UE associated Signalling reference	M		AMF UE NGAP ID 9.2.3.26	Allocated at the AMF on the old NG-C connection.
Signalling TNL Association Address at source NG-C side	M		CP Transport Layer Information 9.2.3.31	This IE indicates the AMF's IP address of the SCTP association used at the source NG-C interface instance.
UE Security Capabilities	M		9.2.3.49	
Security Information	M		9.2.3.50	
UE Aggregate Maximum Bit Rate	M		9.2.3.17	
PDU Session Resources To Be Setup List	M		9.2.1.1	
RRC Context	M		OCTET STRING	Either includes the <i>HandoverPreparationInformation</i> message as defined in subclause 11.2.2 of TS 38.331[10], if the old and new serving NG-RAN nodes are gNBs, or the <i>HandoverPreparationInformation</i> message as defined in subclause 10.2.2 of TS 36.331 [14], if the old and new serving NG-RAN nodes are ng-eNBs.
Mobility Restriction List	O		9.2.3.53	
Index to RAT/Frequency Selection Priority	O		9.2.3.23	

9.2.1.14 DRBs Subject To Status Transfer List

This IE contains a list of DRBs containing information about PDCP PDU transfer status.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
DRBs Subject To Status Transfer Item		1 .. <maxno of DRBs>			EACH	ignore
>DRB ID	M		9.2.3.33		–	
>CHOICE PDCP SN	M				–	
>> 12 bits						
>>>Receive Status Of PDCP SDU	O		BIT STRING (1.. 2048)	The IE is used in case of 12-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.	–	
>>>UL COUNT Value	M		COUNT Value for PDCP SN Length 12 9.2.3.36	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 for PDCP SN Length 12 9.2.3.36	PDCP-SN and Hyper Frame Number that the target NG-RAN node should assign for the next DL SDU not having an SN yet in case of 12-bit long PDCP-SN	–	
>> 18 bits						
>>>Receive Status Of PDCP SDU	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.	–	
>>>UL COUNT Value	M		COUNT Value for PDCP SN Length 18 9.2.3.37	PDCP-SN and Hyper Frame Number of the first missing UL SDU in case of 18-bit long PDCP-SN	–	
>>>DL COUNT Value	M		COUNT Value for PDCP SN Length 18 9.2.3.37	PDCP-SN and Hyper Frame Number that the target NG-RAN node should assign for the next DL SDU not having an SN yet in case of 18-bit long PDCP-SN	–	

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

maxnoofDRBs	Maximum no. of DRBs allowed towards one UE. Value is 32.
-------------	--

9.2.1.15 DRB to QoS Flow Mapping List

This IE contains a list of DRBs containing information about the mapped QoS flows.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
DRBS to QoS Flow Mapping Item IEs		1 .. <maxnoof DRBs>			EACH	reject
>DRB ID	M		9.2.3.33		–	
>QoS Flows List		1			–	
>>QoS Flow Item IEs		1..<maxno ofQoSFlows>			EACH	reject
>>>QoS Flow Indicator	M		9.2.3.10		–	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs allowed towards one UE. Value is 32.
maxnoofQoSFlows	Maximum no. of QoS flows allowed within one PDU session. Value is 64.

9.2.1.16 Data Forwarding Info from target NG-RAN node

This IE contains TNL information for the establishment of data forwarding tunnels towards the target NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDU Session level DL data forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30	To forward NG-U DL data to the target node for which no PDCP SN has been assigned yet.	–	
Data Forwarding Response DRB List		0..1			–	
>Data Forwarding Response DRB Item IEs		1..<maxno ofDRBs>			EACH	reject
>>DRB ID	M		9.2.3.33		–	
>>DL Forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30		–	
>>UL Forwarding UP TNL Information	O		UP Transport Layer Information 9.2.3.30		–	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs. Value is 32.

9.2.2 NG-RAN Node and Cell Configuration related IE definitions

9.2.2.1 Global gNB ID

This IE is used to globally identify a gNB (see TS 38.300 [9]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.2.2.4	
CHOICE <i>gNB ID</i>	M			
> <i>gNB ID</i>				
>>gNB ID	M		BIT STRING (SIZE(22..32))	Equal to the leftmost bits of the <i>NR Cell Identity</i> IE contained in the <i>NR CGI</i> IE of each cell served by the gNB.

9.2.2.2 Global ng-eNB ID

This IE is used to globally identify an ng-eNB (see TS 38.300 [9]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.2.2.4	
CHOICE <i>ng-eNB ID</i>	M			
> <i>Macro ng-eNB ID</i>				
>>Macro ng-eNB ID	M		BIT STRING (SIZE(20))	Equal to the 20 leftmost bits of the <i>E-UTRA Cell Identity</i> IE contained in the <i>E-UTRA CGI</i> IE of each cell served by the ng-eNB.
> <i>Short Macro ng-eNB ID</i>				
>>Short Macro ng-eNB ID	M		BIT STRING (SIZE(18))	Equal to the 18 leftmost bits of the <i>E-UTRA Cell Identity</i> IE contained in the <i>E-UTRA CGI</i> IE of each cell served by the ng-eNB.
> <i>Long Macro ng-eNB ID</i>				
>>Long Macro ng-eNB ID	M		BIT STRING (SIZE(21))	Equal to the 21 leftmost bits of the <i>E-UTRA Cell Identity</i> IE contained in the <i>E-UTRA CGI</i> IE of each cell served by the ng-eNB.

9.2.2.3 Global NG-RAN Node ID

This IE is used to globally identify an NG-RAN node (see TS 38.300 [9]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>NG-RAN node</i>	M			
> <i>gNB</i>				
>>Global gNB ID	M		9.2.2.1	
> <i>ng-eNB</i>				
>>Global ng-eNB ID	M		9.2.2.2	

9.2.2.4 PLMN Identity

This IE indicates the PLMN Identity.

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

9.2.2.5 TAC

This information element is used to uniquely identify a Tracking Area within a PLMN.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TAC	M		OCTET STRING (SIZE (3))	

9.2.2.6 RAN Area Code

This IE defines the RAN Area Code.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
RANAC	M		BIT STRING (SIZE (6))	

9.2.2.7 NR CGI

This IE is used to globally identify an NR cell (see TS 38.300 [9]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.2.2.4	
NR Cell Identity	M		BIT STRING (SIZE(36))	The leftmost bits of the <i>NR Cell Identity</i> IE correspond to the gNB ID (defined in subclause 9.2.2.1).

9.2.2.8 E-UTRA CGI

This IE is used to globally identify an E-UTRA cell (see TS 36.300 [12]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.2.2.4	
E-UTRA Cell Identity	M		BIT STRING (SIZE(28))	The leftmost bits of the <i>E-UTRA Cell Identity</i> IE correspond to the ng-eNB ID (defined in subclause 9.2.2.2).

9.2.2.9 NG-RAN Cell Identity

This IE contains either an NR or an E-UTRA Cell Identity.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>Cell Identifier</i>	M			
> <i>NR</i>				
>> <i>NR Cell Identity</i>	M		BIT STRING (SIZE(36))	The leftmost bits of the <i>NR Cell Identity</i> IE correspond to the gNB ID (defined in subclause 9.2.2.1).
> <i>E-UTRA</i>				
>> <i>E-UTRA Cell Identity</i>	M		BIT STRING (SIZE(28))	The leftmost bits of the <i>E-UTRA Cell Identity</i> IE correspond to the ng-eNB ID (defined in subclause 9.2.2.8).

9.2.2.10 NG-RAN Cell PCI

This IE defines physical cell ID of a cell served by an NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>RAT</i>	M			
> <i>nr</i>				
>> <i>NR PCI</i>	M		INTEGER (0..1007, ...)	NR Physical Cell ID
> <i>e-utra</i>				
>> <i>E-UTRA PCI</i>	M		INTEGER (0..503, ...)	E-UTRA Physical Cell ID

9.2.2.11 Served Cell Information NR

This IE contains cell configuration information of an NR cell that a neighbouring NG-RAN node may need for the Xn AP interface.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NR-PCI	M		INTEGER (0..1007, ...)	NR Physical Cell ID
NR CGI	M		9.2.2.7	
TAC	M		9.2.2.5	Tracking Area Code
RANAC	O		RAN Area Code 9.2.2.6	
Broadcast PLMNs		<i>1..<maxnoof BPLMNs></i>		Broadcast PLMNs
>PLMN Identity	M		9.2.2.4	
CHOICE <i>NR-Mode-Info</i>	M			
> <i>FDD</i>				
>> FDD Info		<i>1</i>		
>>>UL NR Frequency Info	M		NR Frequency Info 9.2.2.19	
>>>DL NR Frequency Info	M		NR Frequency Info 9.2.2.19	
>>>UL Transmission Bandwidth	M		NR Transmission Bandwidth 9.2.2.20	
>>>DL Transmission Bandwidth	M		NR Transmission Bandwidth 9.2.2.20	
> <i>TDD</i>				
>> TDD Info		<i>1</i>		
>>>Frequency Info	M		NR Frequency Info 9.2.2.19	
>>>Transmission Bandwidth	M		NR Transmission Bandwidth 9.2.2.20	
Measurement Timing Configuration	M		OCTET STRING	Contains the <i>MeasurementTimingConfiguration</i> inter-node message for the served cell, as defined in TS 38.331 [10].

Range bound	Explanation
maxnoofBPLMNs	Maximum no. of broadcast PLMNs by a cell. Value is 6. This IE may need to be refined.

9.2.2.12 Served Cell Information E-UTRA

This IE contains cell configuration information of an E-UTRA cell that a neighbour NG-RAN node may need for the Xn AP interface.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
E-UTRA PCI	M		INTEGER (0..503, ...)	E-UTRA Physical Cell ID
ECGI	M		E-UTRA CGI 9.2.2.8	
TAC	M		9.2.2.5	Tracking Area Code
Broadcast PLMNs		<i>1..<maxnoof BPLMNs></i>		Broadcast PLMNs
>PLMN Identity	M		9.2.2.4	
CHOICE <i>E-UTRA-Mode-Info</i>	M			
> <i>FDD</i>				
>>FDD Info		<i>1</i>		
>>>UL EARFCN	M		E-UTRA ARFCN 9.2.2.21	Corresponds to N_{UL} in TS 36.104 [25] for E-UTRA operating bands for which it is defined; ignored for E-UTRA operating bands for which N_{UL} is not defined
>>>DL EARFCN	M		E-UTRA ARFCN 9.2.2.21	Corresponds to N_{DL} in TS 36.104 [25]
>>>UL E-UTRA Transmission Bandwidth	M		E-UTRA Transmission Bandwidth 9.2.2.22	Same as DL Transmission Bandwidth in this release; ignored in case UL EARFCN value is ignored
>>>DL E-UTRA Transmission Bandwidth	M		E-UTRA Transmission Bandwidth 9.2.2.22	
> <i>TDD</i>				
>>TDD Info		<i>1</i>		
>>>EARFCN	M		E-UTRA ARFCN 9.2.2.21	Corresponds to N_{DL}/N_{UL} in TS 36.104 [25]
>>>E-UTRA Transmission Bandwidth	M		9.2.2.22	
>>>Subframe Assignment	M		ENUMERATED (sa0, sa1, sa2, sa3, sa4, sa5, sa6, ...)	Uplink-downlink subframe configuration information defined in TS 36.211 [26]
>>>Special Subframe Info		<i>1</i>		Special subframe configuration information defined in TS 36.211 [26]
>>>>Special Subframe Patterns	M		ENUMERATED (ssp0, ssp1, ssp2, ssp3, ssp4, ssp5, ssp6, ssp7, ssp8, ssp9, ssp10, ...)	
>>>>Cyclic Prefix DL	M		ENUMERATED (Normal, Extended,...)	
>>>>Cyclic Prefix UL	M		ENUMERATED (Normal, Extended, ...)	
Number of Antenna Ports E-UTRA	O		9.2.2.23	
PRACH Configuration	O		E-UTRA PRACH Configuration 9.2.2.25	
MBSFN Subframe Info		<i>0..<maxnoof MBSFN></i>		MBSFN subframe defined in TS 36.331 [14]

>Radioframe Allocation Period	M		ENUMERATED (n1, n2, n4, n8, n16, n32, ...)	
>Radioframe Allocation Offset	M		INTEGER (0..7, ...)	
>MBSFN Subframe Allocation E-UTRA	M		9.2.2.26	
E-UTRA Multiband Info List	O		9.2.2.24	
FreqBandIndicatorPriority	O		ENUMERATED (not-broadcast, broadcast, ...)	This IE indicates that the eNodeB supports <i>FreqBandIndicationPriority</i> , and whether <i>FreqBandIndicatorPriority</i> is broadcast in SIB 1 (see TS 36.331 [14])
BandwidthReducedSI	O		ENUMERATED (scheduled, ...)	This IE indicates that the SystemInformationBlockType1-BR is scheduled in the cell (see TS 36.331 [14])

Range bound	Explanation
maxnoofBPLMNs	Maximum no. of broadcast PLMNs by a cell. The value is 6. The constant needs to be refined.
maxnoofMBSFN	Maximum no. of MBSFN frame allocation with different offset. Value is 8.

9.2.2.13 Neighbour Information NR

This IE contains cell configuration information of NR cells that a neighbour NG-RAN node may need to properly operate its own served cells.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Neighbour Information NR		1 .. <maxnoofNeighbours>		
>NRPCI	M		INTEGER (0..1007)	NR Physical Cell ID
>NR-CGI	M		9.2.2.7	
>TAC	M		9.2.2.5	Tracking Area Code
>CHOICE NR-Mode-Info	M			
>>FDD				
>>>FDD Info		1		
>>>>UL NR FreqInfo	M		NR Frequency Info 9.2.2.19	
>>>>DL NR FreqInfo	M		NR Frequency Info 9.2.2.19	
>>TDD				
>>>TDD Info		1		
>>>>NR FreqInfo	M		NR ARFCN Frequency Info 9.2.2.19	

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

9.2.2.14 Neighbour Information E-UTRA

This IE contains cell configuration information of E-UTRA cells that a neighbour NG-RAN node may need to properly operate its own served cells.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
E-UTRA Neighbour Information E-UTRA		1 .. <maxnoofNeighbours>		
>E-UTRA PCI	M		INTEGER (0..503, ...)	E-UTRA Physical Cell Identifier of the neighbour cell
>ECGI	M		E-UTRA CGI 9.2.2.8	
>EARFCN	M		E-UTRA ARFCN 9.2.2.21	DL EARFCN for FDD or EARFCN for TDD
>TAC	M		9.2.2.5	Tracking Area Code

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

9.2.2.15 Served Cells To Update NR

This IE contains updated configuration information for served NR cells exchanged between NG-RAN nodes.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Served Cells NR To Add		0 .. <maxnoofCellsInNG-RAN node>			GLOBAL	reject
>Served Cell Information NR	M		9.2.2.11		–	
> Neighbour Information NR	O		9.2.2.13		–	
>Neighbour Information E-UTRA	O		9.2.2.14		–	
Served Cells To Modify NR		0 .. <maxnoofCellsInNG-RAN node>			GLOBAL	reject
>Old NR CGI	M		NR CGI 9.2.2.7		–	
>Served Cell Information NR	M		9.2.2.11		–	
>Neighbour Information NR	O		9.2.2.13		–	
>Neighbour Information E-UTRA	O		9.2.2.14		–	
Served Cells To Delete NR		0 .. <maxnoofCellsInNG-RAN node >			GLOBAL	reject
>Old NR-CGI	M		NR CGI 9.2.2.7		–	

Range bound	Explanation
maxnoofCellsInNG-RAN node	Maximum no. cells that can be served by a NG-RAN node. Value is 16384.

9.2.2.16 Served Cells to Update E-UTRA

This IE contains updated configuration information for served E-UTRA cells exchanged between NG-RAN nodes.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Served Cells To Add E-UTRA		0 .. <maxnoofCellsinNG-RAN node>			GLOBAL	reject
>Served Cell Information E-UTRA	M		9.2.2.12		–	
>Neighbour Information NR	O		9.2.2.13		YES	ignore
>Neighbour Information E-UTRA	O		9.2.2.14		YES	ignore
Served Cells To Modify E-UTRA		0 .. <maxnoofCellsinNG-RAN node>			GLOBAL	reject
>Old ECGI	M		E-UTRA CGI 9.2.2.8		–	
>Served Cell Information E-UTRA	M		9.2.2.12		–	
>Neighbour Information NR	O		9.2.2.13		YES	ignore
>Neighbour Information E-UTRA	O		9.2.2.14		YES	ignore
Served Cells To Delete E-UTRA		0 .. <maxnoofCellsinNG-RAN node >			GLOBAL	reject
>Old ECGI	M		E-UTRA CGI 9.2.2.8		–	

Range bound	Explanation
maxnoofCellsinNG-RAN node	Maximum no. cells that can be served by a NG-RAN node. Value is 16384.

9.2.2.17 Cell Assistance Information NR

The *Cell Assistance Information* IE is used by the NG-RAN node to request information about NR cells.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
<i>CHOICE</i> Cell Assistance Type	M			
>Limited NR List				
>>List of Requested NR Cells		1 .. <maxnoofCellsinNG-RAN node>		Included when the NG-RAN node requests a limited list of served NR cells.
>>>NR-CGI	M		9.2.2.7	NR cell for which served NR cell information is requested.
>Full NR List				
>>Complete Information Request Indicator	M		ENUMERATED (allServedCellsNR, ...)	Included when the NG-RAN node requests the complete list of served cells for a gNB

Range bound	Explanation
maxnoofCellsinNG-RAN node	Maximum no. cells that can be served by a NG-RAN node. Value is 16384.

9.2.2.18 SUL Information

This IE contains information about the SUL carrier.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
SUL Frequency Info	M		INTEGER (0..maxNRARFCN)	RF Reference Frequency as defined in TS 38.104 [24] section 5.4.2.1. The frequency provided in this IE identifies the absolute frequency position of the reference resource block (Common RB 0) of the SUL carrier. Its lowest subcarrier is also known as Point A.
SUL Transmission Bandwidth	M		NR Transmission Bandwidth 9.2.2.20	

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

9.2.2.19 NR Frequency Info

The NR Frequency Info defines the carrier frequency and bands used in a cell for a given direction (UL or DL) in FDD or for both UL and DL directions in TDD or for SUL carrier.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
NR ARFCN	M		INTEGER (0..maxNRARFCN)	RF Reference Frequency as defined in TS38.104 [24], section 5.4.2.1. The frequency provided in this IE identifies the absolute frequency position of the reference resource block (Common RB 0) of the carrier. Its lowest subcarrier is also known as Point A.
SUL Information	O		9.2.2.18	
NR Frequency Band List		1		
>NR Frequency Band Item		1..<maxnoofNRCellBands>		
>>NR Frequency Band	M		INTEGER (1.. 1024, ...)	Primary NR Operating Band as defined in TS38.104 [24], section 5.4.2.3. The value 1 corresponds to n1, value 2 corresponds to NR operating band n2, etc.
>>>Supported SUL band List		0..<maxnoofNRCellBands>		
>>>Supported SUL band Item	M		INTEGER (1.. 1024, ...)	Supplementary NR Operating Band as defined in TS 38.104 [24] section 5.4.2.3 that can be used for SUL duplex mode as per TS 38.101-1 table 5.2.-1.. The value 80 corresponds to NR operating band n80, value 81 corresponds to NR operating band n81, etc.

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

9.2.2.20 NR Transmission Bandwidth

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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
NR Transmission Bandwidth	M		INTEGER (0.. 65535)	This IE may need to be refined.

9.2.2.21 E-UTRA ARFCN

The E-UTRA Absolute Radio Frequency Channel Number defines the carrier frequency used in an E-UTRAN 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
E-UTRA ARFCN	M		INTEGER (0..maxEARFCN)	The relation between EARFCN and carrier frequency (in MHz) are defined in TS 36.104 [25].

Range bound	Explanation
maxEARFCN	Maximum value of EARFCNs. Value is 262143.

9.2.2.22 E-UTRA Transmission Bandwidth

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

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

9.2.2.23 Number of Antenna Ports E-UTRA

The *Number of Antenna Ports E-UTRA* IE is used to indicate the number of cell specific antenna ports supported by an E-UTRA cell.

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

9.2.2.24 E-UTRA Multiband Info List

The *E-UTRA Multiband Info List* IE IE contains the additional frequency band indicators that an E-UTRA cell belongs to listed in decreasing order of preference and corresponds to the *MultiBandInfoList* specified in TS 36.331 [14].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
BandInfo		1..<maxnoofEutra Bands>		
>Frequency Band Indicator	M		INTEGER (1.. 256, ...)	E-UTRA operating band as defined in TS 36.101 [27, table 5.5-1]

Range bound	Explanation
maxnoofEUTRABands	Maximum number of frequency bands that an E-UTRA cell belongs to. The value is 16.

