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Foreword

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

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

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 protocol for the NG interface. The NG Application Protocol (NGAP) supports the functions of the NG interface by signalling procedures defined in this document. NGAP is developed in accordance to the general principles stated in TS 38.401 [2] and TS 38.410 [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 38.410: "NG-RAN; NG general aspects and principles".
- [4] ITU-T Recommendation X.691 (07/2002): "Information technology – ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)".
- [5] ITU-T Recommendation X.680 (07/2002): "Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation".
- [6] ITU-T Recommendation X.681 (07/2002): "Information technology – Abstract Syntax Notation One (ASN.1): Information object specification".
- [7] 3GPP TR 25.921 (version.7.0.0): "Guidelines and principles for protocol description and error handling".
- [8] 3GPP TS 38.300: "NR; NR and NG-RAN Overall Description; Stage 2".
- [9] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".
- [10] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".
- [11] 3GPP TS 32.422: "Trace control and configuration management".
- [12] 3GPP TS 38.304: "NR; User Equipment (UE) procedures in idle mode and in RRC inactive state".
- [13] 3GPP TS 33.501: "Security architecture and procedures for 5G System".
- [14] 3GPP TS 38.414: "NG-RAN; NG data transport".
- [15] 3GPP TS 29.281: "General Packet Radio System (GPRS); Tunnelling Protocol User Plane (GTPv1-U)".
- [16] 3GPP TS 36.413: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)".
- [17] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".
- [18] 3GPP TS 38.331: "NG-RAN; Radio Resource Control (RRC) Protocol Specification".
- [19] 3GPP TS 38.455: "NG-RAN; NR Positioning Protocol A (NRPPa)".

- [20] 3GPP TS 23.007: "Technical Specification Group Core Network Terminals; Restoration procedures".
- [21] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC); Protocol specification".
- [22] 3GPP TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".
- [23] 3GPP TS 23.003: "Numbering, addressing and identification".
- [24] 3GPP TS 38.423: "NG-RAN; Xn Application Protocol (XnAP)".
- [25] IETF RFC 5905 (2010-06): "Network Time Protocol Version 4: Protocol and Algorithms Specification".
- [26] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".
- [27] 3GPP TS 33.401: "3GPP System Architecture Evolution (SAE); Security architecture".
- [28] 3GPP TS 25.413: "UTRAN Iu interface RANAP signalling".
- [29] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode".

3 Definitions 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: NGAP consists of Elementary Procedures (EPs). An Elementary Procedure is a unit of interaction between the NG-RAN node and the AMF. These Elementary Procedures are defined separately and are intended to be used to build up complete sequences in a flexible manner. If the independence between some EPs is restricted, it is described under the relevant EP description. Unless otherwise stated by the restrictions, the EPs may be invoked independently of each other as standalone procedures, which can be active in parallel. The usage of several NGAP EPs together or together with EPs from other interfaces is specified in stage 2 specifications (e.g., TS 38.401 [2], TS 38.410 [3] and TS 38.300 [8]).

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 and/or failure).
- **Class 2:** Elementary Procedures without response.

For Class 1 EPs, the types of responses can be as follows:

Successful:

- A signalling message explicitly indicates that the elementary procedure successfully completed with the receipt of the response.

Unsuccessful:

- A signalling message explicitly indicates that the EP failed.
- On time supervision expiry (i.e., absence of expected response).

Successful and Unsuccessful:

- One signalling message reports both successful and unsuccessful outcome for the different included requests. The response message used is the one defined for successful outcome.

Class 2 EPs are considered always successful.

gNB: as defined in TS 38.300 [8].

ng-eNB: as defined in TS 38.300 [8].

NG-RAN node: as defined in TS 38.300 [8].

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].