9.2.2.25 E-UTRA PRACH Configuration

This IE indicates the E-UTRA PRACH resources used in an E-UTRA neighbour cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RootSequenceIndex	M		INTEGER (0..837)	See section 5.7.2. in TS 36.211 [26]
ZeroCorrelationZoneConfiguration	M		INTEGER (0..15)	See section 5.7.2. in TS 36.211 [26]
HighSpeedFlag	M		ENUMERATED (true, false, ...)	"true" corresponds to Restricted set and "false" to Unrestricted set. See section 5.7.2 in TS 36.211 [26]
PRACH-FrequencyOffset	M		INTEGER (0..94)	See section 5.7.1 of TS 36.211 [26]
PRACH-ConfigurationIndex	O		INTEGER (0..63)	Mandatory for TDD, shall not be present for FDD. See section 5.7.1. in TS 36.211 [26]

9.2.2.26 MBSFN Subframe Allocation E-UTRA

The *MBSFN Subframe Allocation E-UTRA* IE is used to indicate the subframes that are allocated for MBSFN within the radio frame allocation period as specified for the *MBSFN-SubframeConfig* IE TS 36.331 [14].

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

9.2.3 General IE definitions

9.2.3.1 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, ...)	

9.2.3.2 Cause

The purpose of the *Cause* IE is to indicate the reason for a particular event for the NGAP protocol.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Cause Group	M			
>Radio Network Layer				
>>Radio Network Layer Cause	M		<p>ENUMERATED (Cell not Available, Handover Desirable for Radio Reasons, Handover Target not Allowed, Invalid AMF Region ID, No Radio Resources Available in Target Cell, Partial Handover, Reduce Load in Serving Cell, Resource Optimisation Handover, Time Critical Handover, TXnRELOCoverall Expiry, TXnRELOCprep Expiry, Unknown GUAMI ID, Unknown Local NG-RAN node UE XnAP ID, Inconsistent Remote NG-RAN node UE XnAP ID, Encryption And/Or Integrity Protection Algorithms Not Supported, Protection Algorithms Not Supported, Multiple PDU Session ID Instances, Unknown PDU Session ID, Unknown QoS Flow ID, Multiple QoS Flow ID Instances, Switch Off Ongoing, Not supported 5QI value, TXnDCoverall Expiry, TXnDCprep 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, UP integrity protection not possible, UP confidentiality protection not possible, Unspecified, ...)</p>	
>Transport Layer				
>>Transport Layer Cause	M		<p>ENUMERATED (Transport Resource Unavailable, Unspecified, ...)</p>	
>Protocol				
>>Protocol Cause	M		<p>ENUMERATED (Transfer Syntax Error, Abstract Syntax Error (Reject), Abstract Syntax Error (Ignore and Notify), Message not Compatible with Receiver State, Semantic Error, Abstract Syntax Error (Falsely Constructed Message), Unspecified, ...)</p>	
>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 specified in the following table. In general, “not supported” cause values indicate that the related capability is missing. On the other hand, “not available” cause values indicate that the related 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 AMF Region ID	The target NG-RAN node doesn't belong to the same pool area of the source NG-RAN node, i.e. NG 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 NG-RAN node did not admit all PDU Sessions included in the HANDOVER REQUEST and the source NG-RAN node estimated service continuity for the UE would be better by not proceeding with handover towards this particular target NG-RAN node.
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.
TXnRELOCoverall Expiry	The reason for the action is expiry of timer TXnRELOCoverall.
TXnRELOCprep Expiry	Handover Preparation procedure is cancelled when timer TXnRELOCprep expires.
Unknown GUAMI ID	The target NG-RAN node belongs to the same AMF Region of the source NG-RAN node and recognizes the AMF Region ID. However, the GUAMI value is unknown to the target NG-RAN node.
Unknown Local NG-RAN node UE XnAP ID	The action failed because the receiving NG-RAN node does not recognise the local NG-RAN node UE XnAP ID.
Inconsistent Remote NG-RAN node UE XnAP ID	The action failed because the receiving NG-RAN node considers that the received remote NG-RAN node UE XnAP ID is inconsistent..
Encryption And/Or Integrity Protection Algorithms Not Supported	The target NG-RAN node is unable to support any of the encryption and/or integrity protection algorithms supported by the UE.
Multiple PDU Session ID Instances	The action failed because multiple instances of the same PDU Session had been provided to the NG-RAN node.
Unknown PDU Session ID	The action failed because the PDU Session ID is unknown in the NG-RAN node.
Unknown QoS Flow ID	The action failed because the QoS Flow ID is unknown in the NG-RAN node.
Multiple QoS Flow ID Instances	The action failed because multiple instances of the same QoS flow had been provided to the NG-RAN node.
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 NG-RAN node in taking subsequent actions, e.g. selecting the target cell for subsequent handovers.
Not supported 5QI value	The action failed because the requested 5QI is not supported.
TXnDCoverall Expiry	The reason for the action is expiry of timer TXnDCoverall.
TXnDCprep Expiry	The reason for the action is expiry of timer TXnDCprep
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 NG-RAN node 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 PDU Sessions, e.g., NG is requested to be released in order to optimise the radio resources; or S-NG-RAN node didn't see activity on the PDU session recently. In the current version of this specification applicable for Dual Connectivity only. The semantics of this value may need to be refined. Cause Values for RRC_INACTIVITY should be discussed first.
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.
UP integrity protection not possible	The PDU session cannot be accepted according to the required user plane integrity protection policy.
UP confidentiality protection not possible	The PDU session cannot be accepted according to the required user plane confidentiality protection policy.
Unspecified	Sent for radio network layer cause when none of the specified cause values applies.

Transport Layer cause	Meaning
Unspecified	Sent when none of the above cause values applies but still the cause is Transport Network Layer related.

NAS cause	Meaning
Unspecified	Sent when none of the above cause values applies but still the cause is NAS related.

Protocol cause	Meaning
Transfer Syntax Error	The received message included a transfer syntax error.
Abstract Syntax Error (Reject)	The received message included an abstract syntax error and the concerning criticality indicated "reject".
Abstract Syntax Error (Ignore And Notify)	The received message included an abstract syntax error and the concerning criticality indicated "ignore and notify".
Message Not Compatible With Receiver State	The received message was not compatible with the receiver state.
Semantic Error	The received message included a semantic error.
Abstract Syntax Error (Falsely Constructed Message)	The received message contained IEs or IE groups in wrong order or with too many occurrences.
Unspecified	Sent when none of the above cause values applies but still the cause is Protocol related.

Miscellaneous cause	Meaning
Control Processing Overload	NG-RAN node control processing overload.
Hardware Failure	NG-RAN node hardware failure.
Not enough User Plane Processing Resources	NG-RAN node has insufficient user plane processing resources available.
O&M Intervention	Operation and Maintenance intervention related to NG-RAN node 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.

9.2.3.3 Criticality Diagnostics

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Procedure Code	O		INTEGER (0..255)	Procedure Code is to be used if Criticality Diagnostics is part of Error Indication procedure, and not within the response message of the same procedure that caused the error.
Triggering Message	O		ENUMERATED (initiating message, successful outcome, unsuccessful outcome)	The Triggering Message is used only if the Criticality Diagnostics is part of Error Indication procedure.
Procedure Criticality	O		ENUMERATED (reject, ignore, notify)	This Procedure Criticality is used for reporting the Criticality of the Triggering message (Procedure).
Information Element Criticality Diagnostics		<i>0..<maxNrOfErrors></i>		
>IE Criticality	M		ENUMERATED (reject, ignore, notify)	The IE Criticality is used for reporting the criticality of the triggering IE. The value "ignore" shall not be used.
>IE ID	M		INTEGER (0..65535)	The IE ID of the not understood or missing IE
>Type Of Error	M		ENUMERATED(not understood, missing, ...)	

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

9.2.3.4 Bit Rate

This IE indicates the number of bits delivered by NG-RAN in UL or to NG-RAN in DL within a period of time, divided by the duration of the period. It is used, for example, to indicate the maximum or guaranteed bit rate for a GBR QoS flow, or an aggregate maximum bit rate.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Bit Rate	M		INTEGER (0..4,000,000,000,000, ...)	The unit is: bit/s

9.2.3.5 QoS Flow Level QoS Parameters

This IE defines the QoS Parameters to be applied to a QoS flow.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE QoS Characteristics	M			
>Non Dynamic 5QI				
>>Non dynamic 5QI Descriptor	M		9.2.3.8	
>Dynamic 5QI				
>>Dynamic 5QI Descriptor	M		9.2.3.9	
Allocation and Retention Priority	M		9.2.3.7	Note: presence needs to be checked with latest SA2 status, hence this IE definition may need to be refined.
GBR QoS Flow Information	O		9.2.3.6	This IE shall be present for GBR QoS Flows only.
Reflective QoS Attribute	O		ENUMERATED (subject to, ...)	Reflective QoS is specified in TS 23.501 [7]. This IE applies to non-GBR bearers only and shall be ignored otherwise.
Additional QoS flow Information	O		ENUMERATED (more likely, ...)	If this IE is set to "more likely", this indicates that traffic for this QoS flow is likely to appear more often than traffic for other flows established for the PDU session. This IE may be present in case of non-GBR flows only and shall be ignored otherwise.
PPI	O		INTEGER (1..8, ...)	Paging Policy Indicator used in PPD feature (Paging Policy Differentiation) as specified in TS 23.501 [7]. This IE applies to PDU sessions of IP type.

9.2.3.6 GBR QoS Flow Information

This IE indicates QoS Parameters for a GBR QoS Flow for downlink and uplink.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Maximum Flow Bit Rate Downlink	M		Bit Rate 9.2.3.4	Maximum Bit Rate in DL. Flow Bit Rates are specified in TS 23.501 [7].
Maximum Flow Bit Rate Uplink	M		Bit Rate 9.2.3.4	Maximum Bit Rate in UL. Flow Bit Rates are specified in TS 23.501 [7].
Guaranteed Flow Bit Rate Downlink	M		Bit Rate 9.2.3.4	Guaranteed Bit Rate (provided that there is data to deliver) in DL. Flow Bit Rates are specified in TS 23.501 [7].
Guaranteed Flow Bit Rate Uplink	M		Bit Rate 9.2.3.4	Guaranteed Bit Rate (provided that there is data to deliver). Flow Bit Rates are specified in TS 23.501 [7].
Notification Control	O		ENUMERATED (notification requested, ...)	Notification control is specified in TS 23.501 [7]
Maximum Packet Loss Rate Downlink	O		Packet Loss Rate 9.2.3.11	Indicates the maximum rate for lost packets that can be tolerated in the downlink direction. Maximum Packet Loss Rate is specified in TS 23.501 [7].
Maximum Packet Loss Rate Uplink	O		Packet Loss Rate 9.2.3.11	Indicates the maximum rate for lost packets that can be tolerated in the uplink direction. Maximum Packet Loss Rate is specified in TS 23.501 [7].

9.2.3.7 Allocation and Retention Priority

This IE specifies the relative importance compared to other QoS flows for allocation and retention of the NR RAN resource.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Allocation/Retention Priority		1		
>Priority Level	M		INTEGER (0..15, ...)	Desc.: This defines the relative importance of a resource request. (see TS 23.501 [7]). Usage: Values between 1 and 15 are ordered in decreasing order of priority, i.e., 1 is the highest and 15 is the lowest.
>Pre-emption Capability	M		ENUMERATED (shall not trigger pre-emption, may trigger pre-emption, ...)	Desc.: This IE indicates the pre-emption capability of the request on other QoS flows Usage: The QoS flow shall not pre-empt other QoS flow or, the QoS flow may pre-empt other QoS flows The Pre-emption Capability indicator applies to the allocation of resources for a QoS flow and as such it provides the trigger to the pre-emption procedures/processes of the gNB.
>Pre-emption Vulnerability	M		ENUMERATED (not pre-emptable, pre-emptable, ...)	Desc.: This IE indicates the vulnerability of the QoS flow to preemption of other QoS flows. Usage: The QoS flow shall not be pre-empted by other QoS flows or the QoS flow may be pre-empted by other QoS flows. Pre-emption Vulnerability indicator applies for the entire duration of the QoS flow, unless modified and as such indicates whether the QoS flow is a target of the pre-emption procedures/processes of the gNB.

9.2.3.8 Non dynamic 5QI Descriptor

This IE defines QoS characteristics for a standardized or pre-configured 5QI for downlink and uplink.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
5QI	M		INTEGER (0..255)	The 5QI is specified in TS 23.501 [7]
Priority level	O		INTEGER (1..128)	Priority level is specified in TS 23.501 [7]. When included, it overrides standardized or pre-configured value.
Averaging window	O		9.2.3.14	This IE applies to GBR QoS Flows only. Averaging window is specified in TS 23.501 [7]. When included, it overrides standardized or pre-configured value.
Maximum Data Burst Volume	O		9.2.3.15	Maximum Data Burst Volume is specified in TS 23.501 [7]. When included, it overrides standardized or pre-configured value.

9.2.3.9 Dynamic 5QI Descriptor

This IE defines the QoS characteristics for a non-standardized or not pre-configured 5QI for downlink and uplink.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Priority level	M		INTEGER (1..128)	Priority level is specified in TS 23.501 [7].
Packet Delay Budget	M		9.2.3.12	Packet Delay Budget is specified in TS 23.501 [7].
Packet Error Rate	M		9.2.3.13	Packet Error Rate is specified in TS 23.501 [7].
Delay Critical	C-ifGBRflow		ENUMERATED (Delay critical, Non-delay critical, ...)	This IE indicates whether the GBR QoS flow is delay critical as specified in TS 23.501 [7].
Averaging window	C-ifGBRflow		9.2.3.14	Averaging window is specified in TS 23.501 [7].
Maximum Data Burst Volume	O		9.2.3.15	Maximum Data Burst Volume is specified in TS 23.501 [7].

Condition	Explanation
ifGBRflow	This IE shall be present if the <i>GBR QoS Flow Information</i> IE is present in the <i>QoS Flow Level QoS Parameters</i> IE.

9.2.3.10 QoS Flow Indicator

This IE identifies a QoS Flow within a PDU Session. Definition and use of the QoS Flow Indicator is specified in TS 23.501 [7].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
QoS Flow Indicator	M		INTEGER (0..63, ...)	

9.2.3.11 Packet Loss Rate

This IE indicates the Packet Loss Rate.

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

9.2.3.12 Packet Delay Budget

This IE indicates the Packet Delay Budget.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Packet Delay Budget	M		INTEGER (0..63)	This IE may need to be refined

9.2.3.13 Packet Error Rate

This IE indicates the Packet Error Rate.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Packet Error Rate	M		INTEGER (0..63)	This IE may need to be refined

9.2.3.14 Averaging Window

This IE indicates the Averaging Window.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Averaging Window	M		INTEGER (0..63)	This IE may need to be refined

9.2.3.15 Maximum Data Burst Volume

This IE indicates the Maximum Data Burst Volume.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Maximum Data Burst Volume	M		INTEGER (0..63)	This IE may need to be refined

9.2.3.16 NG-RAN node UE XnAP ID

The NG-RAN node UE XnAP ID uniquely identifies a UE over the Xn interface within the NG-RAN node.

The use of this IE is defined in TS 38.401 [2].

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

9.2.3.17 UE Aggregate Maximum Bit Rate

The UE Aggregate Maximum Bitrate is applicable for all Non-GBR QoS flows per UE which is defined for the Downlink and the Uplink direction and a subscription parameter provided by the AMF to the NG-RAN.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Aggregate Maximum Bit Rate				Applicable for Non-GBR QoS flows.
>UE Aggregate Maximum Bit Rate Downlink	M		Bit Rate 9.2.3.4	This IE indicates the UE Aggregate Maximum Bit Rate as specified in TS 23.501 [7] in the downlink direction.
>UE Aggregate Maximum Bit Rate Uplink	M		Bit Rate 9.2.3.4	This IE indicates the UE Aggregate Maximum Bit Rate as specified in TS 23.501 [7] in the uplink direction.

9.2.3.18 PDU Session ID

This IE identifies a PDU Session for a UE. Definition and use of the PDU Session ID is specified in TS 23.501 [7].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session ID	M		INTEGER (0 ..255)	The value range of this IE may need to be refined.

9.2.3.19 PDU Session Type

This IE defines the PDU Session Type as specified in TS 23.501 [7].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session Type	M		ENUMERATED (IPv4, IPv6, IPv4v6, Ethernet, Unstructured, ...)	

9.2.3.20 TAI Support List

This IE indicates the list of TAIs supported by NG-RAN node and associated characteristics e.g. supported slices.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
TAI Support Item IEs		<i>1..<maxno ofsupportedTACs></i>			EACH	reject
>TAC	M		9.2.2.5	Broadcast TAC	–	
>Broadcast PLMNs		<i>1..<maxno ofsupportedPLMNs></i>			–	
>>PLMN Identity	M		9.2.2.4	Broadcast PLMN	–	
>>TAI Slice Support List	O		Slice Support List 9.2.3.22	Supported S-NSSAIs per TA	–	

Range bound	Explanation
maxnoofsupportedTACs	Maximum no. of TACs supported by an NG-RAN node. Value is 1024. This IE may need to be refined.
maxnoofsupportedPLMNs	Maximum no. of PLMNs supported by an NG-RAN node. Value is 16. This IE may need to be refined.

9.2.3.21 S-NSSAI

This IE indicates the S-NSSAI.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
>SST	M		OCTET STRING (SIZE(1))	
>SD	O		OCTET STRING (SIZE(3))	

9.2.3.22 Slice Support List

This IE indicates the list of supported slices.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Slice Support Item IEs		<i>1..<maxnoof SliceItems></i>		
>S-NSSAI	M		9.2.3.21	

Range bound	Explanation
maxnoofSliceItems	Maximum no. of signalled slice support items. Value is 1024.

9.2.3.23 Index to RAT/Frequency Selection Priority

The *Index to RAT/Frequency Selection Priority* IE is used to define local configuration for RRM strategies such as camp priorities and control of inter-RAT/inter-frequency mobility in RRC_CONNECTED, as specified in TS 23.501 [7].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Index to RAT/Frequency Selection Priority	M		INTEGER (1..256)	

9.2.3.24 GUAMI

This IE contains the Globally Unique AMF Identifier (GUAMI) as defined in TS 23.003 [22].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN ID	M		9.2.2.4	
AMF Identifier		1		
>AMF Region ID	M		OCTET STRING (SIZE (2))	
>AMF Set ID	M		BIT STRING (SIZE (4))	
>AMF Pointer	M		BIT STRING (SIZE (4))	

9.2.3.25 Target Cell Global ID

This IE contains either an NR CGI or an E-UTRA CGI.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>Target Cell</i>	M			
> <i>NR</i>				
>>NR CGI	M		9.2.2.7	
> <i>E-UTRA</i>				
>>E-UTRA CGI	M		9.2.2.8	

9.2.3.26 AMF UE NGAP ID

This IE is defined in TS 38.413 [5] and used to refer to the UE Context in the serving AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
AMF UE NGAP ID	M		INTEGER (0 .. 2 ³² -1)	As defined in TS 38.413 [5].

9.2.3.27 SCG Configuration Query

The *SCG Configuration Query* IE is used to request the S-NG-RAN node to provide current SCG configuration.

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

9.2.3.28 RLC Mode

The *RLC Mode* IE indicates the RLC Mode used for a DRB.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
RLC Mode	M		ENUMERATED (RLC-AM, RLC-UM)	

9.2.3.29 Transport Layer Address

This IE is defined to contain an IP address.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Transport Layer Address			BIT STRING (1..160, ...)	

9.2.3.30 UP Transport Layer Information

This element is used to provide the transport layer information associated with NG or Xn user plane transport. In this release it corresponds to an IP address and a GTP Tunnel Endpoint Identifier.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>UP Transport Layer Information</i>	M			
> <i>GTP tunnel</i>				
>>Transport Layer Address	M		9.2.3.29	The Transport Layer Address is specified in TS 38.424 [19] and TS 38.414 [20].
>>GTP-TEID	M		OCTET STRING (4)	The Tunnel Endpoint Identifier (TEID) is specified in TS 29.281 [18]

9.2.3.31 CP Transport Layer Information

This element is used to provide the transport layer information associated with NG or Xn control plane transport.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>CP Transport Layer Information</i>				
> <i>Endpoint IP address</i>				
>>Endpoint IP Address	M		Transport Layer Address 9.2.3.29	The Transport Layer Address is specified in TS 38.424 [19] and TS 38.414 [20]. The Transport Layer Address is specified in TS 38.422 [4] and TS 38.412 [21].

9.2.3.32 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 [22] with the last 4 digits of the SNR masked by setting the corresponding bits to 1.

9.2.3.33 DRB ID

This IE contains the DRB ID.

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

9.2.3.34 DL Forwarding

This element indicates a proposal for forwarding of downlink packets.

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

9.2.3.35 Data Forwarding Accepted

This element indicates that data forwarding was accepted.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Data Forwarding Accepted	M		ENUMERATED (data forwarding accepted, ...)	