5GC	5G Core Network
5QI	5G QoS Identifier
AMF	Access and Mobility Management Function
CGI	Cell Global Identifier
CP	Control Plane
DL	Downlink
EPC	Evolved Packet Core
GUAMI	Globally Unique AMF Identifier
IMEISV	International Mobile station Equipment Identity and Software Version number
LMF	Location Management Function
N3IWF	Non 3GPP InterWorking Function
NGAP	NG Application Protocol
NRPPa	NR Positioning Protocol Annex
NSCI	New Security Context Indicator
NSSAI	Network Slice Selection Assistance Information
OTDOA	Observed Time Difference of Arrival
SCG	Secondary Cell Group
SCTP	Stream Control Transmission Protocol
SMF	Session Management Function
S-NG-RAN node	Secondary NG-RAN node
S-NSSAI	Single Network Slice Selection Assistance Information
TAC	Tracking Area Code
TAI	Tracking Area Identity
TNLA	Transport Network Layer Association
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 node exactly and completely. Any rule that specifies the behaviour of the originating 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 REQUEST 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 clause 10.

4.2 Forwards and Backwards Compatibility

The forwards and backwards compatibility of the protocol is assured by 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., Procedure Name 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., MESSAGE NAME 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 <i>Italic font</i> followed by the abbreviation "IE", e.g., <i>Information Element</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 subclause 9.2 enclosed by quotation marks, e.g., "Value".

5 NGAP Services

NGAP provides the signalling service between the NG-RAN node and the AMF that is required to fulfil the NGAP functions described in TS 38.410 [3]. NGAP services are divided into two groups:

Non UE-associated services:	They are related to the whole NG interface instance between the NG-RAN node and AMF utilising a non UE-associated signalling connection.
UE-associated services:	They are related to one UE. NGAP functions that provide these services are associated with a UE-associated signalling connection that is maintained for the UE in question.

6 Services Expected from Signalling Transport

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

7 Functions of NGAP

The functions of NGAP are described in TS 38.410 [3].

8 NGAP Procedures

8.1 List of NGAP Elementary Procedures

In the following tables, all EPs are divided into Class 1 and Class 2 EPs (see subclause 3.1 for explanation of the different classes):

Table 8.1-1: Class 1 procedures

Elementary Procedure	Initiating Message	Successful Outcome	Unsuccessful Outcome
		Response message	Response message
AMF Configuration Update	AMF CONFIGURATION UPDATE	AMF CONFIGURATION UPDATE ACKNOWLEDGE	AMF CONFIGURATION UPDATE FAILURE
RAN Configuration Update	RAN CONFIGURATION UPDATE	RAN CONFIGURATION UPDATE ACKNOWLEDGE	RAN CONFIGURATION UPDATE FAILURE
Handover Cancellation	HANDOVER CANCEL	HANDOVER CANCEL ACKNOWLEDGE	
Handover Preparation	HANDOVER REQUIRED	HANDOVER COMMAND	HANDOVER PREPARATION FAILURE
Handover Resource Allocation	HANDOVER REQUEST	HANDOVER REQUEST ACKNOWLEDGE	HANDOVER FAILURE
Initial Context Setup	INITIAL CONTEXT SETUP REQUEST	INITIAL CONTEXT SETUP RESPONSE	INITIAL CONTEXT SETUP FAILURE
NG Reset	NG RESET	NG RESET ACKNOWLEDGE	
NG Setup	NG SETUP REQUEST	NG SETUP RESPONSE	NG SETUP FAILURE
Path Switch Request	PATH SWITCH REQUEST	PATH SWITCH REQUEST ACKNOWLEDGE	PATH SWITCH REQUEST FAILURE
PDU Session Resource Modify	PDU SESSION RESOURCE MODIFY REQUEST	PDU SESSION RESOURCE MODIFY RESPONSE	
PDU Session Resource Modify Indication	PDU SESSION RESOURCE MODIFY INDICATION	PDU SESSION RESOURCE MODIFY CONFIRM	
PDU Session Resource Release	PDU SESSION RESOURCE RELEASE COMMAND	PDU SESSION RESOURCE RELEASE RESPONSE	
PDU Session Resource Setup	PDU SESSION RESOURCE SETUP REQUEST	PDU SESSION RESOURCE SETUP RESPONSE	
UE Context Modification	UE CONTEXT MODIFICATION REQUEST	UE CONTEXT MODIFICATION RESPONSE	UE CONTEXT MODIFICATION FAILURE
UE Context Release	UE CONTEXT RELEASE COMMAND	UE CONTEXT RELEASE COMPLETE	
Write-Replace Warning	WRITE-REPLACE WARNING REQUEST	WRITE-REPLACE WARNING RESPONSE	
PWS Cancel	PWS CANCEL REQUEST	PWS CANCEL RESPONSE	
UE Radio Capability Check	UE RADIO CAPABILITY CHECK REQUEST	UE RADIO CAPABILITY CHECK RESPONSE	