9.2.3.36 COUNT Value for PDCP SN Length 12

This information element indicates the 12-bit long PDCP sequence number and the corresponding 20 bit long Hyper Frame Number.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDCP-SN Length 12	M		INTEGER (0..4095)	
HFN for PDCP-SN Length 12	M		INTEGER (0..1048575)	

9.2.3.37 COUNT Value for PDCP SN Length 18

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

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

9.2.3.38 RAN Paging Area

The *RAN Paging Area* IE defines the paging area for RAN paging UEs in RRC_INACTIVE state.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.2.2.4	
<i>CHOICE RAN Paging Area Choice</i>	M			
> <i>Cell List</i>				
>> Cell List Item		1 .. < <i>maxnoofCellsInRNA</i> >		
>>>NG-RAN Cell Identity	M		9.2.2.9	
> <i>RAN Area ID List</i>				
>> RAN Area ID List Item		1 .. < <i>maxnoofRanAreasInRNA</i> >		
>>>RAN Area ID	M		9.2.3.39	

Range bound	Explanation
<i>maxnoofCellsInRNA</i>	Maximum no. of cells in a RAN notification area. Value is 32.
<i>maxnoofRanAreasInRNA</i>	Maximum no. of RAN area IDs in a RAN notification area. Value is 16.

9.2.3.39 RAN Area ID

This IE defines the RAN Area ID.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
TAC	M		9.2.2.5	Tracking Area Code
RANAC	O		RAN Area Code 9.2.2.6	

9.2.3.40 UE Context ID

This IE is used to address a UE Context within an NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>UE Context ID</i>	M			
> <i>RRC Resume</i>				
>>I-RNTI	M		9.2.3.46	How the new NG-RAN node is able to resolve the old NG-RAN ID from the I-RNTI is a matter of proper configuration in the old and new NG-RAN node.
> <i>RRC Reestablishment</i>				
>>C-RNTI	M		BIT STRING (SIZE (16))	C-RNTI contained in the <i>RRC Re-establishment Request</i> message (TS 38.331 [10])
>> Failure Cell PCI	M		NG-RAN Cell PCI 9.2.2.10	

9.2.3.41 Assistance Data for RAN Paging

This IE provides assistance information for RAN paging.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RAN Paging Attempt Information	O		9.2.3.42	

9.2.3.42 RAN Paging Attempt Information

This IE includes information related to the RAN paging attempt over Xn.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Paging Attempt Count	M		INTEGER (1..16,...)	Number of the RAN paging attempt.
Intended Number of Paging Attempts	M		INTEGER (1..16,...)	Intended number of RAN paging attempts.
Next Paging Area Scope	O		ENUMERATED (same, changed, ...)	Indicates whether the RAN paging area scope will change at next RAN paging attempt.

9.2.3.43 UE RAN Paging Identity

The IE defines the UE Identity for RAN paging a UE in RRC_INACTIVE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE UE RAN Paging Identity	M			
> <i>I-RNTI</i>				
>>I-RNTI	M		9.2.3.46	

9.2.3.44 RAN Paging Priority

This information element contains an indication of the priority to be considered for the paging request.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RAN Paging Priority	M		INTEGER (1..256)	

9.2.3.45 Delivery Status

This IE provides the delivery status of RRC PDUs provided by RRC Transfer message.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Delivery Status	M		INTEGER (0..2 ¹² -1)	Highest successfully delivered NR PDCP SN, as defined in 38.323 [11].

9.2.3.46 I-RNTI

The I-RNTI is defined for allocation in an NR or E-UTRA serving cell as a reference to a UE Context within an NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
I-RNTI	M		BIT STRING (SIZE (40))	This IE may need to be refined.

9.2.3.47 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
Event Type	M		ENUMERATED (report upon change of serving cell, report UE moving presence into or out of the Area of Interest, ...)	
Report Area	M		ENUMERATED (Cell, ...)	
Area Of Interest	O		9.2.3.48	

9.2.3.48 Area of Interest

This IE indicates the area of interest.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
List of Area Of Interest		1..<maxnoofAols>		
>List of TAIs		0..1		
>>TAI List Item		1..<maxnoofTAIsinAol>		
>>>PLMN	M		9.2.2.4	
>>>TAC	M		9.2.2.5	
>List of Cells		0..1		This IE may need to be refined with SA2.
>>Cell List Item		1..<maxnoofcellsinaol>		
>>>PLMN	M		9.2.2.4	
>>>NG-RAN Cell Identity	M		9.2.2.9	

Range bound	Explanation
maxnoofAOIs	Maximum no. of areas of interest. Value is 64.
maxnoofTAlsinaoI	Maximum no. of tracking areas in an area of interest. Value is 16.
maxnoofcellsinaoI	Maximum no. of cells in an Area of Interest. Value is 256. This value may need to be refined.

9.2.3.49 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
NR Encryption Algorithms	M		BIT STRING {nea1-128(1), nea2-128(2), nea3-128(3)} (SIZE(16, ...))	Each position in the bitmap represents an encryption algorithm: "all bits equal to 0" – UE supports no other NR algorithm than NEA0, "first bit" – 128-NEA1, "second bit" – 128-NEA2, "third bit" – 128-NEA3, other bits reserved for future use. Value '1' indicates support and value '0' indicates no support of the algorithm. Algorithms are defined in TS 33.501 [28].
NR Integrity Protection Algorithms	M		BIT STRING {nia1-128(1), nia2-128(2), nia3-128(3)} (SIZE(16, ...))	Each position in the bitmap represents an integrity protection algorithm: "all bits equal to 0" – UE supports no other NR algorithm than NIA0, "first bit" – 128-NIA1, "second bit" – 128-NIA2, "third bit" – 128-NIA3, other bits reserved for future use. Value '1' indicates support and value '0' indicates no support of the algorithm. Algorithms are defined in TS 33.501 [28].
E-UTRA Encryption Algorithms	M		BIT STRING {eea1-128(1), eea2-128(2), eea3-128(3)} (SIZE(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 [29].
E-UTRA Integrity Protection Algorithms	M		BIT STRING {eia1-128(1), eia2-128(2), eia3-128(3)} (SIZE(16, ...))	Each position in the bitmap represents an integrity protection algorithm: "all bits equal to 0" – UE supports no other algorithm than EIA0, "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 [29].

9.2.3.50 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 NG-RAN Star	M		BIT STRING (256)	$K_{\text{NG-RAN}}^*$ defined in TS 33.501 [28].
Next Hop Chaining Count	M		INTEGER (0..7)	Next Hop Chaining Count (NCC) defined in TS 33.501 [28]

9.2.3.51 S-NG-RAN node Security Key

The *S-NG-RAN node Security Key* IE is used to apply security in the S-NG-RAN node as defined in TS 33.501 [28].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
S-NG-RAN node Security Key	M		BIT STRING (SIZE(256))	The $S\text{-}K_{\text{SN}}$ which is provided by the M-NG-RAN node, see TS 33.501 [28].

9.2.3.52 Security Indication

This IE indicates whether the UP integrity is configured for corresponding PDU sessions, respectively.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Integrity Protection Indication	M		ENUMERATED (required, preferred, not needed,...)	Indicates whether UP integrity protection shall apply, should apply, or shall not apply for the concerned PDU session.
Confidentiality Protection Indication	M		ENUMERATED (required, preferred, not needed, ...)	Indicates whether UP ciphering shall apply, should apply, or shall not apply for the concerned PDU session.

9.2.3.53 Mobility Restriction List

This IE defines roaming or access restrictions for subsequent mobility actions for which the NR-RAN provides information about the target of the mobility action towards the UE, e.g., handover, or for SCG selection during dual connectivity operation or for assigning proper RNAs. If the NG-RAN receives the *Mobility Restriction List* IE, it shall overwrite previously received restriction information. NG-RAN behaviour upon receiving this IE is specified in TS 23.501 [7].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Serving PLMN	M		PLMN Identity 9.2.2.4	
Equivalent PLMNs		<i>0..<maxnoofEPLMNs></i>		Allowed PLMNs in addition to Serving PLMN. This list corresponds to the list of "equivalent PLMNs" as defined in TS 24.501 [30]. 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		9.2.2.4	
RAT Restrictions		<i>0..<maxnoofPLMNs></i>		This IE contains RAT restriction related information as specified in TS 23.501 [7].
>PLMN Identity	M		9.2.2.4	
>RAT Restriction Information	M		BIT STRING { e-UTRA (0), nR (1) } (SIZE(8, ...))	Each position in the bitmap represents a RAT. If a bit is set to "1", the respective RAT is restricted for the UE. If a bit is set to "0", the respective RAT is not restricted for the UE. This version of the specification does not use bits 2-7, the sending node shall set bits 2-7 to "0", the sender shall ignore bits 2-7.
Forbidden Area Information		<i>0..<maxnoofPLMNs></i>		This IE contains Forbidden Area information as specified in TS 23.501 [7].
>PLMN Identity	M		9.2.2.4	
>Forbidden TACs		<i>1..<maxnoofForbiddenTACs></i>		
>>TAC	M		9.2.2.5	The TAC of the forbidden TAI.
Service Area Information		<i>0..<maxnoofPLMNs></i>		This IE contains Service Area Restriction information as specified in TS 23.501 [7].
>PLMN Identity	M		9.2.2.4	
>Allowed TACs		<i>0..<maxnoofAllowedAreas></i>		
>>TAC	M		9.2.2.5	The TAC of the allowed TAI.
>Not Allowed TACs		<i>0..<maxnoofAllowedAreas></i>		
>>TAC	M		9.2.2.5	The TAC of the not-allowed TAI.

Range bound	Explanation
maxnoofEPLMNs	Maximum no. of equivalent PLMNs. Value is 15.
maxnoofPLMNs	Maximum no. of allowed PLMNs. Value is 16.
maxnoofForbiddenTACs	Maximum no. of forbidden Tracking Area Codes. Value is 4096.
maxnoofAllowedAreas	Maximum no. of allowed or not allowed Tracking Areas. Value is 16.

9.2.3.54 Xn Benefit Value

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Xn Benefit Value	M		INTEGER (1..8, ...)	Value 1 indicates lowest benefit, and 8 indicates highest benefit.

9.2.3.55 Trace Activation

This IE defines parameters related to a trace activation.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NG-RAN Trace ID	M		OCTET STRING (SIZE(8))	This IE is composed of the following: Trace Reference defined in TS 32.422 [23] (leftmost 6 octets, with PLMN information encoded as in 9.2.2.4), and Trace Recording Session Reference defined in TS 32.422 [23] (last 2 octets).
Interfaces To Trace	M		BIT STRING (SIZE(8))	Each position in the bitmap represents an NG-RAN node interface: first bit = NG-C, second bit = Xn-C, third bit = Uu, fourth bit = F1-C, fifth bit = E1: other bits reserved for future use. Value '1' indicates 'should be traced'. Value '0' indicates 'should not be traced'.
Trace Depth	M		ENUMERATED (minimum, medium, maximum, MinimumWithoutVendorSpecificExtension, MediumWithoutVendorSpecificExtension, MaximumWithoutVendorSpecificExtension, ...)	Defined in TS 32.422 [23].
Trace Collection Entity IP Address	M		Transport Layer Address 9.2.3.29	Defined in TS 32.422 [23]

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

Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018, the content of section 9.3 related to Dual Connectivity is FFS.

9.3.1 General

XnAP ASN.1 definition conforms to ITU-T Rec. X.680 [16] and ITU-T Rec. X.681 [17].

Sub clause 9.3 presents the Abstract Syntax of the XnAP 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 XnAP messages. XnAP 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 XnAP 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 XnAP 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
--
-- *****

XnAP-PDU-Descriptions {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) xnap (2) version1 (1) xnap-PDU-Descriptions (0) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    Criticality,
    ProcedureCode

FROM XnAP-CommonDataTypes

    HandoverRequest,
    HandoverRequestAcknowledge,
    HandoverPreparationFailure,
    SNStatusTransfer,
    UEContextRelease,
    HandoverCancel,
    RANPaging,
    RetrieveUEContextRequest,
    RetrieveUEContextResponse,
    RetrieveUEContextFailure,
    DataForwardingAddressIndication,
    SNodeAdditionRequest,
    SNodeAdditionRequestAcknowledge,
    SNodeAdditionRequestReject,
    SNodeReconfigurationComplete,
    SNodeModificationRequest,
    SNodeModificationRequestAcknowledge,
    SNodeModificationRequestReject,
    SNodeModificationRequired,
    SNodeModificationConfirm,
    SNodeModificationRefuse,
    SNodeReleaseRequest,
    SNodeReleaseRequestAcknowledge,
    SNodeReleaseReject,
    SNodeReleaseRequired,
```

```
SNodeReleaseConfirm,  
SNodeCounterCheckRequest,  
SNodeChangeRequired,  
SNodeChangeConfirm,  
SNodeChangeRefuse,  
RRCTransfer,  
XnRemovalRequest,  
XnRemovalResponse,  
XnRemovalFailure,  
XnSetupRequest,  
XnSetupResponse,  
XnSetupFailure,  
NGRANNodeConfigurationUpdate,  
NGRANNodeConfigurationUpdateAcknowledge,  
NGRANNodeConfigurationUpdateFailure,  
CellActivationRequest,  
CellActivationResponse,  
CellActivationFailure,  
ResetRequest,  
ResetResponse,  
ErrorIndication,  
PrivateMessage
```

FROM XnAP-PDU-Contents

```
id-handoverPreparation,  
id-sNStatusTransfer,  
id-handoverCancel,  
id-retrieveUEContext,  
id-rANPaging,  
id-dataForwardingAddressIndication,  
id-uEContextRelease,  
id-sNGRANnodeAdditionPreparation,  
id-sNGRANnodeReconfigurationCompletion,  
id-mNGRANnodeinitiatedSNGRANnodeModificationPreparation,  
id-sNGRANnodeinitiatedSNGRANnodeModificationPreparation,  
id-mNGRANnodeinitiatedSNGRANnodeRelease,  
id-sNGRANnodeinitiatedSNGRANnodeRelease,  
id-sNGRANnodeCounterCheck,  
id-sNGRANnodeChange,  
id-rRCTransfer,  
id-xnRemoval,  
id-xnSetup,  
id-nGRANnodeConfigurationUpdate,  
id-cellActivation,  
id-reset,  
id-errorIndication,  
id-privateMessage
```

FROM XnAP-Constants;

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

```

--
-- *****
XNAP-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
--
-- *****

XnAP-PDU ::= CHOICE {
    initiatingMessage    InitiatingMessage,
    successfulOutcome    SuccessfulOutcome,
    unsuccessfulOutcome  UnsuccessfulOutcome,
    ...
}

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

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

UnsuccessfulOutcome ::= SEQUENCE {
    procedureCode    XNAP-ELEMENTARY-PROCEDURE.&procedureCode    ( { XNAP-ELEMENTARY-PROCEDURES } ),
    criticality      XNAP-ELEMENTARY-PROCEDURE.&criticality        ( { XNAP-ELEMENTARY-PROCEDURES } { @procedureCode } ),
    value            XNAP-ELEMENTARY-PROCEDURE.&UnsuccessfulOutcome ( { XNAP-ELEMENTARY-PROCEDURES } { @procedureCode } )
}
-- *****
--
-- Interface Elementary Procedure List
--
-- *****

```

```

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

XNAP-ELEMENTARY-PROCEDURES-CLASS-1 XNAP-ELEMENTARY-PROCEDURE ::= {
    handoverPreparation
    retrieveUEContext
    sNGRANnodeAdditionPreparation
    mNGRANnodeinitiatedSNGRANnodeModificationPreparation
    sNGRANnodeinitiatedSNGRANnodeModificationPreparation
    mNGRANnodeinitiatedSNGRANnodeRelease
    sNGRANnodeinitiatedSNGRANnodeRelease
    sNGRANnodeChange
    xnRemoval
    xnSetup
    nGRANnodeConfigurationUpdate
    cellActivation
    reset
    ...
}

XNAP-ELEMENTARY-PROCEDURES-CLASS-2 XNAP-ELEMENTARY-PROCEDURE ::= {
    sNStatusTransfer
    handoverCancel
    rANPaging
    dataForwardingAddressIndication
    uEContextRelease
    sNGRANnodeReconfigurationCompletion
    sNGRANnodeCounterCheck
    rRCTransfer
    errorIndication
    privateMessage
    ...
}

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

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

```

```
sNStatusTransfer XNAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      SNStatusTransfer
  PROCEDURE CODE          id-sNStatusTransfer
  CRITICALITY              ignore
}

handoverCancel XNAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      HandoverCancel
  PROCEDURE CODE          id-handoverCancel
  CRITICALITY              ignore
}

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

rANPaging XNAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      RANPaging
  PROCEDURE CODE          id-rANPaging
  CRITICALITY              reject
}

dataForwardingAddressIndication XNAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      DataForwardingAddressIndication
  PROCEDURE CODE          id-dataForwardingAddressIndication
  CRITICALITY              reject
}

ueContextRelease XNAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      UEContextRelease
  PROCEDURE CODE          id-ueContextRelease
  CRITICALITY              reject
}

sNGRANnodeAdditionPreparation XNAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      SNodeAdditionRequest
  SUCCESSFUL OUTCOME      SNodeAdditionRequestAcknowledge
  UNSUCCESSFUL OUTCOME    SNodeAdditionRequestReject
  PROCEDURE CODE          id-sNGRANnodeAdditionPreparation
  CRITICALITY              reject
}

sNGRANnodeReconfigurationCompletion XNAP-ELEMENTARY-PROCEDURE ::= {
```



```

INITIATING MESSAGE      SNodeReconfigurationComplete
PROCEDURE CODE          id-sNGRANnodeReconfigurationCompletion
CRITICALITY             reject
}

mNGRANnodeinitiatedSNGRANnodeModificationPreparation  XNAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      SNodeModificationRequest
  SUCCESSFUL OUTCOME      SNodeModificationRequestAcknowledge
  UNSUCCESSFUL OUTCOME    SNodeModificationRequestReject
  PROCEDURE CODE          id-mNGRANnodeinitiatedSNGRANnodeModificationPreparation
  CRITICALITY             reject
}

sNGRANnodeinitiatedSNGRANnodeModificationPreparation  XNAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      SNodeModificationRequired
  SUCCESSFUL OUTCOME      SNodeModificationConfirm
  UNSUCCESSFUL OUTCOME    SNodeModificationRefuse
  PROCEDURE CODE          id-sNGRANnodeinitiatedSNGRANnodeModificationPreparation
  CRITICALITY             reject
}

mNGRANnodeinitiatedSNGRANnodeRelease  XNAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      SNodeReleaseRequest
  SUCCESSFUL OUTCOME      SNodeReleaseRequestAcknowledge
  UNSUCCESSFUL OUTCOME    SNodeReleaseReject
  PROCEDURE CODE          id-mNGRANnodeinitiatedSNGRANnodeRelease
  CRITICALITY             reject
}

sNGRANnodeinitiatedSNGRANnodeRelease  XNAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      SNodeReleaseRequired
  SUCCESSFUL OUTCOME      SNodeReleaseConfirm
  PROCEDURE CODE          id-sNGRANnodeinitiatedSNGRANnodeRelease
  CRITICALITY             reject
}

sNGRANnodeCounterCheck  XNAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      SNodeCounterCheckRequest
  PROCEDURE CODE          id-sNGRANnodeCounterCheck
  CRITICALITY             reject
}

sNGRANnodeChange  XNAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      SNodeChangeRequired
  SUCCESSFUL OUTCOME      SNodeChangeConfirm
  UNSUCCESSFUL OUTCOME    SNodeChangeRefuse
  PROCEDURE CODE          id-sNGRANnodeChange
  CRITICALITY             reject
}

```

```
}

rRCTransfer XNAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      RRCTransfer
    PROCEDURE CODE         id-rRCTransfer
    CRITICALITY             ignore
}

xnRemoval XNAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      XnRemovalRequest
    SUCCESSFUL OUTCOME     XnRemovalResponse
    UNSUCCESSFUL OUTCOME   XnRemovalFailure
    PROCEDURE CODE         id-xnRemoval
    CRITICALITY             reject
}

xnSetup XNAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      XnSetupRequest
    SUCCESSFUL OUTCOME     XnSetupResponse
    UNSUCCESSFUL OUTCOME   XnSetupFailure
    PROCEDURE CODE         id-xnSetup
    CRITICALITY             reject
}

nGRANnodeConfigurationUpdate XNAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      NGRANnodeConfigurationUpdate
    SUCCESSFUL OUTCOME     NGRANnodeConfigurationUpdateAcknowledge
    UNSUCCESSFUL OUTCOME   NGRANnodeConfigurationUpdateFailure
    PROCEDURE CODE         id-nGRANnodeConfigurationUpdate
    CRITICALITY             reject
}

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

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

```

errorIndication XNAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ErrorIndication
    PROCEDURE CODE          id-errorIndication
    CRITICALITY             ignore
}

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

END

```

9.3.4 PDU Definitions

```

-- *****
--
-- PDU definitions for XnAP.
--
-- *****

XnAP-PDU-Contents {
    itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
    ngran-access (22) modules (3) xnap (2) version1 (1) xnap-PDU-Contents (1) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS

    ActivationIDforCellActivation,
    ActivationIDforCellActivation,
    AMF-Pool-Information,
    AMF-UE-NGAP-ID,
    AS-SecurityInformation,
    AssistanceDataForRANPaging,
    Cause,
    CellAssistanceInfo-NR,
    CPTransportLayerInformation,
    CriticalityDiagnostics,
    DataforwardingInfoPerPDUSession,
    DRBsSubjectToStatusTransfer-List,
    DRBToQoSFlowMapping-List,
    E-UTRA-CGI,
    GlobalNG-RANNode-ID,
    GUAMI,