Table 8.1-2: Class 2 procedures

Elementary Procedure	Message
Downlink RAN Configuration Transfer	DOWNLINK RAN CONFIGURATION TRANSFER
Downlink RAN Status Transfer	DOWNLINK RAN STATUS TRANSFER
Downlink NAS Transport	DOWNLINK NAS TRANSPORT
Error Indication	ERROR INDICATION
Uplink RAN Configuration Transfer	UPLINK RAN CONFIGURATION TRANSFER
Uplink RAN Status Transfer	UPLINK RAN STATUS TRANSFER
Handover Notification	HANDOVER NOTIFY
Initial UE Message	INITIAL UE MESSAGE
NAS Non Delivery Indication	NAS NON DELIVERY INDICATION
Paging	PAGING
PDU Session Resource Notify	PDU SESSION RESOURCE NOTIFY
Reroute NAS Request	REROUTE NAS REQUEST
UE Context Release Request	UE CONTEXT RELEASE REQUEST
Uplink NAS Transport	UPLINK NAS TRANSPORT
AMF Status Indication	AMF STATUS INDICATION
PWS Restart Indication	PWS RESTART INDICATION
PWS Failure Indication	PWS FAILURE INDICATION
Downlink UE Associated NRPPa Transport	DOWNLINK UE ASSOCIATED NRPPA TRANSPORT
Uplink UE Associated NRPPa Transport	UPLINK UE ASSOCIATED NRPPA TRANSPORT
Downlink Non UE Associated NRPPa Transport	DOWNLINK NON UE ASSOCIATED NRPPA TRANSPORT
Uplink Non UE Associated NRPPa Transport	UPLINK NON UE ASSOCIATED NRPPA TRANSPORT
Trace Start	TRACE START
Trace Failure Indication	TRACE FAILURE INDICATION
Deactivate Trace	DEACTIVATE TRACE
Cell Traffic Trace	CELL TRAFFIC TRACE
Location Reporting Control	LOCATION REPORTING CONTROL
Location Reporting Failure Indication	LOCATION REPORTING FAILURE INDICATION
Location Report	LOCATION REPORT
UE TNLA Binding Release	UE TNLA BINDING RELEASE REQUEST
UE Radio Capability Info Indication	UE RADIO CAPABILITY INFO INDICATION
RRC Inactive Transition Report	RRC INACTIVE TRANSITION REPORT
Overload Start	OVERLOAD START
Overload Stop	OVERLOAD STOP

8.2 PDU Session Management Procedures

8.2.1 PDU Session Resource Setup

8.2.1.1 General

The purpose of the PDU Session Resource Setup procedure is to assign resources on Uu and NG-U for one or several PDU sessions and the corresponding QoS flows, and to setup corresponding DRBs for a given UE. The procedure uses UE-associated signalling.

8.2.1.2 Successful Operation

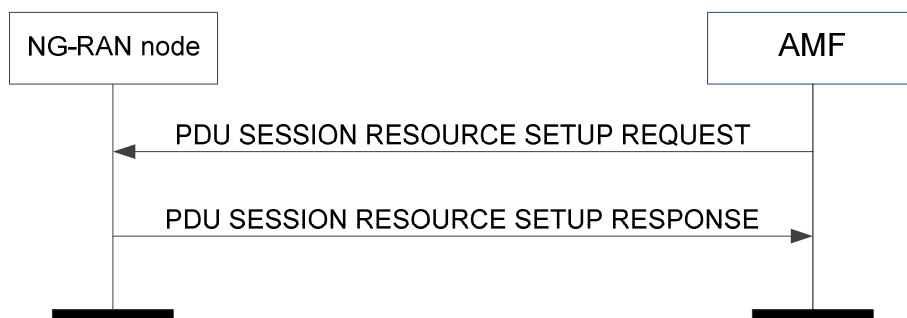


Figure 8.2.1.2-1: PDU session resource setup: successful operation

The AMF initiates the procedure by sending a PDU SESSION RESOURCE SETUP REQUEST message to the NG-RAN node.