```

I-RNTI,
LocationReportingInformation,
ServedCells-E-UTRA,
ServedCells-NR,
ServedCellsToUpdate-E-UTRA,
ServedCellsToUpdate-NR,
MAC-I,
MaskedIMEISV,
MobilityRestrictionList,
NG-RAN-Cell-Identity,
NG-RANnodeUEXnAPID,
NR-CGI,
PagingDRX,
PDUSession-ID,
PDUSessionResourcesAdmitted-List,
PDUSessionResourcesNotAdmitted-List,
PDUSessionResourcesToBeSetup-List,
PDUSessionType,
QoSFlows-List,
RANPagingArea,
RANPagingPriority,
ResetRequestTypeInfo,
ResetResponseTypeInfo,
RFSP-Index,
SecurityIndication,
ServedCells-NR,
S-NSSAI,
TAISupport-List,
Target-CGI,
TraceActivation,
TraceActivation,
UEAggregateMaximumBitRate,
UEContextID,
UEContextInfoRetrUECtxtResp,
UEIdentityIndexValue,
UERANPagingIdentity,
UESecurityCapabilities,
UPTransportLayerInformation,
XnBenefitValue

FROM XnAP-IEs

PrivateIE-Container{},
ProtocolExtensionContainer{},
ProtocolIE-Container{},
ProtocolIE-ContainerList{},
ProtocolIE-ContainerPair{},
ProtocolIE-ContainerPairList{},
ProtocolIE-Single-Container{},
XNAP-PRIVATE-IES,
XNAP-PROTOCOL-EXTENSION,
XNAP-PROTOCOL-IES,
XNAP-PROTOCOL-IES-PAIR

FROM XnAP-Containers

id-ActivatedServedCells,
id-ActivationIDforCellActivation,
id-AMF-Pool-Information,
id-AssistanceDataForRANPaging,
id-Cause,
id-cellAssistanceInfo-NR,
id-ConfigurationUpdateInitiatingNodeChoice,
id-UEContextID,
id-CriticalityDiagnostics,
id-dataforwardingInfoPerPDUSession, id-DRBsSubjectToStatusTransfer-List,
id-GlobalNG-RAN-node-ID,
id-GUAMI,
id-List-of-served-cells-E-UTRA,
id-List-of-served-cells-NR,
id-LocationReportingInformation,
id-MAC-I,
id-MaskedIMEISV,
id-new-NG-RAN-Cell-Identity,
id-newNG-RANnodeUEXnAPID,
id-oldNG-RANnodeUEXnAPID,
id-PagingDRX,
id-PDUSessionResourcesAdmitted-List,
id-PDUSessionResourcesNotAdmitted-List,
id-RANPagingArea,
id-RANPagingPriority,
id-ResetRequestTypeInfo,
id-ResetResponseTypeInfo,
id-RespondingNodeTypeConfigUpdateAck,
id-ServedCellsToActivate,
id-servedCellsToUpdate-E-UTRA,
id-ServedCellsToUpdateInitiatingNodeChoice,
id-servedCellsToUpdate-NR,
id-sourceNG-RANnodeUEXnAPID,
id-TAISupport-list,
id-Target2SourceNG-RANnodeTranspContainer,
id-targetCellGlobalID,
id-targetNG-RANnodeUEXnAPID,
id-TraceActivation,
id-TraceActivation,
id-UEContextInfoHORequest,
id-UEContextInfoRetrUECtxtResp,
id-UEIdentityIndexValue,
id-UERANPagingIdentity,
id-XnRemovalThreshold,

maxnoofCellsinNGRANnode,
maxnoofPDUSessions

FROM XnAP-Constants;

-- *****

```

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

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

HandoverRequest-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-sourceNG-RANnodeUEXnAPID          CRITICALITY reject TYPE NG-RANnodeUEXnAPID          PRESENCE mandatory}|
    { ID id-Cause                             CRITICALITY reject TYPE Cause                     PRESENCE mandatory}|
    { ID id-targetCellGlobalID                CRITICALITY reject TYPE Target-CGI                 PRESENCE mandatory}|
    { ID id-GUAMI                             CRITICALITY reject TYPE GUAMI                       PRESENCE mandatory}|
    { ID id-UEContextInfoHORequest           CRITICALITY reject TYPE UEContextInfoHORequest      PRESENCE mandatory}|
    { ID id-TraceActivation                   CRITICALITY ignore TYPE TraceActivation             PRESENCE optional }|
    { ID id-MaskedIMEISV                      CRITICALITY ignore TYPE MaskedIMEISV                PRESENCE optional },
    ...
}

UEContextInfoHORequest ::= SEQUENCE {
    ng-c-UE-reference                AMF-UE-NGAP-ID,
    cp-TNL-info-source               CPTransportLayerInformation,
    ueSecurityCapabilities            UESecurityCapabilities,
    securityInformation              AS-SecurityInformation,
    indexToRatFrequencySelectionPriority RFSP-Index                                OPTIONAL,    ue-AMBR
    UEAggregateMaximumBitRate,
    pduSessionResourcesToBeSetup-List PDUSessionResourcesToBeSetup-List,
    rrc-Context                      OCTET STRING,
    locationReportingInformation      LocationReportingInformation                OPTIONAL,
    hlr                               MobilityRestrictionList                    OPTIONAL,
    iE-Extensions                    ProtocolExtensionContainer { {UEContextInfoHORequest-ExtIEs} } OPTIONAL,
    ...
}

UEContextInfoHORequest-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

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

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

HandoverRequestAcknowledge-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-sourceNG-RANnodeUEXnAPID          CRITICALITY ignore TYPE NG-RANnodeUEXnAPID          PRESENCE mandatory}|
    { ID id-targetNG-RANnodeUEXnAPID         CRITICALITY ignore TYPE NG-RANnodeUEXnAPID          PRESENCE mandatory}|
}

```

```

    { ID id-PDUSessionResourcesAdmitted-List          CRITICALITY ignore TYPE PDUSessionResourcesAdmitted-List PRESENCE mandatory }|
    { ID id-PDUSessionResourcesNotAdmitted-List       CRITICALITY ignore TYPE PDUSessionResourcesNotAdmitted-List PRESENCE optional }|
    { ID id-Target2SourceNG-RANnodeTranspContainer    CRITICALITY ignore TYPE OCTET STRING PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics                    CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

-- *****
--
-- HANOVER PREPARATION FAILURE
--
-- *****

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

HandoverPreparationFailure-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-sourceNG-RANnodeUEXnAPID          CRITICALITY ignore TYPE NG-RANnodeUEXnAPID PRESENCE mandatory }|
    { ID id-Cause                             CRITICALITY ignore TYPE Cause PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics            CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

-- *****
--
-- SN STATUS TRANSFER
--
-- *****

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

SNStatusTransfer-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-sourceNG-RANnodeUEXnAPID          CRITICALITY reject TYPE NG-RANnodeUEXnAPID PRESENCE mandatory }|
    { ID id-targetNG-RANnodeUEXnAPID         CRITICALITY reject TYPE NG-RANnodeUEXnAPID PRESENCE mandatory }|
    { ID id-DRBsSubjectToStatusTransfer-List CRITICALITY ignore TYPE DRBsSubjectToStatusTransfer-List PRESENCE mandatory },
    ...
}

-- *****
--
-- UE CONTEXT RELEASE
--
-- *****

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

```

```

UEContextRelease-IEs XNAP-PROTOCOL-IES ::= {
  { ID id-sourceNG-RANnodeUEXnAPIID          CRITICALITY reject          TYPE NG-RANnodeUEXnAPIID          PRESENCE mandatory}|
  { ID id-targetNG-RANnodeUEXnAPIID          CRITICALITY reject          TYPE NG-RANnodeUEXnAPIID          PRESENCE mandatory},
  ...
}

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

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

HandoverCancel-IEs XNAP-PROTOCOL-IES ::= {
  { ID id-sourceNG-RANnodeUEXnAPIID          CRITICALITY reject          TYPE NG-RANnodeUEXnAPIID          PRESENCE mandatory}|
  { ID id-targetNG-RANnodeUEXnAPIID          CRITICALITY ignore         TYPE NG-RANnodeUEXnAPIID          PRESENCE optional  }|
  { ID id-Cause                               CRITICALITY ignore         TYPE Cause                          PRESENCE mandatory},
  ...
}

-- *****
--
-- RAN PAGING
--
-- *****

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

RANPaging-IEs XNAP-PROTOCOL-IES ::= {
  { ID id-UEIdentityIndexValue                CRITICALITY reject          TYPE UEIdentityIndexValue          PRESENCE mandatory}|
  { ID id-UERANPagingIdentity                 CRITICALITY ignore         TYPE UERANPagingIdentity           PRESENCE mandatory}|
  { ID id-PagingDRX                           CRITICALITY ignore         TYPE PagingDRX                      PRESENCE mandatory}|
  { ID id-RANPagingArea                       CRITICALITY reject          TYPE RANPagingArea                  PRESENCE mandatory}|
  { ID id-RANPagingPriority                    CRITICALITY ignore         TYPE RANPagingPriority               PRESENCE optional  }|
  { ID id-AssistanceDataForRANPaging          CRITICALITY ignore         TYPE AssistanceDataForRANPaging     PRESENCE optional  },
  ...
}

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

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

```



```

}

RetrieveUEContextRequest-IEs XNAP-PROTOCOL-IES ::= {
  { ID id-newNG-RANnodeUEXnAPIID          CRITICALITY reject      TYPE NG-RANnodeUEXnAPIID          PRESENCE mandatory}|
  { ID id-UEContextID                      CRITICALITY reject      TYPE UEContextID                  PRESENCE mandatory}|
  { ID id-MAC-I                             CRITICALITY reject      TYPE MAC-I                        PRESENCE mandatory}|
  { ID id-new-NG-RAN-Cell-Identity          CRITICALITY reject      TYPE NG-RAN-Cell-Identity         PRESENCE mandatory},
  ...
}

-- *****
--
-- RETRIEVE UE CONTEXT RESPONSE
--
-- *****

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

RetrieveUEContextResponse-IEs XNAP-PROTOCOL-IES ::= {
  { ID id-newNG-RANnodeUEXnAPIID          CRITICALITY ignore      TYPE NG-RANnodeUEXnAPIID          PRESENCE mandatory}|
  { ID id-oldNG-RANnodeUEXnAPIID          CRITICALITY ignore      TYPE NG-RANnodeUEXnAPIID          PRESENCE mandatory}|
  { ID id-GUAMI                           CRITICALITY reject      TYPE GUAMI                         PRESENCE mandatory}|
  { ID id-UEContextInfoRetrUECtxtResp     CRITICALITY reject      TYPE UEContextInfoRetrUECtxtResp   PRESENCE mandatory}|
  { ID id-TraceActivation                  CRITICALITY ignore      TYPE TraceActivation                PRESENCE optional  }|
  { ID id-MaskedIMEISV                     CRITICALITY ignore      TYPE MaskedIMEISV                   PRESENCE optional  }|
  { ID id-LocationReportingInformation     CRITICALITY ignore      TYPE LocationReportingInformation    PRESENCE optional  }|
  { ID id-CriticalityDiagnostics           CRITICALITY ignore      TYPE CriticalityDiagnostics         PRESENCE optional  },
  ...
}

-- *****
--
-- RETRIEVE UE CONTEXT FAILURE
--
-- *****

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

RetrieveUEContextFailure-IEs XNAP-PROTOCOL-IES ::= {
  { ID id-newNG-RANnodeUEXnAPIID          CRITICALITY ignore      TYPE NG-RANnodeUEXnAPIID          PRESENCE mandatory}|
  { ID id-Cause                           CRITICALITY ignore      TYPE Cause                         PRESENCE mandatory}|
  { ID id-CriticalityDiagnostics           CRITICALITY ignore      TYPE CriticalityDiagnostics         PRESENCE optional  },
  ...
}

-- *****
--
-- DATA FORWARDING ADDRESS INDICATION

```

```

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

DataForwardingAddressIndication-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-newNG-RANnodeUEXnAPIID          CRITICALITY ignore          TYPE NG-RANnodeUEXnAPIID          PRESENCE mandatory}|
    { ID id-oldNG-RANnodeUEXnAPIID          CRITICALITY ignore          TYPE NG-RANnodeUEXnAPIID          PRESENCE mandatory}|
    { ID id-dataforwardingInfoperPDUSession CRITICALITY reject           TYPE DataforwardingInfoperPDUSession PRESENCE mandatory},
    ...
}

-- *****
--
-- S-NODE ADDITION REQUEST
--
-- *****
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeAdditionRequest-IEs XNAP-PROTOCOL-IES ::= {
    ...
}

-- *****
--
-- S-NODE ADDITION REQUEST ACKNOWLEDGE
--
-- *****
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeAdditionRequestAcknowledge-IEs XNAP-PROTOCOL-IES ::= {
    ...
}

-- *****
--
-- S-NODE ADDITION REQUEST REJECT
--
-- *****

```

```
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.  
-- ASN.1 for this message is FFS.
```

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

```
SNodeAdditionRequestReject-IEs XNAP-PROTOCOL-IES ::= {  
    ...  
}
```

```
-- *****  
--  
-- S-NODE RECONFIGURATION COMPLETE  
--  
-- *****  
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.  
-- ASN.1 for this message is FFS.
```

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

```
SNodeReconfigurationComplete-IEs XNAP-PROTOCOL-IES ::= {  
    ...  
}
```

```
-- *****  
--  
-- S-NODE MODIFICATION REQUEST  
--  
-- *****  
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.  
-- ASN.1 for this message is FFS.
```

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

```
SNodeModificationRequest-IEs XNAP-PROTOCOL-IES ::= {  
    ...  
}
```

```
-- *****  
--  
-- S-NODE MODIFICATION REQUEST ACKNOWLEDGE  
--  
-- *****  
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.  
-- ASN.1 for this message is FFS.
```

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

SNodeModificationRequestAcknowledge-IEs XNAP-PROTOCOL-IES ::= {
    ...
}

-- *****
--
-- S-NODE MODIFICATION REQUEST REJECT
--
-- *****
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeModificationRequestReject-IEs XNAP-PROTOCOL-IES ::= {
    ...
}

-- *****
--
-- S-NODE MODIFICATION REQUIRED
--
-- *****
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeModificationRequired-IEs XNAP-PROTOCOL-IES ::= {
    ...
}

-- *****
--
-- S-NODE MODIFICATION CONFIRM
--
-- *****
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

```
}
SNodeModificationConfirm-IEs XNAP-PROTOCOL-IES ::= {
  ...
}
-- *****
--
-- S-NODE MODIFICATION REFUSE
--
-- *****
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeModificationRefuse-IEs XNAP-PROTOCOL-IES ::= {
  ...
}
-- *****
--
-- S-NODE RELEASE REQUEST
--
-- *****
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeReleaseRequest-IEs XNAP-PROTOCOL-IES ::= {
  ...
}
-- *****
--
-- S-NODE RELEASE REQUEST ACKNOWLEDGE
--
-- *****
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeReleaseRequestAcknowledge-IEs XNAP-PROTOCOL-IES ::= {
```

```
    ...
  }
-- *****
--
-- S-NODE RELEASE REJECT
--
-- *****
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeReleaseReject-IEs XNAP-PROTOCOL-IES ::= {
  ...
}

-- *****
--
-- S-NODE RELEASE REQUIRED
--
-- *****
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeReleaseRequired-IEs XNAP-PROTOCOL-IES ::= {
  ...
}

-- *****
--
-- S-NODE RELEASE CONFIRM
--
-- *****
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeReleaseConfirm-IEs XNAP-PROTOCOL-IES ::= {
  ...
}
```

```
-- *****
--
-- S-NODE COUNTER CHECK REQUEST
--
-- *****

-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeCounterCheckRequest-IEs XNAP-PROTOCOL-IES ::= {
    ...
}

-- *****
--
-- S-NODE CHANGE REQUIRED
--
-- *****

-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeChangeRequired-IEs XNAP-PROTOCOL-IES ::= {
    ...
}

-- *****
--
-- S-NODE CHANGE CONFIRM
--
-- *****

-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeChangeConfirm-IEs XNAP-PROTOCOL-IES ::= {
    ...
}

-- *****
--
```

```

-- S-NODE CHANGE REFUSE
--
-- *****
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

SNodeChangeRefuse-IEs XNAP-PROTOCOL-IES ::= {
    ...
}

-- *****
--
-- RRC TRANSFER
--
-- *****
-- Editor's Note: Dual Connectivity is not complete and is targeted for completion in December 2018.
-- ASN.1 for this message is FFS.

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

RRCTransfer-IEs XNAP-PROTOCOL-IES ::= {
    ...
}

-- *****
--
-- XN SETUP REQUEST
--
-- *****

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

XnSetupRequest-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-GlobalNG-RAN-node-ID      CRITICALITY reject TYPE GlobalNG-RANNode-ID      PRESENCE mandatory } |
    { ID id-TAISupport-list           CRITICALITY reject TYPE TAISupport-List      PRESENCE optional } |
    { ID id-AMF-Pool-Information       CRITICALITY reject TYPE AMF-Pool-Information  PRESENCE mandatory } |
    { ID id-List-of-served-cells-NR   CRITICALITY reject TYPE ServedCells-NR      PRESENCE optional } |
    { ID id-List-of-served-cells-E-UTRA CRITICALITY reject TYPE ServedCells-E-UTRA  PRESENCE optional },
    ...
}

-- *****
--

```



```

-- XN SETUP RESPONSE
--
-- *****
XnSetupResponse ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{ XnSetupResponse-IEs}},
    ...
}

XnSetupResponse-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-GlobalNG-RAN-node-ID          CRITICALITY reject  TYPE GlobalNG-RANNode-ID          PRESENCE mandatory}|
    { ID id-TAISupport-list                CRITICALITY reject  TYPE TAISupport-List          PRESENCE optional }|
    { ID id-List-of-served-cells-NR        CRITICALITY reject  TYPE ServedCells-NR          PRESENCE optional }|
    { ID id-List-of-served-cells-E-UTRA    CRITICALITY reject  TYPE ServedCells-E-UTRA      PRESENCE optional }|
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics   PRESENCE optional },
    ...
}

-- *****
--
-- XN SETUP FAILURE
--
-- *****
XnSetupFailure ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{ XnSetupFailure-IEs}},
    ...
}

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

-- *****
--
-- NG-RAN NODE CONFIGURATION UPDATE
--
-- *****
NGRANNodeConfigurationUpdate ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{ NGRANNodeConfigurationUpdate-IEs}},
    ...
}

NGRANNodeConfigurationUpdate-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-TAISupport-list                CRITICALITY reject  TYPE TAISupport-List          PRESENCE optional }|
    { ID id-ConfigurationUpdateInitiatingNodeChoice CRITICALITY ignore  TYPE ConfigurationUpdateInitiatingNodeChoice PRESENCE mandatory},
    ...
}

ConfigurationUpdateInitiatingNodeChoice ::= CHOICE {
    gNB          ProtocolIE-Container    { {ConfigurationUpdate-gNB} },

```

```

    ng-eNB          ProtocolIE-Container    { {ConfigurationUpdate-ng-eNB} },
    choice-extension ProtocolExtensionContainer { {ServedCellsToUpdateInitiatingNodeChoice-ExtIEs} },
                                                    -- This IE may need to be refined -- ...
}

ServedCellsToUpdateInitiatingNodeChoice-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

ConfigurationUpdate-gNB XNAP-PROTOCOL-IES ::= {
    { ID id-servedCellsToUpdate-NR          CRITICALITY ignore TYPE ServedCellsToUpdate-NR          PRESENCE optional }|
    { ID id-cellAssistanceInfo-NR          CRITICALITY ignore TYPE CellAssistanceInfo-NR          PRESENCE optional },
    ...
}

ConfigurationUpdate-ng-eNB XNAP-PROTOCOL-IES ::= {
    { ID id-servedCellsToUpdate-E-UTRA     CRITICALITY ignore TYPE ServedCellsToUpdate-E-UTRA     PRESENCE optional }|
    { ID id-cellAssistanceInfo-NR         CRITICALITY ignore TYPE CellAssistanceInfo-NR         PRESENCE optional },
    ...
}

-- *****
--
-- NG-RAN NODE CONFIGURATION UPDATE ACKNOWLEDGE
--
-- *****

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

NGRANNodeConfigurationUpdateAcknowledge-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-RespondingNodeTypeConfigUpdateAck  CRITICALITY ignore TYPE RespondingNodeTypeConfigUpdateAck  PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics            CRITICALITY ignore TYPE CriticalityDiagnostics            PRESENCE optional },
    ...
}

RespondingNodeTypeConfigUpdateAck ::= CHOICE {
    ng-eNB          RespondingNodeTypeConfigUpdateAck-ng-eNB,
    gNB             RespondingNodeTypeConfigUpdateAck-gNB,
    choice-extension ProtocolExtensionContainer { {RespondingNodeTypeConfigUpdateAck-ExtIEs} }, -- This IE may need to be refined --
    ...
}

RespondingNodeTypeConfigUpdateAck-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

RespondingNodeTypeConfigUpdateAck-ng-eNB ::= SEQUENCE {
    IE-Extension          ProtocolExtensionContainer { {RespondingNodeTypeConfigUpdateAck-ng-eNB-ExtIEs} } OPTIONAL,
    ...
}

```

```

}

RespondingNodeTypeConfigUpdateAck-ng-eNB-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

RespondingNodeTypeConfigUpdateAck-gNB ::= SEQUENCE {
  served-NR-Cells      ServedCells-NR                                OPTIONAL,
  iE-Extension         ProtocolExtensionContainer { {RespondingNodeTypeConfigUpdateAck-gNB-ExtIEs} } OPTIONAL,
  ...
}

RespondingNodeTypeConfigUpdateAck-gNB-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- *****
--
-- NG-RAN NODE CONFIGURATION UPDATE FAILURE
--
-- *****

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

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

-- *****
--
-- XN REMOVAL REQUEST
--
-- *****

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

XnRemovalRequest-IEs XNAP-PROTOCOL-IES ::= {
  { ID id-GlobalNG-RAN-node-ID CRITICALITY reject TYPE GlobalNG-RANNode-ID PRESENCE mandatory}|
  { ID id-XnRemovalThreshold CRITICALITY reject TYPE XnBenefitValue PRESENCE optional },
  ...
}

-- *****
--

```

```

-- XN REMOVAL RESPONSE
--
-- *****
XnRemovalResponse ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{ XnRemovalResponse-IEs}},
    ...
}

XnRemovalResponse-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-GlobalNG-RAN-node-ID          CRITICALITY reject  TYPE GlobalNG-RANNode-ID          PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics        CRITICALITY ignore  TYPE CriticalityDiagnostics        PRESENCE optional },
    ...
}

-- *****
--
-- XN REMOVAL FAILURE
--
-- *****

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

XnRemovalFailure-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-CriticalityDiagnostics        CRITICALITY ignore  TYPE CriticalityDiagnostics        PRESENCE optional },
    ...
}

-- *****
--
-- CELL ACTIVATION REQUEST
--
-- *****

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

CellActivationRequest-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-ServedCellsToActivate        CRITICALITY reject  TYPE ServedCellsToActivate        PRESENCE mandatory}|
    { ID id-ActivationIDforCellActivation CRITICALITY reject  TYPE ActivationIDforCellActivation PRESENCE mandatory},
    ...
}

ServedCellsToActivate ::= CHOICE {
    nr-cells                SEQUENCE (SIZE(1..maxnoofCellsinNGRANnode)) OF NR-CGI,
    e-utra-cells            SEQUENCE (SIZE(1..maxnoofCellsinNGRANnode)) OF E-UTRA-CGI,
    choice-extension        ProtocolExtensionContainer { {ServedCellsToActivate-ExtIEs} }, -- This IE may need to be refined --
    ...
}

```

```

ServedCellsToActivate-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- *****
--
-- CELL ACTIVATION RESPONSE
--
-- *****

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

CellActivationResponse-IEs XNAP-PROTOCOL-IES ::= {
  { ID id-ActivatedServedCells          CRITICALITY reject      TYPE ActivatedServedCells          PRESENCE mandatory}|
  { ID id-ActivationIDforCellActivation  CRITICALITY reject      TYPE ActivationIDforCellActivation  PRESENCE mandatory}|
  { ID id-CriticalityDiagnostics        CRITICALITY ignore     TYPE CriticalityDiagnostics        PRESENCE optional },
  ...
}

ActivatedServedCells ::= CHOICE {
  nr-cells                SEQUENCE (SIZE(1..maxnoofCellsinNGRANnode)) OF NR-CGI,
  e-utra-cells            SEQUENCE (SIZE(1..maxnoofCellsinNGRANnode)) OF E-UTRA-CGI,
  choice-extension       ProtocolExtensionContainer { {ActivatedServedCells-ExtIEs} }, -- This IE may need to be refined -
  ...
}

ActivatedServedCells-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- *****
--
-- CELL ACTIVATION FAILURE
--
-- *****

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

CellActivationFailure-IEs XNAP-PROTOCOL-IES ::= {
  { ID id-ActivationIDforCellActivation  CRITICALITY reject      TYPE ActivationIDforCellActivation  PRESENCE mandatory}|
  { ID id-Cause                        CRITICALITY ignore     TYPE Cause                          PRESENCE mandatory}|
  { ID id-CriticalityDiagnostics        CRITICALITY ignore     TYPE CriticalityDiagnostics        PRESENCE optional },
  ...
}

```

```

-- *****
--
-- RESET REQUEST
--
-- *****

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

ResetRequest-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-ResetRequestTypeInfo          CRITICALITY reject          TYPE ResetRequestTypeInfo          PRESENCE mandatory }|
    { ID id-Cause                          CRITICALITY ignore           TYPE Cause                          PRESENCE mandatory },
    ...
}

-- *****
--
-- RESET RESPONSE
--
-- *****

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

ResetResponse-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-ResetResponseTypeInfo          CRITICALITY reject          TYPE ResetResponseTypeInfo          PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics         CRITICALITY ignore         TYPE CriticalityDiagnostics         PRESENCE optional },
    ...
}

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

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

ErrorIndication-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-oldNG-RANnodeUEXnAPID         CRITICALITY ignore         TYPE NG-RANnodeUEXnAPID           PRESENCE optional }|
    { ID id-newNG-RANnodeUEXnAPID         CRITICALITY ignore         TYPE NG-RANnodeUEXnAPID           PRESENCE optional }|
    { ID id-Cause                          CRITICALITY ignore         TYPE Cause                          PRESENCE optional }|
    { ID id-CriticalityDiagnostics         CRITICALITY ignore         TYPE CriticalityDiagnostics         PRESENCE optional },
    ...
}

-- *****

```

```

--
-- PRIVATE MESSAGE
--
-- *****
PrivateMessage ::= SEQUENCE {
    privateIEs      PrivateIE-Container {{PrivateMessage-IEs}},
    ...
}
PrivateMessage-IEs XNAP-PRIVATE-IES ::= {
    ...
}

END

```

9.3.5 Information Element definitions

```

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

XnAP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) xnap (2) version1 (1) xnap-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

    id-AreaOfInterest-Item,
    id-dataforwardingInfoPerPDUSession-Item,
    id-DataForwardingResponseDRBItem,
    id-DRBsSubjectToStatusTransfer-Item,
    id-DRBToQoSFlowMapping-Item,
    id-PDUSessionResourceAdmittedResponseTransferItem,
    id-PDUSessionResourcesAdmitted-Item,
    id-PDUSessionResourcesNotAdmitted-Item,
    id-PDUSessionResourcesToBeSetup-Item,
    id-QoSFlowAdmitted-Item,
    id-QoSFlow-Item,
    id-QoSFlowNotAdmitted-Item,
    id-QoSFlowsToBeSetup-Item,
    id-ResetRequestPartialReleaseItem,
    id-ResetResponsePartialReleaseItem,
    id-TAISupport-Item,

    maxEARFCN,

```

```

maxnoofAllowedAreas,
maxnoofAoIs,
maxnoofBPLMNs,
maxnoofCellsInAoI,
maxnoofCellsInNGRANnode,
maxnoofCellsInRNA,
maxnoofDRBs,
maxnoofEPLMNs,
maxnoofEUTRABands,
maxnoofForbiddenTACs,
maxnoofMBSFN EUTRA,
maxnoofNeighbours,
maxnoofNRCellBands,
maxnoofPDUSessions,
maxnoofPLMNs,
maxnoofQoSFlows,
maxnoofRANAreaCodes,
maxnoofRANAreasInRNA,
maxnoofSliceItems,
maxnoofSupportedTACs,
maxnoofSupportedPLMNs,
maxnoofTAI,
maxnoofTAIsInAoI,
maxnoofUEContexts,
maxNRARFCN,
maxNrOfErrors

```

```
FROM XnAP-Constants
```

```

Criticality,
ProcedureCode,
ProtocolIE-ID,
TriggeringMessage

```

```
FROM XnAP-CommonDataTypes
```

```

ProtocolExtensionContainer {},
ProtocolIE-Single-Container {},

```

```

XNAP-PROTOCOL-EXTENSION,
XNAP-PROTOCOL-IES

```

```
FROM XnAP-Containers;
```

```
-- A
```

```
ActivationIDforCellActivation ::= INTEGER (0..255)
```

```

AllocationandRetentionPriority ::= SEQUENCE {
  priorityLevel          INTEGER (0..15,...),
  pre-emption-capability ENUMERATED {shall-not-trigger-preemptdatDion, may-trigger-preemption, ...},
  pre-emption-vulnerability ENUMERATED {not-preemptable, preemptable, ...},
  iE-Extensions         ProtocolExtensionContainer { {AllocationandRetentionPriority-ExtIEs} } OPTIONAL,
}

```



```

}
...
AllocationandRetentionPriority-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
}
...

AMF-Pool-Information ::= OCTET STRING -- This IE may need to be refined.

AMF-UE-NGAP-ID ::= INTEGER (0..4294967295)

AreaOfInterest ::= SEQUENCE (SIZE(1..maxnoofAoIs)) OF ProtocolIE-Single-Container { {AreaOfInterest-ItemIEs} }

AreaOfInterest-ItemIEs XNAP-PROTOCOL-IES ::= {
  { ID id-AreaOfInterest-Item CRITICALITY ignore TYPE AreaOfInterest-Item PRESENCE mandatory },
  ...
}

AreaOfInterest-Item ::= SEQUENCE {
  listOfTAIs ListOfTAIsinAoI OPTIONAL,
  listOfCells ListOfCells OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {AreaOfInterest-Item-ExtIEs} } OPTIONAL,
  ...
}

AreaOfInterest-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
}
...

AS-SecurityInformation ::= SEQUENCE {
  key-NG-RAN-Star BIT STRING (SIZE(256)),
  ncc INTEGER (0..7),
  iE-Extensions ProtocolExtensionContainer { {AS-SecurityInformation-ExtIEs} } OPTIONAL,
  ...
}

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

AssistanceDataForRANPaging ::= SEQUENCE {
  ran-paging-attempt-info RANPagingAttemptInfo OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {AssistanceDataForRANPaging-ExtIEs} } OPTIONAL,
  ...
}

AssistanceDataForRANPaging-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
}
...

```

```

AveragingWindow ::= INTEGER (0..63)

-- B

BitRate ::= INTEGER (0..4000000000000, ...)

BroadcastPLMNs ::= SEQUENCE (SIZE(1..maxnoofBPLMNs)) OF PLMN-Identity

BroadcastPLMNinTAISupport-Item ::= SEQUENCE {
    plmn-id                PLMN-Identity,
    tAISliceSupport-List   SliceSupport-List          OPTIONAL,
    iE-Extension           ProtocolExtensionContainer { {BroadcastPLMNinTAISupport-Item-ExtIEs} } OPTIONAL,
    ...
}

BroadcastPLMNinTAISupport-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- C

Cause ::= CHOICE {
    radioNetwork          CauseRadioNetworkLayer,
    transport             CauseTransportLayer,
    protocol              CauseProtocol,
    misc                  CauseMisc,
    choice-extension     ProtocolExtensionContainer { {Cause-ExtIEs} }, -- This IE may need to be refined --
    ...
}

Cause-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

CauseRadioNetworkLayer ::= ENUMERATED {
    cell-not-available,
    handover-desirable-for-radio-reasons,
    handover-target-not-allowed,
    invalid-AMF-Region-ID,
    no-radio-resources-available-in-target-cell,
    partial-handover,
    reduce-load-in-serving-cell,
    resource-optimisation-handover,
    time-critical-handover,
    tXnRELOCoverall-expiry,
    tXnRELOCprep-expiry,
}

```

```
unknown-GUAMI-ID,  
unknown-local-NG-RAN-node-UE-XnAP-ID,  
inconsistent-remote-NG-RAN-node-UE-XnAP-ID,  
encryption-and-or-integrity-protection-algorithms-not-supported,  
protection-algorithms-not-supported,  
multiple-PDU-session-ID-instances,  
unknown-PDU-session-ID,  
unknown-QoS-Flow-ID,  
multiple-QoS-Flow-ID-instances,  
switch-off-ongoing,  
not-supported-5QI-value,  
tXnDCoverall-expiry,  
tXnDCprep-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,  
up-integrity-protection-not-possible,  
up-confidentiality-protection-not-possible,  
unspecified,  
...  
}  
  
CauseTransportLayer ::= ENUMERATED {  
    transport-resource-unavailable,  
    unspecified,  
    ...  
}  
  
CauseProtocol ::= ENUMERATED {  
    transfer-syntax-error,  
    abstract-syntax-error-reject,  
    abstract-syntax-error-ignore-and-notify,  
    message-not-compatible-with-receiver-state,  
    semantic-error,  
    abstract-syntax-error-falsely-constructed-message,  
    unspecified,  
    ...  
}  
  
CauseMisc ::= ENUMERATED {  
    control-processing-overload,  
    hardware-failure,  
    ...  
}
```

```

    o-and-M-intervention,
    not-enough-user-plane-processing-resources,
    unspecified,
    ...
}

CellAssistanceInfo-NR ::= CHOICE {
    limitedNR-List          SEQUENCE (SIZE(1..maxnoofCellsinNGRANnode)) OF NR-CGI,
    full-List              ENUMERATED {all-served-cells-NR, ...},
    choice-extension       ProtocolExtensionContainer { {CellAssistanceInfo-NR-ExtIEs} }, -- This IE may need to be refined --
    ...
}

CellAssistanceInfo-NR-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

COUNT-PDCP-SN12 ::= SEQUENCE {
    pdcp-SN12              INTEGER (0..4095),
    hfn-PDCP-SN12         INTEGER (0..1048575),
    iE-Extensions         ProtocolExtensionContainer { {COUNT-PDCP-SN12-ExtIEs} } OPTIONAL,
    ...
}

COUNT-PDCP-SN12-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

COUNT-PDCP-SN18 ::= SEQUENCE {
    pdcp-SN18              INTEGER (0..262143),
    hfn-PDCP-SN18         INTEGER (0..16383),
    iE-Extensions         ProtocolExtensionContainer { {COUNT-PDCP-SN18-ExtIEs} } OPTIONAL,
    ...
}

COUNT-PDCP-SN18-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

CPTransportLayerInformation ::= CHOICE {
    endpointIPAddress      TransportLayerAddress,
    choice-extension       ProtocolExtensionContainer { {CPTransportLayerInformation-ExtIEs} }, -- This IE may need to be refined --
    ...
}

CPTransportLayerInformation-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

CriticalityDiagnostics ::= SEQUENCE {

```

```

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

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

C-RNTI ::= BIT STRING (SIZE(16))

CyclicPrefix-E-UTRA-DL ::= ENUMERATED {
    normal,
    extended,
    ...
}

CyclicPrefix-E-UTRA-UL ::= ENUMERATED {
    normal,
    extended,
    ...
}

-- D

DataforwardingInfoperPDUSession ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF ProtocolIE-Single-Container { {DataForwardingInfoperPDUSessionItem-
IEs} }

DataForwardingInfoperPDUSessionItem-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-dataforwardingInfoperPDUSession-Item    CRITICALITY reject    TYPE DataforwardingInfoperPDUSession-Item PRESENCE mandatory },
    ...
}

```

```

DataforwardingInfoperPDUSession-Item ::= SEQUENCE {
    pduSession-ID          PDUSESSION-ID,
    dlForwardingUPTNL      UPTransportLayerInformation          OPTIONAL,
    iE-Extension           ProtocolExtensionContainer { { DataforwardingInfoperPDUSession-Item-ExtIEs } } OPTIONAL,
    ...
}

DataforwardingInfoperPDUSession-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

DataForwardingAccepted ::= ENUMERATED {data-forwarding-accepted, ...}
DataForwardingInfoFromTargetNGRANnode ::= SEQUENCE {
    pduSessionLevelDLDataForwardingInfo          UPTransportLayerInformation          OPTIONAL,
    dataForwardingResponseDRBItemList            DataForwardingResponseDRBItemList          OPTIONAL,
    iE-Extension           ProtocolExtensionContainer { {DataForwardingInfoFromTargetNGRANnode-ExtIEs} } OPTIONAL,
    ...
}

DataForwardingInfoFromTargetNGRANnode-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

DataForwardingResponseDRBItemList ::= SEQUENCE (SIZE(1..maxnoofDRBs)) OF ProtocolIE-Single-Container { {DataForwardingResponseDRBItem-IEs} }

DataForwardingResponseDRBItem-IEs XNAP-PROTOCOL-IES ::= {
    { ID id-DataForwardingResponseDRBItem    CRITICALITY reject    TYPE DataForwardingResponseDRBItem    PRESENCE mandatory },
    ...
}

DataForwardingResponseDRBItem ::= SEQUENCE {
    drb-ID          DRB-ID,
    dlForwardingUPTNL  UPTransportLayerInformation          OPTIONAL,
    ulForwardingUPTNL  UPTransportLayerInformation          OPTIONAL,
    iE-Extension           ProtocolExtensionContainer { {DataForwardingResponseDRBItem-ExtIEs} } OPTIONAL,
    ...
}

DataForwardingResponseDRBItem-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

DeliveryStatus ::= INTEGER (0..4095, ...)

DLForwarding ::= ENUMERATED {dl-forwarding-proposed, ...}

DRB-ID ::= INTEGER (1..32, ...)

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

```

```

DRBsSubjectToStatusTransfer-ItemIES XNAP-PROTOCOL-IES ::= {
  { ID id-DRBsSubjectToStatusTransfer-Item CRITICALITY ignore TYPE DRBsSubjectToStatusTransfer-Item PRESENCE mandatory },
  ...
}

DRBsSubjectToStatusTransfer-Item ::= SEQUENCE {
  drbID DRB-ID,
  statusTransfer DRBBStatusTransferChoice,
  iE-Extension ProtocolExtensionContainer { {DRBsSubjectToStatusTransfer-Item-ExtIEs} } OPTIONAL,
  ...
}

DRBsSubjectToStatusTransfer-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

DRBBStatusTransferChoice ::= CHOICE {
  pdcp-sn-12bits DRBBStatusTransfer12bitsSN,
  pdcp-sn-18bits DRBBStatusTransfer18bitsSN,
  choice-extension ProtocolExtensionContainer { {DRBBStatusTransferChoice-ExtIEs} }, -- This IE may need to be refined --
  ...
}

DRBBStatusTransferChoice-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

DRBBStatusTransfer12bitsSN ::= SEQUENCE {
  receiveStatusofPDCPSDU BIT STRING (SIZE(1..2048)) OPTIONAL,
  ulCOUNTValue COUNT-PDCP-SN12,
  dlCOUNTValue COUNT-PDCP-SN12,
  iE-Extension ProtocolExtensionContainer { {DRBBStatusTransfer12bitsSN-ExtIEs} } OPTIONAL,
  ...
}

DRBBStatusTransfer12bitsSN-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

DRBBStatusTransfer18bitsSN ::= SEQUENCE {
  receiveStatusofPDCPSDU BIT STRING (SIZE(1..131072)) OPTIONAL,
  ulCOUNTValue COUNT-PDCP-SN18,
  dlCOUNTValue COUNT-PDCP-SN18,
  iE-Extension ProtocolExtensionContainer { {DRBBStatusTransfer18bitsSN-ExtIEs} } OPTIONAL,
  ...
}

DRBBStatusTransfer18bitsSN-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

```

```

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

DRBToQoSFlowMapping-ItemIEs XNAP-PROTOCOL-IES ::= {
  { ID id-DRBToQoSFlowMapping-Item CRITICALITY ignore TYPE DRBToQoSFlowMapping-Item PRESENCE mandatory },
  ...
}

DRBToQoSFlowMapping-Item ::= SEQUENCE {
  drb-ID DRB-ID,
  qosFlows-List QoSFlows-List,
  iE-Extension ProtocolExtensionContainer { {DRBToQoSFlowMapping-Item-ExtIEs} } OPTIONAL,
  ...
}

DRBToQoSFlowMapping-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

Dynamic5QIDescriptor ::= SEQUENCE {
  priorityLevel INTEGER (1..128),
  packetDelayBudget PacketDelayBudget,
  packetErrorRate PacketErrorRate,
  delayCritical ENUMERATED {delay-critical, non-delay-critical, ...} OPTIONAL,
  -- This IE shall be present if the GBR QoS Flow Information IE is present in the QoS Flow Level QoS Parameters IE.
  averagingWindow AveragingWindow OPTIONAL,
  -- This IE shall be present if the GBR QoS Flow Information IE is present in the QoS Flow Level QoS Parameters IE.
  maximumDataBurstVolume MaximumDataBurstVolume OPTIONAL,
  iE-Extension ProtocolExtensionContainer { {Dynamic5QIDescriptor-ExtIEs} } OPTIONAL,
  ...
}

Dynamic5QIDescriptor-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- E

E-RAB-ID ::= INTEGER (0..15, ...)

E-UTRAARFCN ::= INTEGER (0..maxEARFCN)

E-UTRA-Cell-Identity ::= BIT STRING (SIZE(28))

E-UTRA-CGI ::= SEQUENCE {
  plmn-id PLMN-Identity,
  e-utra-CI E-UTRA-Cell-Identity,
}