The PDU SESSION RESOURCE SETUP REQUEST message shall contain the information required by the NG-RAN node to setup the PDU session related NG-RAN configuration consisting of at least one PDU session resource and include each PDU session resource to setup in the *PDU Session Resource Setup Request List IE*.

Upon reception of the PDU SESSION RESOURCE SETUP REQUEST message, if resources are available for the requested configuration, the NG-RAN node shall execute the requested NG-RAN configuration and allocate associated resources over NG and over Uu for each PDU session listed in the *PDU Session Resource Setup Request List IE*.

If the *RAN Paging Priority IE* is included in the PDU SESSION RESOURCE SETUP REQUEST message, the NG-RAN node may use it to determine a priority for paging the UE in RRC_INACTIVE state.

For each requested PDU session, if resources are available for the requested configuration, the NG-RAN node shall establish at least one DRB and associate each accepted QoS flow of the PDU session to a DRB established.

For each PDU session successfully established the NG-RAN node shall pass to the UE the *PDU Session NAS-PDU IE*, if included, and the value contained in the *PDU Session ID IE* received for the PDU session. The NG-RAN node shall not send to the UE the PDU Session NAS PDUs associated to the failed PDU sessions.

If the *NAS-PDU IE* is included in the PDU SESSION RESOURCE SETUP REQUEST message, the NG-RAN node shall pass it to the UE.

For each PDU session the NG-RAN node shall store the *UL NG-U UP TNL Information IE* included in the *PDU Session Resource Setup Request Transfer IE* contained in the PDU SESSION RESOURCE SETUP REQUEST message and use it as the uplink termination point for the user plane data for this PDU session.

For each PDU session, if the *Additional UL NG-U UP TNL Information IE* is included in the *PDU Session Resource Setup Request Transfer IE* contained in the PDU SESSION RESOURCE SETUP REQUEST message, the NG-RAN node may forward it to the S-NG-RAN node as the uplink termination point for the user plane data for split PDU session.

For each PDU session, if the *Network Instance IE* is included in the *PDU Session Resource Setup Request Transfer IE* contained in the PDU SESSION RESOURCE SETUP REQUEST message, the NG-RAN node shall, if supported, use it when selecting transport network resource as specified in TS 23.501 [9].

For each PDU session, if the *PDU Session Type IE* included in the *PDU Session Resource Setup Request Transfer IE* of the PDU SESSION RESOURCE SETUP REQUEST message is set to "ethernet" or "unstructured", the NG-RAN node shall not perform header compression for the concerned PDU session.

For each PDU session for which the *Security Indication IE* is included in the *PDU Session Resource Setup Request Transfer IE* of the PDU SESSION RESOURCE SETUP REQUEST message, and the *Integrity Protection Indication IE* or *Confidentiality Protection Indication IE* is set to "required", then the NG-RAN node shall perform user plane integrity protection or ciphering, respectively, for the concerned PDU session. If the NG-RAN node cannot 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 Setup Request Transfer IE* of the PDU SESSION RESOURCE SETUP REQUEST message, and the *Integrity Protection Indication IE* or *Confidentiality Protection Indication IE* is set to "preferred", then the NG-RAN node should, if supported, perform user plane integrity protection or ciphering, respectively, for the concerned PDU session and shall notify whether it performed the user plane integrity protection or ciphering by including the *Integrity Protection Result IE* or *Confidentiality Protection Result IE*, respectively, in the *PDU Session Resource Setup Response Transfer IE* of the PDU SESSION RESOURCE SETUP RESPONSE message.

For each PDU session for which the *Maximum Integrity Protected Data Rate IE* is included in the *Security Indication IE* in the *PDU Session Resource Setup Request Transfer IE* of the PDU SESSION RESOURCE SETUP REQUEST message, the NG-RAN node shall store the respective information and, if integrity protection is to be performed for the PDU session, it shall enforce the traffic corresponding to the received *Maximum Integrity Protected Data Rate IE*, for the concerned PDU session and concerned UE, as specified in TS 23.501 [9].

For each PDU session for which the *Security Indication* IE is included in the *PDU Session Resource Setup Request Transfer* IE of the PDU SESSION RESOURCE SETUP REQUEST message:

- if the *Integrity Protection Indication* IE is set to "not needed", then the NG-RAN node shall not perform user plane integrity protection for the concerned PDU session;
- if the *Confidentiality Protection Indication* IE is set to "not needed", then the NG-RAN node shall not perform user plane ciphering for the concerned PDU session.

For each PDU session for which the *PDU Session Aggregate Maximum Bit Rate* IE is included in the *PDU Session Resource Setup Request Transfer* IE of the PDU SESSION RESOURCE SETUP REQUEST message, the NG-RAN node shall store the received value in the UE context and use it when enforcing traffic policing for non-GBR QoS flows for the concerned UE as specified in TS 23.501 [9].

For each PDU session in the PDU SESSION RESOURCE SETUP REQUEST message, if the *Additional QoS Flow Information* IE is included in the *QoS Flow Level QoS Parameters* IE in the *PDU Session Resource Setup Request Transfer* IE of the PDU SESSION RESOURCE SETUP REQUEST message, the NG-RAN node may consider it for the DRB allocation process. It is up to NG-RAN node implementation to decide whether and how to use it.

For each QoS flow requested to be setup the NG-RAN node shall take into account the received *QoS Flow Level QoS Parameters* IE. For each QoS flow the NG-RAN node shall establish or modify the resources according to the values of the *Allocation and Retention Priority* IE (priority level and pre-emption indicators) and the resource situation as follows:

- The NG-RAN node shall consider the priority level of the requested QoS flow, when deciding on the resource allocation.
- The priority levels and the pre-emption indicators may (individually or in combination) be used to determine whether the QoS flow setup has to be performed unconditionally and immediately. If the requested QoS flow is marked as "may trigger pre-emption" and the resource situation requires so, the NG-RAN node may trigger the pre-emption procedure which may then cause the forced release of a lower priority QoS flow which is marked as "pre-emptable". Whilst the process and the extent of the pre-emption procedure are operator-dependent, the pre-emption indicators shall be treated as follows:
 1. The values of the last received *Pre-emption Vulnerability* IE and *Priority Level* IE shall prevail.
 2. If the *Pre-emption Capability* IE is set to "may trigger pre-emption", then this allocation request may trigger the pre-emption procedure.
 3. If the *Pre-emption Capability* IE is set to "shall not trigger pre-emption", then this allocation request shall not trigger the pre-emption procedure.
 4. If the *Pre-emption Vulnerability* IE is set to "pre-emptable", then this QoS flow shall be included in the pre-emption process.
 5. If the *Pre-emption Vulnerability* IE is set to "not pre-emptable", then this QoS flow shall not be included in the pre-emption process.
- The NG-RAN node pre-emption process shall keep the following rules:
 1. The NG-RAN node shall only pre-empt QoS flows with lower priority, in ascending order of priority.
 2. The pre-emption may be done for QoS flows belonging to the same UE or to other UEs.

For each QoS flow which has been successfully established, the NG-RAN node shall store the mapped E-RAB ID if included in the *PDU Session Resource Setup Request Transfer* IE contained in the PDU SESSION RESOURCE SETUP REQUEST message and use it as specified in TS 38.300 [8].

The NG-RAN node shall report to the AMF in the PDU SESSION RESOURCE SETUP RESPONSE message the result for each PDU session resource requested to be setup:

- For each PDU session resource successfully setup, the *PDU Session Resource Setup Response Transfer* IE shall be included containing:
 1. The NG-U UP transport layer information to be used for the PDU session and associated list of QoS flows which have been successfully established, in the *QoS Flow per TNL Information* IE.

2. The list of QoS flows which failed to be established, if any, in the *QoS Flow Failed to Setup List* IE. When the NG-RAN node reports unsuccessful establishment of a QoS flow, the cause value should be precise enough to enable the SMF to know the reason for the unsuccessful establishment.
- For each PDU session resource which failed to be setup, the *PDU Session Resource Setup Unsuccessful Transfer* IE shall be included containing a cause value that should be precise enough to enable the SMF to know the reason for the unsuccessful establishment.