```



```
    iE-Extension      ProtocolExtensionContainer { {E-UTRA-CGI-ExtIEs} } OPTIONAL,
  }
  ...
}

E-UTRA-CGI-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

E-UTRAFrequencyBandIndicator ::= INTEGER (1..256, ...)

E-UTRAMultibandInfoList ::= SEQUENCE (SIZE(1..maxnoofEUTRABands)) OF E-UTRAFrequencyBandIndicator

E-UTRAPCI ::= INTEGER (0..503, ...)

E-UTRAPRACHConfiguration ::= SEQUENCE {
  rootSequenceIndex      INTEGER (0..837),
  zeroCorrelationIndex   INTEGER (0..15),
  highSpeedFlag          ENUMERATED {true, false, ...},
  prach-FreqOffset       INTEGER (0..94),
  prach-ConfigIndex      INTEGER (0..63) OPTIONAL, -- present for TDD --
  iE-Extensions          ProtocolExtensionContainer { {E-UTRAPRACHConfiguration-ExtIEs} } OPTIONAL,
  ...
}

E-UTRAPRACHConfiguration-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

E-UTRATransmissionBandwidth ::= ENUMERATED {bw6, bw15, bw25, bw50, bw75, bw100, ..., bw1}

EventType ::= ENUMERATED {
  report-upon-change-of-serving-cell,
  report-UE-moving-presence-into-or-out-of-the-Area-of-Interest,
  ...
}

-- F

-- G

GBRQoSFlowInfo ::= SEQUENCE {
  maxFlowBitRateDL      BitRate,
  maxFlowBitRateUL      BitRate,
  guaranteedFlowBitRateDL BitRate,
  guaranteedFlowBitRateUL BitRate,
  notificationControl   ENUMERATED {notification-requested, ...} OPTIONAL,
}
```

```

    maxPacketLossRateDL      PacketLossRate      OPTIONAL,
    maxPacketLossRateUL      PacketLossRate      OPTIONAL,
    iE-Extensions            ProtocolExtensionContainer { {GBRQoSFlowInfo-ExtIEs} } OPTIONAL,
    ...
}

GBRQoSFlowInfo-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

GlobalgNB-ID ::= SEQUENCE {
    plmn-id      PLMN-Identity,
    gnb-id       GNB-ID-Choice,
    iE-Extensions ProtocolExtensionContainer { {GlobalgNB-ID-ExtIEs} } OPTIONAL,
    ...
}

GlobalgNB-ID-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

GNB-ID-Choice ::= CHOICE {
    gnb-ID          BIT STRING (SIZE(22..32)),
    choice-extension ProtocolExtensionContainer { {GNB-ID-Choice-ExtIEs} }, -- This IE may need to be refined --
    ...
}

GNB-ID-Choice-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

GlobalenbNB-ID ::= SEQUENCE {
    plmn-id      PLMN-Identity,
    enb-id       ENB-ID-Choice,
    iE-Extensions ProtocolExtensionContainer { {GlobaleNB-ID-ExtIEs} } OPTIONAL,
    ...
}

GlobaleNB-ID-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

ENB-ID-Choice ::= CHOICE {
    enb-ID-macro      BIT STRING (SIZE(20)),
    enb-ID-shortmacro BIT STRING (SIZE(18)),
    enb-ID-longmacro  BIT STRING (SIZE(21)),
    choice-extension  ProtocolExtensionContainer { {ENB-ID-Choice-ExtIEs} }, -- This IE may need to be refined --
    ...
}

ENB-ID-Choice-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {

```

```
    ...
}

GlobalNG-RANNode-ID ::= CHOICE {
    gNB                GlobalgNB-ID,
    ng-eNB             GlobalngeNB-ID,
    choice-extension   ProtocolExtensionContainer { {GlobalNG-RANNode-ID-ExtIEs} }, -- This IE may need to be refined --
    ...
}

GlobalNG-RANNode-ID-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

GTP-TEID      ::= OCTET STRING (SIZE(4))

GTPtunnelTransportLayerInformation ::= SEQUENCE {
    tnl-address      TransportLayerAddress,
    gtp-teid         GTP-TEID,
    iE-Extensions   ProtocolExtensionContainer { {GTPtunnelTransportLayerInformation-ExtIEs} } OPTIONAL,
    ...
}

GTPtunnelTransportLayerInformation-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

GUAMI ::= SEQUENCE {
    plmn-ID          PLMN-Identity,
    amf-region-if   OCTET STRING (SIZE (2)),
    amf-set-id       BIT STRING (SIZE (4)),
    amf-pointer      BIT STRING (SIZE (4)),
    iE-Extensions   ProtocolExtensionContainer { {GUAMI-ExtIEs} } OPTIONAL,
    ...
}

GUAMI-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- H

-- I

I-RNTI ::= BIT STRING (SIZE(40)) -- This IE may need to be refined

-- J
```

-- K

-- L

ListOfTAI ::= SEQUENCE (SIZE(1..maxnoofTAI)) OF TAI-Item

```
TAI-Item ::= SEQUENCE {
    pLMN-Identity    PLMN-Identity,
    tAC              TAC,
    iE-Extensions   ProtocolExtensionContainer { {TAI-Item-ExtIEs} } OPTIONAL,
    ...
}
```

```
TAI-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}
```

ListOfCells ::= SEQUENCE (SIZE(1..maxnoofCellsinAoI)) OF CellsinAoI-Item

```
CellsinAoI-Item ::= SEQUENCE {
    pLMN-Identity    PLMN-Identity,
    ng-ran-cell-id   NG-RAN-Cell-Identity,
    iE-Extensions   ProtocolExtensionContainer { {CellsinAoI-Item-ExtIEs} } OPTIONAL,
    ...
}
```

```
CellsinAoI-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}
```

ListOfTAIsinAoI ::= SEQUENCE (SIZE(1..maxnoofTAIsinAoI)) OF TAIsinAoI-Item

```
TAIsinAoI-Item ::= SEQUENCE {
    pLMN-Identity    PLMN-Identity,
    tAC              TAC,
    iE-Extensions   ProtocolExtensionContainer { {TAIsinAoI-Item-ExtIEs} } OPTIONAL,
    ...
}
```

```
TAIsinAoI-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
LocationReportingInformation ::= SEQUENCE {
    eventType        EventType,
    reportArea       ReportArea,
    areaOfInterest   AreaOfInterest          OPTIONAL,
}
```

```

    iE-Extensions      ProtocolExtensionContainer { {LocationReportingInformation-ExtIEs} } OPTIONAL,
    ...
}

LocationReportingInformation-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- M

MAC-I ::= BIT STRING (SIZE(16))

MaskedIMEISV      ::= BIT STRING (SIZE(64))

MaximumDataBurstVolume ::= INTEGER (0..63)

MBSFNSubframeAllocation-E-UTRA ::= CHOICE {
    oneframe          BIT STRING (SIZE(6)),
    fourframes        BIT STRING (SIZE(24)),
    choice-extension  ProtocolExtensionContainer { {MBSFNSubframeAllocation-E-UTRA-ExtIEs} }, -- This IE may need to be refined --
    ...
}

MBSFNSubframeAllocation-E-UTRA-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

MBSFNSubframeInfo-E-UTRA ::= SEQUENCE (SIZE(1..maxnoofMBSFNEUTRA)) OF MBSFNSubframeInfo-E-UTRA-Item

MBSFNSubframeInfo-E-UTRA-Item ::= SEQUENCE {
    radioframeAllocationPeriod    ENUMERATED{n1,n2,n4,n8,n16,n32,...},
    radioframeAllocationOffset    INTEGER (0..7, ...),
    subframeAllocation            MBSFNSubframeAllocation-E-UTRA,
    iE-Extensions                 ProtocolExtensionContainer { {MBSFNSubframeInfo-E-UTRA-Item-ExtIEs} } OPTIONAL,
    ...
}

MBSFNSubframeInfo-E-UTRA-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

MobilityRestrictionList ::= SEQUENCE {
    serving-PLMN          PLMN-Identity,
    equivalent-PLMNs      SEQUENCE (SIZE(1..maxnoofEPLMNs)) OF PLMN-Identity          OPTIONAL,
    rat-Restrictions       RAT-RestrictionsList                                     OPTIONAL,
    forbiddenAreaInformation ForbiddnAreaList                                     OPTIONAL,
}

```

```

    serviceAreaInformation          ServiceAreaList                                OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { {MobilityRestrictionList-ExtIEs} } OPTIONAL,
    ...
}

MobilityRestrictionList-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

RAT-RestrictionsList ::= SEQUENCE (SIZE(1..maxnoofPLMNs)) OF RAT-RestrictionsItem

RAT-RestrictionsItem ::= SEQUENCE {
    plmn-Identity          PLMN-Identity,
    rat-RestrictionInformation          RAT-RestrictionInformation,
    iE-Extensions          ProtocolExtensionContainer { {RAT-RestrictionsItem-ExtIEs} } OPTIONAL,
    ...
}

RAT-RestrictionsItem-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

RAT-RestrictionInformation ::= BIT STRING {e-UTRA (0),nR (1)} (SIZE(8, ...))

ForbiddenAreaList ::= SEQUENCE (SIZE(1..maxnoofPLMNs)) OF ForbiddenAreaItem

ForbiddenAreaItem ::= SEQUENCE {
    plmn-Identity          PLMN-Identity,
    forbidden-TACs          SEQUENCE (SIZE(1..maxnoofForbiddenTACs)) OF TAC,
    iE-Extensions          ProtocolExtensionContainer { {ForbiddenAreaItem-ExtIEs} } OPTIONAL,
    ...
}

ForbiddenAreaItem-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

ServiceAreaList ::= SEQUENCE (SIZE(1..maxnoofPLMNs)) OF ServiceAreaItem

ServiceAreaItem ::= SEQUENCE {
    plmn-Identity          PLMN-Identity,
    allowed-TACs-ServiceArea          SEQUENCE (SIZE(1..maxnoofAllowedAreas)) OF TAC,
    not-allowed-TACs-ServiceArea          SEQUENCE (SIZE(1..maxnoofAllowedAreas)) OF TAC,
    iE-Extensions          ProtocolExtensionContainer { {ServiceAreaItem-ExtIEs} } OPTIONAL,
    ...
}

```

```

ServiceAreaItem-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- N

NeighbourInformation-E-UTRA ::= SEQUENCE (SIZE(1..maxnoofNeighbours)) OF NeighbourInformation-E-UTRA-Item

NeighbourInformation-E-UTRA-Item ::= SEQUENCE {
    e-utra-PCI          E-UTRAPCI,
    e-utra-cgi         E-UTRA-CGI,
    earfcn             E-UTRAARFCN,
    tac                TAC,
    iE-Extensions      ProtocolExtensionContainer { {NeighbourInformation-E-UTRA-Item-ExtIEs} } OPTIONAL,
    ...
}

NeighbourInformation-E-UTRA-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

NeighbourInformation-NR ::= SEQUENCE (SIZE(1..maxnoofNeighbours)) OF NeighbourInformation-NR-Item

NeighbourInformation-NR-Item ::= SEQUENCE {
    e-utra-cgi         E-UTRA-CGI,
    e-utra-PCI        E-UTRAPCI,
    earfcn            E-UTRAARFCN,
    tac               TAC,
    nr-mode-info      NeighbourInformation-NR-ModeInfo,
    iE-Extensions      ProtocolExtensionContainer { {NeighbourInformation-NR-Item-ExtIEs} } OPTIONAL,
    ...
}

NeighbourInformation-NR-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

NeighbourInformation-NR-ModeInfo ::= CHOICE {
    fdd-info          NeighbourInformation-NR-ModeFDDInfo,
    tdd-info          NeighbourInformation-NR-ModeTDDInfo,
    choice-extension  ProtocolExtensionContainer { {NeighbourInformation-NR-ModeInfo-ExtIEs} }, -- This IE may need to be refined --
    ...
}

NeighbourInformation-NR-ModeInfo-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

NeighbourInformation-NR-ModeFDDInfo ::= SEQUENCE {

```

```

    ul-NR-FreqInfo      NRFrequencyInfo,
    dl-NR-FreqInfo      NRFrequencyInfo,
    ie-Extensions       ProtocolExtensionContainer { {NeighbourInformation-NR-ModeFDDInfo-ExtIEs} } OPTIONAL,
    ...
}

NeighbourInformation-NR-ModeFDDInfo-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

NeighbourInformation-NR-ModeTDDInfo ::= SEQUENCE {
    nr-FreqInfo          NRFrequencyInfo,
    ie-Extensions       ProtocolExtensionContainer { {NeighbourInformation-NR-ModeTDDInfo-ExtIEs} } OPTIONAL,
    ...
}

NeighbourInformation-NR-ModeTDDInfo-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

NG-RAN-Cell-Identity ::= CHOICE {
    nr                    NR-Cell-Identity,
    e-utra                E-UTRA-Cell-Identity,
    choice-extension     ProtocolExtensionContainer { {NG-RAN-Cell-Identity-ExtIEs} }, -- This IE may need to be refined --
    ...
}

NG-RAN-Cell-Identity-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

NG-RAN-CellPCI ::= CHOICE {
    nr                    NRPCI,
    e-utra                E-UTRAPCI,
    choice-extension     ProtocolExtensionContainer { {NG-RAN-CellPCI-ExtIEs} }, -- This IE may need to be refined --
    ...
}

NG-RAN-CellPCI-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

NG-RANnodeUEXnAPID ::= INTEGER (0.. 4294967295)

NonDynamic5QIDescriptor ::= SEQUENCE {
    fiveQI                INTEGER (0..255),
    priorityLevel          INTEGER (1..128)                OPTIONAL,
    averagingWindow        AveragingWindow                OPTIONAL,
    maximumDataBurstVolume MaximumDataBurstVolume        OPTIONAL,

```



```

    iE-Extension          ProtocolExtensionContainer { {NonDynamic5QIDescriptor-ExtIEs } } OPTIONAL,
    ...
}

NonDynamic5QIDescriptor-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

NRARFCN ::= INTEGER (0.. maxNRARFCN)

NR-Cell-Identity        ::= BIT STRING (SIZE (36))

NG-RAN-Cell-Identity-ListinRANpagingArea ::= SEQUENCE (SIZE (1..maxnoofCellsinRNA)) OF NG-RAN-Cell-Identity

NR-CGI ::= SEQUENCE {
    plmn-id              PLMN-Identity,
    nr-CI                NR-Cell-Identity,
    iE-Extension          ProtocolExtensionContainer { {NR-CGI-ExtIEs} } OPTIONAL,
    ...
}

NR-CGI-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

NRFrequencyBand ::= INTEGER (1..1024, ...)

NRFrequencyBand-List ::= SEQUENCE (SIZE(1..maxnoofNRCellBands)) OF NRFrequencyBandItem

NRFrequencyBandItem ::= SEQUENCE {
    nr-frequency-band    NRFrequencyBand,
    supported-SUL-Band-List SupportedSULBandList                                OPTIONAL,
    iE-Extension          ProtocolExtensionContainer { {NRFrequencyBandItem-ExtIEs} } OPTIONAL,
    ...
}

NRFrequencyBandItem-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

NRFrequencyInfo ::= SEQUENCE {
    nrARFCN              NRARFCN,
    sul-information      SUL-Information                                OPTIONAL,
    frequencyBand-List  NRFrequencyBand-List,
    iE-Extension          ProtocolExtensionContainer { {NRFrequencyInfo-ExtIEs} } OPTIONAL,
    ...
}

```

```

}
NRFrequencyInfo-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

NRModeInfo ::= CHOICE {
  fdd                NRModeInfoFDD,
  tdd                NRModeInfoTDD,
  choice-extension  ProtocolExtensionContainer { {NRModenInfor-ExtIEs} }, -- This IE may need to be refined --
  ...
}

NRModeInfoFDD-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

NRModeInfoFDD ::= SEQUENCE {
  ulNRFrequencyInfo      NRFrequencyInfo,
  dlNRFrequencyInfo      NRFrequencyInfo,
  ulNRTransmissonBandwidth NRTransmissionBandwidth,
  dlNRTransmissonBandwidth NRTransmissionBandwidth,
  iE-Extension           ProtocolExtensionContainer { {NRModeInfoFDD-ExtIEs} } OPTIONAL,
  ...
}

NRModeInfoTDD ::= SEQUENCE {
  nrFrequencyInfo        NRFrequencyInfo,
  nrTransmissonBandwidth NRTransmissionBandwidth,
  iE-Extension           ProtocolExtensionContainer { {NRModeInfoTDD-ExtIEs} } OPTIONAL,
  ...
}

NRModeInfoTDD-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

NRModenInfor-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

NRPCI ::= INTEGER (0..1007, ...)

NRTransmissionBandwidth ::= INTEGER (0..65535, ...)

NumberOfAntennaPorts-E-UTRA ::= ENUMERATED {an1, an2, an3, ...}

```

-- 0

```

-- P

PacketDelayBudget ::= INTEGER (0..63)

PacketErrorRate ::= INTEGER (0..63)

PacketLossRate ::= INTEGER (0..1000)

PagingDRX ::= INTEGER (0..63) -- This IE may need to be refined

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

PDUSessionResourcesAdmitted-ItemIEs XNAP-PROTOCOL-IES ::= {
  { ID id-PDUSessionResourcesAdmitted-Item CRITICALITY reject TYPE PDUSessionResourcesAdmitted-Item PRESENCE mandatory },
  ...
}

PDUSessionResourcesAdmitted-Item ::= SEQUENCE {
  pduSessionId PDUSession-ID,
  pduSessionResourceAdmittedInfo PDUSessionResourceAdmittedInfo OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {PDUSessionResourcesAdmitted-Item-ExtIEs} } OPTIONAL,
  ...
}

PDUSessionResourcesAdmitted-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

PDUSessionResourceAdmittedInfo ::= SEQUENCE {
  qosFlowsAdmitted-List QoSFlowsAdmitted-List OPTIONAL,
  qosFlowsNotAdmitted-List QoSFlowsNotAdmitted-List OPTIONAL,
  dataForwardingInfoFromTarget DataForwardingInfoFromTargetNGRANnode OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {PDUSessionResourceAdmittedResponseTransferItem-ExtIEs} } OPTIONAL,
  ...
}

PDUSessionResourceAdmittedResponseTransferItem-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

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

PDUSessionResourcesNotAdmitted-ItemIEs XNAP-PROTOCOL-IES ::= {
  { ID id-PDUSessionResourcesNotAdmitted-Item CRITICALITY reject TYPE PDUSessionResourcesNotAdmitted-Item PRESENCE mandatory },
  ...
}

```

```

PDUSessionResourcesNotAdmitted-Item ::= SEQUENCE {
    pduSessionId          PDUSession-ID,
    cause                 Cause          OPTIONAL,
    iE-Extension          ProtocolExtensionContainer { {PDUSessionResourcesNotAdmitted-Item-Item-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourcesNotAdmitted-Item-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

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

PDUSessionResourcesToBeSetup-ItemIEs XNAP-PROTOCOL-IES ::= {
    { ID id-PDUSessionResourcesToBeSetup-Item    CRITICALITY reject    TYPE PDUSessionResourcesToBeSetup-Item    PRESENCE mandatory },
    ...
}

PDUSessionResourcesToBeSetup-Item ::= SEQUENCE {
    pduSessionId          PDUSession-ID,
    s-NSSAI               S-NSSAI,
    pduSessionAMBR        OCTET STRING, -- This IE may need to be refined
    uL-NG-U-TNLatUPF      UPTransportLayerInformation,
    securityIndication     SecurityIndication                                OPTIONAL,
    pduSessionType         PDUSessionType,
    qosFlowsToBeSetup-List QoSFlowsToBeSetup-List,
    sourceDRBtoQoSFlowMapping DRBtoQoSFlowMapping-List                    OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { {PDUSessionResourcesToBeSetup-Item-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourcesToBeSetup-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionType ::= ENUMERATED {ipv4, ipv6, ipv4v6, ethernet, unstructured, ...}

PDUSession-ID ::= INTEGER (0..255)

PLMN-Identity ::= OCTET STRING (SIZE(3))

-- Q

QoSCharacteristics ::= CHOICE {
    non-dynamic          NonDynamic5QIDescriptor,
    dynamic              Dynamic5QIDescriptor,
    choice-extension     ProtocolExtensionContainer { {QoSCharacteristics-ExtIEs} }, -- This IE may need to be refined --
}

```

```

    ...
}

QoSCharacteristics-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

QoSFlowIndicator ::= INTEGER (0..63, ...)

QoSFlowLevelQoSParameters ::= SEQUENCE {
    qos-characteristics          QoSCharacteristics,
    allocationAndRetentionPrio AllocationandRetentionPriority,
    gBRQoSFlowInfo              GBRQoSFlowInfo                OPTIONAL,
    relectiveQoS                 ReflectiveQoSAttribute        OPTIONAL,
    additionalQoSflowInfo        ENUMERATED {more-likely, ...}  OPTIONAL,
    pPI                          INTEGER(1..8, ...)           OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { {QoSFlowLevelQoSParameters-ExtIEs} } OPTIONAL,
    ...
}

QoSFlowLevelQoSParameters-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

QoSFlows-List ::= SEQUENCE (SIZE (1..maxnoofQoSFlows)) OF ProtocolIE-Single-Container { {QoSFlow-ItemIEs} }

QoSFlow-ItemIEs XNAP-PROTOCOL-IES ::= {
    { ID id-QoSFlow-Item          CRITICALITY reject          TYPE QoSFlow-Item          PRESENCE mandatory },
    ...
}

QoSFlow-Item ::= SEQUENCE {
    qfi          QoSFlowIndicator,
    iE-Extension ProtocolExtensionContainer { {QoSFlow-Item-ExtIEs} } OPTIONAL,
    ...
}

QoSFlow-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

QoSFlowsAdmitted-List ::= SEQUENCE (SIZE (1..maxnoofQoSFlows)) OF ProtocolIE-Single-Container { {QoSFlowAdmitted-ItemIEs} }

QoSFlowAdmitted-ItemIEs XNAP-PROTOCOL-IES ::= {
    { ID id-QoSFlowAdmitted-Item          CRITICALITY reject          TYPE QoSFlowAdmitted-Item          PRESENCE mandatory },
    ...
}

QoSFlowAdmitted-Item ::= SEQUENCE {
    qfi          QoSFlowIndicator,

```

```

    dataForwardingAccepted          DataForwardingAccepted  OPTIONAL,
    iE-Extension                    ProtocolExtensionContainer { {QoSFlowAdmitted-Item-ExtIEs} }  OPTIONAL,
    ...
}

QoSFlowAdmitted-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

QoSFlowsNotAdmitted-List ::= SEQUENCE (SIZE (1..maxnoofQoSFlows)) OF ProtocolIE-Single-Container { {QoSFlowNotAdmitted-ItemIEs} }

QoSFlowNotAdmitted-ItemIEs XNAP-PROTOCOL-IES ::= {
    { ID id-QoSFlowNotAdmitted-Item  CRITICALITY reject      TYPE QoSFlowNotAdmitted-Item      PRESENCE mandatory },
    ...
}

QoSFlowNotAdmitted-Item ::= SEQUENCE {
    qfi                QoSFlowIndicator,
    cause              Cause,
    iE-Extension       ProtocolExtensionContainer { {QoSFlowNotAdmitted-Item-ExtIEs} } OPTIONAL,
    ...
}

QoSFlowNotAdmitted-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

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

QoSFlowsToBeSetup-ItemIEs XNAP-PROTOCOL-IES ::= {
    { ID id-QoSFlowsToBeSetup-Item  CRITICALITY reject      TYPE QoSFlowsToBeSetup-Item      PRESENCE mandatory },
    ...
}

QoSFlowsToBeSetup-Item ::= SEQUENCE {
    qfi                QoSFlowIndicator,
    dlDataForwarding  DLForwarding                                OPTIONAL,
    qosFlowLevelQoSParameters  QoSFlowLevelQoSParameters,
    e-RAB-ID          E-RAB-ID                                    OPTIONAL,
    iE-Extension       ProtocolExtensionContainer { {QoSFlowsToBeSetup-Item-ExtIEs} } OPTIONAL,
    ...
}

QoSFlowsToBeSetup-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- R

RANAC ::= BIT STRING (SIZE(6))

```

```

RANAreaID ::= SEQUENCE {
    tAC                TAC,
    rANAC              RANAC                                OPTIONAL,
    iE-Extensions     ProtocolExtensionContainer { {RANAreaID-ExtIEs} } OPTIONAL,
    ...
}

RANAreaID-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

RANAreaID-List ::= SEQUENCE (SIZE(1..maxnoofRANAreasinRNA)) OF RANAreaID

RANAC-Item ::= SEQUENCE {
    rANAC              RANAC,
    iE-Extensions     ProtocolExtensionContainer { {RANAC-Item-ExtIEs} } OPTIONAL,
    ...
}

RANAC-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

RANPagingArea ::= SEQUENCE {
    pLMN-Identity     PLMN-Identity,
    rANPagingAreaChoice RANPagingAreaChoice,
    iE-Extensions     ProtocolExtensionContainer { {RANPagingArea-ExtIEs} } OPTIONAL,
    ...
}

RANPagingArea-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

RANPagingAreaChoice ::= CHOICE {
    cell-List         NG-RAN-Cell-Identity-ListinRANPagingArea,
    rANAreaID-List    RANAreaID-List,
    choice-extension  ProtocolExtensionContainer { {RANPagingAreaChoice-ExtIEs} }, -- This IE may need to be refined --
    ...
}

RANPagingAreaChoice-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

RANPagingAttemptInfo ::= SEQUENCE {
    pagingAttemptCount    INTEGER (1..16, ...),
    intendedNumberOfPagingAttempts    INTEGER (1..16, ...),

```

```

    nextPagingAreaScope          ENUMERATED {same, changed, ...} OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { {RANPagingAttemptInfo-ExtIEs} } OPTIONAL,
    ...
}

RANPagingAttemptInfo-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

RANPagingPriority ::= INTEGER (1..256)

ReferenceID ::= INTEGER (1..64, ...) -- This IE may need to be refined.

ReflectiveQoSAttribute ::= ENUMERATED {subject-to-reflective-QoS, ...}

ReportArea ::= ENUMERATED {
    cell,
    ...
}

ResetRequestTypeInfo ::= CHOICE {
    fullReset          ResetRequestTypeInfo-Full,
    partialReset       ResetRequestTypeInfo-Partial,
    choice-extension   ProtocolExtensionContainer { {ResetRequestTypeInfo-ExtIEs} }, -- This IE may need to be refined --
    ...
}

ResetRequestTypeInfo-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

ResetRequestTypeInfo-Full ::= SEQUENCE {
    iE-Extension        ProtocolExtensionContainer { {ResetRequestTypeInfo-Full-ExtIEs} } OPTIONAL,
    ...
}

ResetRequestTypeInfo-Full-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

ResetRequestTypeInfo-Partial ::= SEQUENCE {
    ue-contexts-ToBeReleasedList ResetRequestPartialReleaseList,
    iE-Extension                 ProtocolExtensionContainer { {ResetRequestTypeInfo-Partial-ExtIEs} } OPTIONAL,
    ...
}

ResetRequestTypeInfo-Partial-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

```



```

ResetRequestPartialReleaseList ::= SEQUENCE (SIZE(1..maxnoofUEContexts)) OF ProtocolIE-Single-Container { {ResetRequestPartialReleaseItemIEs} }

ResetRequestPartialReleaseItemIEs XNAP-PROTOCOL-IES ::= {
  { ID id-ResetRequestPartialReleaseItem      CRITICALITY reject  TYPE ResetRequestPartialReleaseItem      PRESENCE mandatory},
  ...
}

ResetRequestPartialReleaseItem ::= SEQUENCE {
  ng-ran-node1UEXnAPID          NG-RANnodeUEXnAPID,
  ng-ran-node2UEXnAPID          NG-RANnodeUEXnAPID,
  iE-Extensions                  ProtocolExtensionContainer { {ResetRequestPartialReleaseItem-ExtIEs} } OPTIONAL,
  ...
}

ResetRequestPartialReleaseItem-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

ResetResponseTypeInfo ::= CHOICE {
  fullReset          ResetResponseTypeInfo-Full,
  partialReset       ResetResponseTypeInfo-Partial,
  choice-extension   ProtocolExtensionContainer { {ResetResponseTypeInfo-ExtIEs} }, -- This IE may need to be refined --
  ...
}

ResetResponseTypeInfo-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

ResetResponseTypeInfo-Full ::= SEQUENCE {
  iE-Extension       ProtocolExtensionContainer { {ResetResponseTypeInfo-Full-ExtIEs} } OPTIONAL,
  ...
}

ResetResponseTypeInfo-Full-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

ResetResponseTypeInfo-Partial ::= SEQUENCE {
  ue-contexts-AdmittedToBeReleasedList  ResetResponsePartialReleaseList,
  iE-Extension                           ProtocolExtensionContainer { {ResetResponseTypeInfo-Partial-ExtIEs} } OPTIONAL,
  ...
}

ResetResponseTypeInfo-Partial-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

ResetResponsePartialReleaseList ::= SEQUENCE (SIZE(1..maxnoofUEContexts)) OF ProtocolIE-Single-Container { {ResetResponsePartialReleaseItemIEs} }

ResetResponsePartialReleaseItemIEs XNAP-PROTOCOL-IES ::= {
  { ID id-ResetResponsePartialReleaseItem      CRITICALITY reject  TYPE ResetResponsePartialReleaseItem      PRESENCE mandatory},

```

```

}
...
}
ResetResponsePartialReleaseItem ::= SEQUENCE {
    ng-ran-node1UEXnAPID          NG-RANnodeUEXnAPID,
    ng-ran-node2UEXnAPID          NG-RANnodeUEXnAPID,
    iE-Extensions                  ProtocolExtensionContainer { {ResetResponsePartialReleaseItem-ExtIEs} } OPTIONAL,
    ...
}

ResetResponsePartialReleaseItem-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

RLCMode ::= ENUMERATED {rlc-am, rlc-um}

RFSP-Index ::= INTEGER (1..256)

-- S

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

SecurityIndication ::= SEQUENCE {
    integrityProtectionIndication    ENUMERATED {required, preferred, not-needed, ...},
    confidentialityProtectionIndication    ENUMERATED {required, preferred, not-needed, ...},
    iE-Extensions                    ProtocolExtensionContainer { {SecurityIndication-ExtIEs} } OPTIONAL,
    ...
}

SecurityIndication-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- Served Cells E-UTRA IEs

ServedCellInformation-E-UTRA ::= SEQUENCE {
    e-utra-pci          E-UTRAPCI,
    e-utra-cgi          E-UTRA-CGI,
    tac                 TAC,
    broadcastPLMNs      SEQUENCE (SIZE(1..maxnoofBPLMNs)) OF ServedCellInformation-E-UTRA-perBPLMN,
    numberOfAntennaPorts    NumberOfAntennaPorts-E-UTRA          OPTIONAL,
    prach-configuration     E-UTRAPRACHConfiguration             OPTIONAL,
    mBSFNsubframeInfo       MBSFNsubframeInfo-E-UTRA             OPTIONAL,
    multibandInfo           E-UTRAMultibandInfoList               OPTIONAL,
    freqBandIndicatorPriority    ENUMERATED {not-broadcast, broadcast, ...}    OPTIONAL,
    bandwidthReducedSI        ENUMERATED {scheduled, ...}          OPTIONAL,
    iE-Extensions           ProtocolExtensionContainer { {ServedCellInformation-E-UTRA-ExtIEs} } OPTIONAL,
}

```

```

}
...
}

ServedCellInformation-E-UTRA-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
...
}

ServedCellInformation-E-UTRA-perBPLMN ::= SEQUENCE {
plmn-id          PLMN-Identity,
e-utra-mode-info ServedCellInformation-E-UTRA-perBPLMN-ModeInfo,
iE-Extensions   ProtocolExtensionContainer { {ServedCellInformation-E-UTRA-perBPLMN-ExtIEs} } OPTIONAL,
...
}

ServedCellInformation-E-UTRA-perBPLMN-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
...
}

ServedCellInformation-E-UTRA-perBPLMN-ModeInfo ::= CHOICE {
fdd          ServedCellInformation-E-UTRA-perBPLMN-FDDInfo,
tdd          ServedCellInformation-E-UTRA-perBPLMN-TDDInfo,
choice-extension ProtocolExtensionContainer { {ServedCellInformation-E-UTRA-perBPLMN-ModeInfo-ExtIEs} },-- This IE may need to be refined
...
}

ServedCellInformation-E-UTRA-perBPLMN-ModeInfo-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
...
}

ServedCellInformation-E-UTRA-perBPLMN-FDDInfo ::= SEQUENCE {
ul-earfcn          E-UTRAARFCN,
dl-earfcn          E-UTRAARFCN,
ul-e-utraTxBW     E-UTRATransmissionBandwidth,
dl-e-utraTxBW     E-UTRATransmissionBandwidth,
iE-Extensions   ProtocolExtensionContainer { {ServedCellInformation-E-UTRA-perBPLMN-FDDInfo-ExtIEs} } OPTIONAL,
...
}

ServedCellInformation-E-UTRA-perBPLMN-FDDInfo-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
...
}

ServedCellInformation-E-UTRA-perBPLMN-TDDInfo ::= SEQUENCE {
earfcn          E-UTRAARFCN,
e-utraTxBW     E-UTRATransmissionBandwidth,
subframeAssignmnet ENUMERATED {sa0,sa1,sa2,sa3,sa4,sa5,sa6,...},
specialSubframeInfo SpecialSubframeInfo-E-UTRA,
iE-Extensions   ProtocolExtensionContainer { {ServedCellInformation-E-UTRA-perBPLMN-TDDInfo-ExtIEs} } OPTIONAL,
...
}

```

```

ServedCellInformation-E-UTRA-perBPLMN-TDDInfo-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

ServedCells-E-UTRA ::= SEQUENCE (SIZE (1..maxnoofCellsinNGRANnode)) OF ServedCells-E-UTRA-Item

ServedCells-E-UTRA-Item ::= SEQUENCE {
  served-cell-info-E-UTRA      ServedCellInformation-E-UTRA,
  neighbour-info-NR           NeighbourInformation-NR           OPTIONAL,
  neighbour-info-E-UTRA      NeighbourInformation-E-UTRA      OPTIONAL,
  iE-Extensions              ProtocolExtensionContainer { {ServedCells-E-UTRA-Item-ExtIEs} } OPTIONAL,
  ...
}

ServedCells-E-UTRA-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

ServedCellsToUpdate-E-UTRA ::= SEQUENCE {
  served-Cells-ToAdd-E-UTRA      ServedCells-E-UTRA           OPTIONAL,
  served-Cells-ToModify-E-UTRA  ServedCells-ToModify-E-UTRA  OPTIONAL,
  served-Cells-ToDelete-E-UTRA  SEQUENCE (SIZE (1..maxnoofCellsinNGRANnode)) OF E-UTRA-CGI  OPTIONAL,
  iE-Extensions                 ProtocolExtensionContainer { {ServedCellsToUpdate-E-UTRA-ExtIEs} } OPTIONAL,
  ...
}

ServedCellsToUpdate-E-UTRA-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

ServedCells-ToModify-E-UTRA ::= SEQUENCE (SIZE (1..maxnoofCellsinNGRANnode)) OF ServedCells-ToModify-E-UTRA-Item

ServedCells-ToModify-E-UTRA-Item ::= SEQUENCE {
  old-ECGI                    E-UTRA-CGI,
  served-cell-info-E-UTRA      ServedCellInformation-E-UTRA,
  neighbour-info-NR           NeighbourInformation-NR           OPTIONAL,
  neighbour-info-E-UTRA      NeighbourInformation-E-UTRA      OPTIONAL,
  iE-Extensions              ProtocolExtensionContainer { {Served-cells-ToModify-E-UTRA-Item-ExtIEs} } OPTIONAL,
  ...
}

Served-cells-ToModify-E-UTRA-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- Served Cells NR IEs

ServedCellInformation-NR ::= SEQUENCE {

```

```

nrPCI                NRPCI,
cellID               NR-CGI,
tac                  TAC,
ranac                 RANAC                                OPTIONAL,
broadcastPLMN        BroadcastPLMNs,
nrModeInfo           NRMModeInfo,
measurementTimingConfiguration OCTET STRING,
iE-Extensions        ProtocolExtensionContainer { {ServedCellInformation-NR-ExtIEs} } OPTIONAL,
...
}

ServedCellInformation-NR-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
...
}

ServedCells-NR ::= SEQUENCE (SIZE (1..maxnoofCellsinNGRANnode)) OF ServedCells-NR-Item

ServedCells-NR-Item ::= SEQUENCE {
served-cell-info-NR      ServedCellInformation-NR,
neighbour-info-NR        NeighbourInformation-NR            OPTIONAL,
neighbour-info-E-UTRA    NeighbourInformation-E-UTRA        OPTIONAL,
iE-Extensions           ProtocolExtensionContainer { {ServedCells-NR-Item-ExtIEs} } OPTIONAL,
...
}

ServedCells-NR-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
...
}

ServedCells-ToModify-NR ::= SEQUENCE (SIZE (1..maxnoofCellsinNGRANnode)) OF ServedCells-ToModify-NR-Item

ServedCells-ToModify-NR-Item ::= SEQUENCE {
old-NR-CGI              NR-CGI,
served-cell-info-NR      ServedCellInformation-NR,
neighbour-info-NR        NeighbourInformation-NR            OPTIONAL,
neighbour-info-E-UTRA    NeighbourInformation-E-UTRA        OPTIONAL,
iE-Extensions           ProtocolExtensionContainer { {Served-cells-ToModify-NR-Item-ExtIEs} } OPTIONAL,
...
}

Served-cells-ToModify-NR-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
...
}

ServedCellsToUpdate-NR ::= SEQUENCE {
served-Cells-ToAdd-NR     ServedCells-NR                                OPTIONAL,
served-Cells-ToModify-NR ServedCells-ToModify-NR                    OPTIONAL,
served-Cells-ToDelete-NR SEQUENCE (SIZE (1..maxnoofCellsinNGRANnode)) OF NR-CGI    OPTIONAL,
iE-Extensions           ProtocolExtensionContainer { {ServedCellsToUpdate-NR-ExtIEs} } OPTIONAL,
...
}

```

```
ServedCellsToUpdate-NR-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

SliceSupport-List ::= SEQUENCE (SIZE(1..maxnoofSliceItems)) OF S-NSSAI

S-NG-RANnode-SecurityKey ::= BIT STRING (SIZE(256))

S-NSSAI ::= SEQUENCE {
  sst          OCTET STRING (SIZE(1)),
  sd          OCTET STRING (SIZE(3)),
  iE-Extensions ProtocolExtensionContainer { {S-NSSAI-ExtIEs} } OPTIONAL,
  ...
}

S-NSSAI-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

SpecialSubframeInfo-E-UTRA ::= SEQUENCE {
  specialSubframePattern SpecialSubframePatterns-E-UTRA,
  cyclicPrefixDL          CyclicPrefix-E-UTRA-DL,
  cyclicPrefixUL          CyclicPrefix-E-UTRA-UL,
  iE-Extensions          ProtocolExtensionContainer { {SpecialSubframeInfo-E-UTRA-ExtIEs} } OPTIONAL,
  ...
}

SpecialSubframeInfo-E-UTRA-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
  ...
}

SpecialSubframePatterns-E-UTRA ::= ENUMERATED {
  ssp0,
  ssp1,
  ssp2,
  ssp3,
  ssp4,
  ssp5,
  ssp6,
  ssp7,
  ssp8,
  ssp9,
  ssp10,
  ...
}

SUL-FrequencyBand ::= INTEGER (1..1024)
```

```

SUL-Information ::= SEQUENCE {
    sulFrequencyInfo      NRARFCN,
    sulTransmissionBandwidth NRTransmissionBandwidth,
    iE-Extensions        ProtocolExtensionContainer { {SUL-Information-ExtIEs} } OPTIONAL,
    ...
}

SUL-Information-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

SupportedSULBandList ::= SEQUENCE (SIZE(1..maxnoofNRCellBands)) OF SupportedSULBandItem

SupportedSULBandItem ::= SEQUENCE {
    sulBandItem          SUL-FrequencyBand,
    iE-Extensions        ProtocolExtensionContainer { {SupportedSULBandItem-ExtIEs} } OPTIONAL,
    ...
}

SupportedSULBandItem-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- T

TAC ::= OCTET STRING (SIZE (3))

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

TAISupport-ItemIEs XNAP-PROTOCOL-IES ::= {
    { ID id-TAISupport-Item CRITICALITY reject TYPE TAISupport-Item PRESENCE mandatory },
    ...
}

TAISupport-Item ::= SEQUENCE {
    tac          TAC,
    broadcastPLMNs SEQUENCE (SIZE(1..maxnoofsupportedPLMNs)) OF BroadcastPLMNinTAISupport-Item,
    iE-Extensions ProtocolExtensionContainer { {TAISupport-Item-ExtIEs} } OPTIONAL,
    ...
}

TAISupport-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

Target-CGI ::= CHOICE {
    nr          NR-CGI,