For each PDU session resource successfully setup at the NG-RAN node, if the *Additional UL NG-U UP TNL Information* IE is included in the *PDU Session Resource Setup Request Transfer* IE the NG-RAN node may allocate resources for an additional NG-U transport bearer for some or all QoS flows which it shall indicate in the *Additional QoS Flow per TNL Information* IE in the *PDU Session Resource Setup Response Transfer* IE. In case the *Additional QoS Flow per TNL Information* IE is not included the SMF shall consider the proposed additional UL NG-U UP TNL information as available again.

Upon reception of the PDU SESSION RESOURCE SETUP RESPONSE message the AMF shall, for each PDU session indicated in the *PDU Session ID* IE, transfer transparently the *PDU Session Resource Setup Response Transfer* IE or *PDU Session Resource Setup Unsuccessful Transfer* IE to the SMF associated with the concerned PDU session.

Interactions with Handover Preparation procedure:

If a handover becomes necessary during the PDU Session Resource Setup procedure, the NG-RAN node may interrupt the ongoing PDU Session Resource Setup procedure and initiate the Handover Preparation procedure as follows:

1. The NG-RAN node shall send the PDU SESSION RESOURCE SETUP RESPONSE message in which the NG-RAN node shall indicate, if necessary, all the PDU session resources which failed to be setup with an appropriate cause value, e.g. "NG intra-system handover triggered", "NG inter-system handover triggered" or "Xn handover triggered".
2. The NG-RAN node shall trigger the handover procedure.

8.2.1.3 Unsuccessful Operation

The unsuccessful operation is specified in the successful operation section.

8.2.1.4 Abnormal Conditions

If the NG-RAN node receives a PDU SESSION RESOURCE SETUP REQUEST message containing several *PDU Session ID* IEs (in the *PDU Session Resource Setup Request List* IE) set to the same value, the NG-RAN node shall report the establishment of the corresponding PDU sessions as failed in the PDU SESSION RESOURCE SETUP RESPONSE message with an appropriate cause value.

If the NG-RAN node receives a PDU SESSION RESOURCE SETUP REQUEST message containing a *PDU Session ID* IE (in the *PDU Session Resource Setup Request List* IE) set to a value that identifies an active PDU session (established before the PDU SESSION RESOURCE SETUP REQUEST message was received), the NG-RAN node shall report the establishment of the new PDU session as failed in the PDU SESSION RESOURCE SETUP REQUEST message with an appropriate cause value.

8.2.2 PDU Session Resource Release

8.2.2.1 General

The purpose of the PDU Session Resource Release procedure is to enable the release of already established PDU session resources for a given UE. The procedure uses UE-associated signalling.

8.2.2.2 Successful Operation

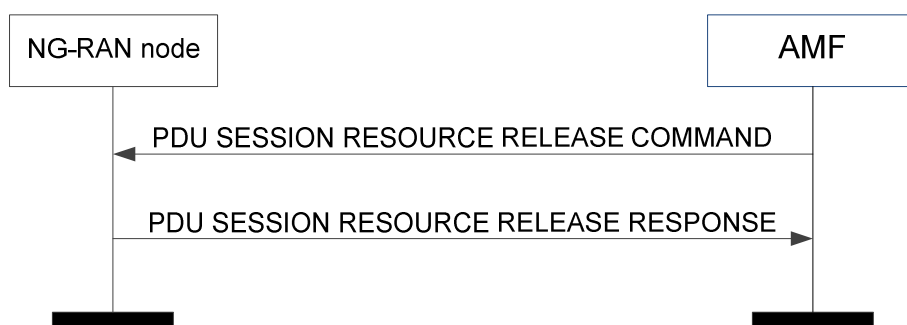


Figure 8.2.2.2-1: PDU session resource release: successful operation

The AMF initiates the procedure by sending a PDU SESSION RESOURCE RELEASE COMMAND message.

The PDU SESSION RESOURCE RELEASE COMMAND message shall contain the information required by the NG-RAN node to release at least one PDU session resource, and include each PDU session resource to release in the *PDU Session Resource to Release List* IE.