```

```
e-utra                E-UTRA-CGI,
choice-extension      ProtocolExtensionContainer { {TargetCGI-ExtIEs} },-- This IE may need to be refined --
...
}

TargetCGI-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
...
}

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

TraceActivation ::= SEQUENCE {
  ng-ran-TraceID      OCTET STRING (SIZE (8)),
  interfaces-to-trace BIT STRING { ng-c (0), x-nc (1), uu (2), fl-c (3), e1 (4)} (SIZE(8)),
  trace-depth         Trace-Depth,
  trace-coll-address  TransportLayerAddress,
  ie-extension        ProtocolExtensionContainer { {TraceActivation-ExtIEs} } OPTIONAL,
  ...
}

TraceActivation-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
...
}

Trace-Depth ::= ENUMERATED {
  minimum,
  medium,
  maximum,
  minimumWithoutVendorSpecificExtension,
  mediumWithoutVendorSpecificExtension,
  maximumWithoutVendorSpecificExtension,
  ...
}

TypeOfError ::= ENUMERATED {
  not-understood,
  missing,
  ...
}

-- U

UEAggregateMaximumBitRate ::= SEQUENCE {
  dl-UE-AMBR          BitRate,
  ul-UE-AMBR          BitRate,
  ie-extension        ProtocolExtensionContainer { {UEAggregateMaximumBitRate-ExtIEs} } OPTIONAL,
  ...
}
```



```

UEAggregateMaximumBitRate-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

UEContextID ::= CHOICE {
    rRCResume                UEContextIDforRRResume,
    rRRCReestablishment     UEContextIDforRRCReestablishment,
    choice-extension        ProtocolExtensionContainer { {UEContextID-ExtIEs} },-- This IE may need to be refined -
    ...
}

UEContextID-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

UEContextIDforRRResume ::= SEQUENCE {
    i-rnti                    I-RNTI,
    iE-Extension              ProtocolExtensionContainer { {UEContextIDforRRResume-ExtIEs} } OPTIONAL,
    ...
}

UEContextIDforRRResume-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

UEContextIDforRRCReestablishment ::= SEQUENCE {
    c-rnti                    C-RNTI,
    failureCellPCI           NG-RAN-CellPCI,
    iE-Extension              ProtocolExtensionContainer { {UEContextIDforRRCReestablishment-ExtIEs} } OPTIONAL,
    ...
}

UEContextIDforRRCReestablishment-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

UEContextInfoRetrUECtxtResp ::= SEQUENCE {
    ng-c-UE-signalling-ref    AMF-UE-NGAP-ID,
    signalling-TNL-at-source  CPTransportLayerInformation,
    ueSecurityCapabilities    UESecurityCapabilities,
    securityInformation       AS-SecurityInformation,
    ue-AMBR                   UEAggregateMaximumBitRate,
    pduSessionResourcesToBeSet-List PDUSessionResourcesToBeSetup-List,
    rrc-Context                OCTET STRING,
    mobilityRestrictionList    MobilityRestrictionList                                OPTIONAL,
    indexToRatFrequencySelectionPriority RFSP-Index                                OPTIONAL,
    iE-Extension              ProtocolExtensionContainer { {UEContextInfoRetrUECtxtResp-ExtIEs} } OPTIONAL,
    ...
}

```

```

UEContextInfoRetrUECtxtResp-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

UEIdentityIndexValue ::= INTEGER (0..63) -- This IE may need to be refined

UERANPagingIdentity ::= CHOICE {
    i-RNTI          I-RNTI,
    choice-extension ProtocolExtensionContainer { {UERANPagingIdentity-ExtIEs} },-- This IE may need to be refined -
    ...
}

UERANPagingIdentity-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

UESecurityCapabilities ::= SEQUENCE {
    nr-EncryptionAlgorithms          BIT STRING {nea1-128(1),
                                                nea2-128(2),
                                                nea3-128(3)} (SIZE(16, ...)),
    nr-IntegrityProtectionAlgorithms BIT STRING {nia1-128(1),
                                                nia2-128(2),
                                                nia3-128(3)} (SIZE(16, ...)),
    e-utra-EncryptionAlgorithms      BIT STRING {eea1-128(1),
                                                eea2-128(2),
                                                eea3-128(3)} (SIZE(16, ...)),
    e-utra-IntegrityProtectionAlgorithms BIT STRING {eial-128(1),
                                                eia2-128(2),
                                                eia3-128(3)} (SIZE(16, ...)),
    iE-Extension          ProtocolExtensionContainer { {UESecurityCapabilities-ExtIEs} } OPTIONAL,
    ...
}

UESecurityCapabilities-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

UPTransportLayerInformation ::= CHOICE {
    gtpTunnel          GTPtunnelTransportLayerInformation,
    choice-extension   ProtocolExtensionContainer { {UPTransportLayerInformation-ExtIEs} },-- This IE may need to be refined --
    ...
}

UPTransportLayerInformation-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- V

```

```
-- W

-- X
XnBenefitValue ::= INTEGER (1..8, ...)
```

```
-- Y
```

```
-- Z
```

```
END
```

9.3.6 Common definitions

```
-- *****
--
-- Common definitions
--
-- *****

XnAP-CommonDataTypes {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) xnap (2) version1 (1) xnap-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
--
-- *****

XnAP-Constants {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-Access (22) modules (3) xnap (2) version1 (1) xnap-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    ProcedureCode,
    ProtocolIE-ID
FROM XnAP-CommonDataTypes;

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

id-handoverPreparation      ProcedureCode ::= 0
id-sNStatusTransfer        ProcedureCode ::= 1
id-handoverCancel          ProcedureCode ::= 2
id-retrieveUEContext       ProcedureCode ::= 3
id-rANPaging               ProcedureCode ::= 4
id-dataForwardingAddressIndication ProcedureCode ::= 5
id-uEContextRelease        ProcedureCode ::= 6
id-sNGRANnodeAdditionPreparation ProcedureCode ::= 7
id-sNGRANnodeReconfigurationCompletion ProcedureCode ::= 8
id-mNGRANnodeinitiatedSNGRANnodeModificationPreparation ProcedureCode ::= 9
id-sNGRANnodeinitiatedSNGRANnodeModificationPreparation ProcedureCode ::= 10
id-mNGRANnodeinitiatedSNGRANnodeRelease ProcedureCode ::= 11

```

id-sNGRANnodeinitiatedSNGRANnodeRelease	ProcedureCode ::= 12
id-sNGRANnodeCounterCheck	ProcedureCode ::= 13
id-sNGRANnodeChange	ProcedureCode ::= 14
id-rRCtransfer	ProcedureCode ::= 15
id-xnRemoval	ProcedureCode ::= 16
id-xnSetup	ProcedureCode ::= 17
id-nGRANnodeConfigurationUpdate	ProcedureCode ::= 18
id-cellActivation	ProcedureCode ::= 19
id-reset	ProcedureCode ::= 20
id-errorIndication	ProcedureCode ::= 21
id-privateMessage	ProcedureCode ::= 22

```
-- *****
```

```
--
```

```
-- Lists
```

```
--
```

```
-- *****
```

maxEARFCN	INTEGER ::= 262143
maxnoofAllowedAreas	INTEGER ::= 16
maxnoofAoIs	INTEGER ::= 64
maxnoofBPLMNs	INTEGER ::= 6 -- This IE may need to be refined.
maxnoofCellsInAoI	INTEGER ::= 256
maxnoofCellsInNGRANnode	INTEGER ::= 16384
maxnoofCellsInRNA	INTEGER ::= 32
maxnoofDRBs	INTEGER ::= 32
maxnoofEUTRABands	INTEGER ::= 16
maxnoofEPLMNs	INTEGER ::= 15
maxnoofForbiddenTACs	INTEGER ::= 4096
maxnoofMBSFNUEUTRA	INTEGER ::= 8
maxnoofNeighbours	INTEGER ::= 1024
maxnoofNRCellBands	INTEGER ::= 32
maxnoofPLMNs	INTEGER ::= 16
maxnoofPDUSessions	INTEGER ::= 256
maxnoofQoSFlows	INTEGER ::= 64
maxnoofRANAreaCodes	INTEGER ::= 32
maxnoofRANAreasInRNA	INTEGER ::= 16
maxnoofSliceItems	INTEGER ::= 1024
maxnoofSupportedPLMNs	INTEGER ::= 16 -- This IE may need to be refined.
maxnoofSupportedTACs	INTEGER ::= 1024 -- This IE may need to be refined.
maxnoofTAI	INTEGER ::= 16
maxnoofTAIsInAoI	INTEGER ::= 16
maxnoofUEContexts	INTEGER ::= 8292
maxNRARFCN	INTEGER ::= 3279165
maxNrOfErrors	INTEGER ::= 256

```
-- *****
```

```
--
```

```
-- IEs
```

```
--
```

```
-- *****
```

id-ActivatedServedCells	ProtocolIE-ID ::= 0
id-ActivationIDforCellActivation	ProtocolIE-ID ::= 1
id-AMF-Pool-Information	ProtocolIE-ID ::= 2
id-AreaOfInterest-Item	ProtocolIE-ID ::= 3
id-AssistanceDataForRANPaging	ProtocolIE-ID ::= 4
id-Cause	ProtocolIE-ID ::= 5
id-cellAssistanceInfo-NR	ProtocolIE-ID ::= 6
id-ConfigurationUpdateInitiatingNodeChoice	ProtocolIE-ID ::= 7
id-CriticalityDiagnostics	ProtocolIE-ID ::= 8
id-dataforwardingInfoforPDUSession	ProtocolIE-ID ::= 9
id-dataforwardingInfoforPDUSession-Item	ProtocolIE-ID ::= 10
id-DataForwardingResponseDRBItem	ProtocolIE-ID ::= 11
id-DRBsSubjectToStatusTransfer-Item	ProtocolIE-ID ::= 12
id-DRBsSubjectToStatusTransfer-List	ProtocolIE-ID ::= 13
id-DRBToQoSFlowMapping-Item	ProtocolIE-ID ::= 14
id-GlobalNG-RAN-node-ID	ProtocolIE-ID ::= 15
id-GUAMI	ProtocolIE-ID ::= 16
id-List-of-served-cells-E-UTRA	ProtocolIE-ID ::= 17
id-List-of-served-cells-NR	ProtocolIE-ID ::= 18
id-LocationReportingInformation	ProtocolIE-ID ::= 19
id-MAC-I	ProtocolIE-ID ::= 20
id-MaskedIMEISV	ProtocolIE-ID ::= 21
id-new-NG-RAN-Cell-Identity	ProtocolIE-ID ::= 22
id-newNG-RANnodeUEXnAPID	ProtocolIE-ID ::= 23
id-oldNG-RANnodeUEXnAPID	ProtocolIE-ID ::= 24
id-PagingDRX	ProtocolIE-ID ::= 25
id-PDUSessionResourceAdmittedResponseTransferItem	ProtocolIE-ID ::= 26
id-PDUSessionResourcesAdmitted-Item	ProtocolIE-ID ::= 27
id-PDUSessionResourcesAdmitted-List	ProtocolIE-ID ::= 28
id-PDUSessionResourcesNotAdmitted-Item	ProtocolIE-ID ::= 29
id-PDUSessionResourcesNotAdmitted-List	ProtocolIE-ID ::= 30
id-PDUSessionResourcesToBeSetup-Item	ProtocolIE-ID ::= 31
id-QoSFlowAdmitted-Item	ProtocolIE-ID ::= 32
id-QoSFlow-Item	ProtocolIE-ID ::= 33
id-QoSFlowNotAdmitted-Item	ProtocolIE-ID ::= 34
id-QoSFlowsToBeSetup-Item	ProtocolIE-ID ::= 35
id-RANPagingArea	ProtocolIE-ID ::= 36
id-RANPagingPriority	ProtocolIE-ID ::= 37
id-ResetRequestPartialReleaseItem	ProtocolIE-ID ::= 38
id-ResetRequestTypeInfo	ProtocolIE-ID ::= 39
id-ResetResponsePartialReleaseItem	ProtocolIE-ID ::= 40
id-ResetResponseTypeInfo	ProtocolIE-ID ::= 41
id-RespondingNodeTypeConfigUpdateAck	ProtocolIE-ID ::= 42
id-ServedCellsToActivate	ProtocolIE-ID ::= 43
id-servedCellsToUpdate-E-UTRA	ProtocolIE-ID ::= 44
id-ServedCellsToUpdateInitiatingNodeChoice	ProtocolIE-ID ::= 45
id-servedCellsToUpdate-NR	ProtocolIE-ID ::= 46
id-sourceNG-RANnodeUEXnAPID	ProtocolIE-ID ::= 47
id-TAISupport-Item	ProtocolIE-ID ::= 48
id-TAISupport-list	ProtocolIE-ID ::= 40
id-Target2SourceNG-RANnodeTranspContainer	ProtocolIE-ID ::= 50
id-targetCellGlobalID	ProtocolIE-ID ::= 51
id-targetNG-RANnodeUEXnAPID	ProtocolIE-ID ::= 52
id-TraceActivation	ProtocolIE-ID ::= 53

```

id-UEContextID
id-UEContextInfoHORequest
id-UEContextInfoRetrUECtxtResp
id-UEIdentityIndexValue
id-UEERANPagingIdentity
id-XnRemovalThreshold

```

```

ProtocolIE-ID ::= 54
ProtocolIE-ID ::= 55
ProtocolIE-ID ::= 56
ProtocolIE-ID ::= 57
ProtocolIE-ID ::= 58
ProtocolIE-ID ::= 59

```

END

9.3.8 Container definitions

```

-- *****
--
-- Container definitions
--
-- *****

XnAP-Containers {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) xnap (2) version1 (1) xnap-Containers (5) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    maxPrivateIEs,
    maxProtocolExtensions,
    maxProtocolIEs,
    Criticality,
    Presence,
    PrivateIE-ID,
    ProtocolIE-ID
FROM XnAP-CommonDataTypes;

-- *****
--
-- Class Definition for Protocol IEs
--
-- *****

XNAP-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 IE pairs
--
-- *****

XNAP-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
--
-- *****

XNAP-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
--
-- *****

```



```

XNAP-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 {XNAP-PROTOCOL-IES : IEsSetParam} ::=
    SEQUENCE (SIZE (0..maxProtocolIEs)) OF
    ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Single-Container {XNAP-PROTOCOL-IES : IEsSetParam} ::=
    ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Field {XNAP-PROTOCOL-IES : IEsSetParam} ::= SEQUENCE {
    id          XNAP-PROTOCOL-IES.&id          ({{IEsSetParam}}),
    criticality XNAP-PROTOCOL-IES.&criticality ({{IEsSetParam}}{@id}),
    value       XNAP-PROTOCOL-IES.&Value      ({{IEsSetParam}}{@id})
}

-- *****
--
-- Container for Protocol IE Pairs
--
-- *****

ProtocolIE-ContainerPair {XNAP-PROTOCOL-IES-PAIR : IEsSetParam} ::=
    SEQUENCE (SIZE (0..maxProtocolIEs)) OF
    ProtocolIE-FieldPair {{IEsSetParam}}

ProtocolIE-FieldPair {XNAP-PROTOCOL-IES-PAIR : IEsSetParam} ::= SEQUENCE {
    id          XNAP-PROTOCOL-IES-PAIR.&id          ({{IEsSetParam}}),
    firstCriticality XNAP-PROTOCOL-IES-PAIR.&firstCriticality ({{IEsSetParam}}{@id}),
    firstValue     XNAP-PROTOCOL-IES-PAIR.&FirstValue ({{IEsSetParam}}{@id}),
    secondCriticality XNAP-PROTOCOL-IES-PAIR.&secondCriticality ({{IEsSetParam}}{@id}),
    secondValue    XNAP-PROTOCOL-IES-PAIR.&SecondValue ({{IEsSetParam}}{@id})
}

-- *****
--
-- Container Lists for Protocol IE Containers
--

```

```
-- *****
ProtocolIE-ContainerList {INTEGER : lowerBound, INTEGER : upperBound, XNAP-PROTOCOL-IES : IEsSetParam} ::=
  SEQUENCE (SIZE (lowerBound..upperBound)) OF
    ProtocolIE-Container {{IEsSetParam}}

ProtocolIE-ContainerPairList {INTEGER : lowerBound, INTEGER : upperBound, XNAP-PROTOCOL-IES-PAIR : IEsSetParam} ::=
  SEQUENCE (SIZE (lowerBound..upperBound)) OF
    ProtocolIE-ContainerPair {{IEsSetParam}}

-- *****
--
-- Container for Protocol Extensions
--
-- *****

ProtocolExtensionContainer {XNAP-PROTOCOL-EXTENSION : ExtensionSetParam} ::=
  SEQUENCE (SIZE (1..maxProtocolExtensions)) OF
    ProtocolExtensionField {{ExtensionSetParam}}

ProtocolExtensionField {XNAP-PROTOCOL-EXTENSION : ExtensionSetParam} ::= SEQUENCE {
  id                XNAP-PROTOCOL-EXTENSION.&id                ({ExtensionSetParam}),
  criticality       XNAP-PROTOCOL-EXTENSION.&criticality       ({ExtensionSetParam}@id),
  extensionValue    XNAP-PROTOCOL-EXTENSION.&Extension         ({ExtensionSetParam}@id)
}

-- *****
--
-- Container for Private IEs
--
-- *****

PrivateIE-Container {XNAP-PRIVATE-IES : IEsSetParam} ::=
  SEQUENCE (SIZE (1..maxPrivateIEs)) OF
    PrivateIE-Field {{IEsSetParam}}

PrivateIE-Field {XNAP-PRIVATE-IES : IEsSetParam} ::= SEQUENCE {
  id                XNAP-PRIVATE-IES.&id                ({IEsSetParam}),
  criticality       XNAP-PRIVATE-IES.&criticality       ({IEsSetParam}@id),
  value            XNAP-PRIVATE-IES.&Value            ({IEsSetParam}@id)
}

END
```

9.4 Message transfer syntax

XnAP shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax, as specified in ITU-T Rec. X.691 [15].

9.5 Timers

$TXn_{RELOCprep}$

- Specifies the maximum time for the Handover Preparation procedure in the source NG-RAN node.

$TXn_{RELOCoverall}$

- Specifies the maximum time for the protection of the overall handover procedure in the source NG-RAN node.

TXn_{DCprep}

- Specifies the maximum time for the S-NG-RAN node Addition Preparation or M-NG-RAN node initiated S-NG-RAN node Modification Preparation.

$TXn_{DCoverall}$

- Specifies the maximum time in the S-NG-RAN node for either the S-NG-RAN node initiated S-NG-RAN node Modification procedure or the protection of the NG-RAN actions necessary to configure UE resources at S-NG-RAN node Addition or M-NG-RAN node initiated S-NG-RAN node Modification.

10 Handling of unknown, unforeseen and erroneous protocol data

Section 10 of TS 38.413 [5] is applicable for the purposes of the present document.

Annex A (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-04	RAN3#95bis	R3-171316				Implementing agreements from meeting RAN3#95bis: R3-171147 (removing last two IEs and FFS on NG-C UE), R3-171372, R3-171351 (only NSSAI related text), R3-171338 (with Editor's Note on text and message structure), R3-171371 (with Editor's Note in generic section and name for RAN Paging FFS), R3-171345, R3-171347	0.0.1
2017-05	RAN3#96					Add SGNB MODIFICATION REQUEST in tabular. Editorial change	0.0.2
2017-05	RAN3#96					Implementing agreements from meeting RAN3#96: R3-171925 (Handover messages – tabular format), R3-171928 (additions for RAN Paging) Editorials (remove highlight, change style sheet assignments, correcting and adding references to other TSs and TRs, replacing some FFSs by Editor's Notes)	0.1.0
2017-06	RAN3#ad-hoc2	R3-172548				Submission	0.1.1
2017-06	RAN3#ad-hoc2	R3-173452				Implementing agreed R3-172612 and agreed node naming conventions.	0.2.0
2017-08	RAN3#97	R3-173462				Implement the agreed pCRs from RAN3#97 meeting: R3-173237, R3-173337, R3-173416, R3-173429, R3-173431	0.3.0
2017-10	RAN3#97bis	R3-174242				Implementing the agreed pCRs from RAN3#97bis meeting: R3-173976, R3-174097, R3-174183, R3-174192, R3-174205	0.4.0
2017-12	RAN3#98	R3-175058				Implementing agreed pCRs from RAN3#98 meeting: R3-175024, R3-174817, R3-174920, R3-174920, R3-174924, R3-174934, R3-174837, R3-175077	0.5.0
2018.01	RAN3 AH 1801	R3-180656				Implementing agreed pCRs from RAN3 AH 1801: R3-180114, R3-180545, R3-180548, R3-180561, R3-180569, R3-180601, R3-180607, R3-180615, R3-180629, R3-180631, R3-180638	0.6.0
2018-03	RAN3#99	R3-181593				Implementing agreed pCRs from RAN3#99: R3-180850, R3-180980, R3-181247, R3-181280, R3-181350, R3-181385, R3-181390, R3-181415, R3-181418, R3-181461, R3-181504, R3-181509	0.7.0
2018-04	RAN3#99bis	R3-182527				Implementing agreements from RAN3#99bis: R3-182213, R3-182396, R3-182401, R3-181855, R3-182488, R3-182371, R3-182157, R3-182373, R3-182375, R3-182376, R3-182163, R3-182384, R3-182392, R3-181825, R3-182494, R3-181980, R3-182433, update along R3-182378, update along R3-182344, update along R3-181899	0.8.0
2018-05	RAN3#100	R3-183597				Implementing agreements from RAN3#100: R3-182614, R3-182615, R3-182635, R3-182815, R3-182935, R3-183091, R3-183154, R3-183165, R3-183252, R3-183314, R3-183369, R3-183376, R3-183386, R3-183389, R3-183393, R3-183404, R3-183407, R3-183411, R3-183441, R3-183442, R3-183444, R3-183450, R3-183455, R3-183497, R3-183511, R3-183517, R3-183519, R3-183534, R3-183541. Adding ASN.1 and performing editorial cleanups.	0.9.0
2018-06	RAN#80	RP-180816				Submission to TSG RAN for approval	1.0.0
2018-06	RAN#80		-	-	-	Specification approved at TSG-RAN and placed under change control	15.0.0

History

Document history		
V15.0.0	July 2018	Publication