If a *NAS-PDU* IE is contained in the PDU SESSION RESOURCE RELEASE COMMAND message, the NG-RAN node shall pass it to the UE.

Upon reception of the PDU SESSION RESOURCE RELEASE COMMAND message the NG-RAN node shall execute the release of the requested PDU sessions. For each PDU session to be released the NG-RAN node shall release the corresponding resources over Uu and over NG.

If the *RAN Paging Priority* IE is included in the PDU SESSION RESOURCE RELEASE COMMAND message, the NG-RAN node may use it to determine a priority for paging the UE in RRC_INACTIVE state.

The NG-RAN node shall, if supported, report in the PDU SESSION RESOURCE RELEASE RESPONSE message location information of the UE in the *User Location Information* IE.

After sending a PDU SESSION RESOURCE RELEASE RESPONSE message, the NG-RAN node shall be prepared to receive a PDU SESSION RESOURCE SETUP REQUEST message requesting establishment of a PDU session with a PDU Session ID corresponding to one of the PDU Session IDs that was present in the *PDU Session Resource to Release List* IE of the PDU SESSION RESOURCE RELEASE COMMAND message.

If the *User Location Information* IE is included in the PDU SESSION RESOURCE RELEASE RESPONSE message, the AMF shall handle this information as specified in TS 23.501 [9].

8.2.2.3 Unsuccessful Operation

The unsuccessful operation is specified in the successful operation section.

8.2.2.4 Abnormal Conditions

If the NG-RAN node receives a PDU SESSION RESOURCE RELEASE COMMAND message containing multiple *PDU Session ID* IEs (in the *PDU Session Resource to Release List* IE) set to the same value, the NG-RAN node shall initiate the release of one corresponding PDU session and ignore the duplication of the instances of the selected corresponding PDU sessions.

If the NG-RAN node receives a PDU SESSION RESOURCE RELEASE COMMAND message containing *PDU Session ID* IE(s) (in the *PDU Session Resource to Release List* IE) that the NG-RAN node does not recognize, the NG-RAN node shall report the corresponding invalid PDU session(s) as failed in the PDU SESSION RESOURCE RELEASE RESPONSE message with an appropriate cause value.

8.2.3 PDU Session Resource Modify

8.2.3.1 General

The purpose of the PDU Session Resource Modify procedure is to enable configuration modifications of already established PDU session(s) for a given UE. It is also to enable the setup, modification and release of the QoS flow for already established PDU session(s). The procedure uses UE-associated signalling.

8.2.3.2 Successful Operation

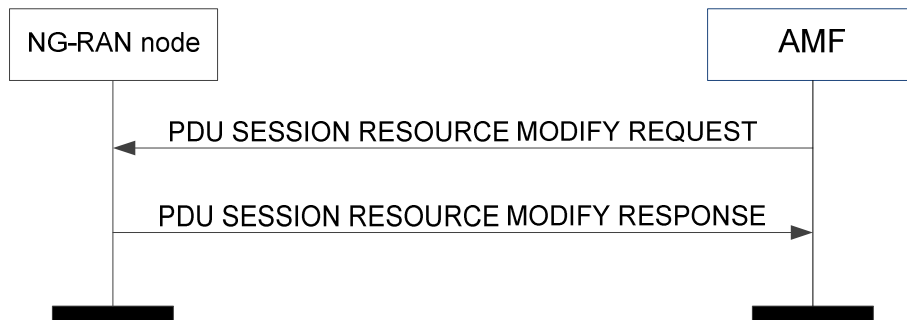


Figure 8.2.3.2-1: PDU session resource modify: successful operation

The AMF initiates the procedure by sending a PDU SESSION RESOURCE MODIFY REQUEST message to the NG-RAN node.

The PDU SESSION RESOURCE MODIFY REQUEST message shall contain the information required by the NG-RAN node, which may trigger the NG-RAN configuration modification for the existing PDU sessions listed in the *PDU Session Resource Modify Request List IE*.

Upon reception of the PDU SESSION RESOURCE MODIFY REQUEST message, if the NG-RAN configuration is triggered to be modified and if resources are available for the modified NG-RAN configuration, the NG-RAN node shall execute the configuration modification for the requested PDU session.

If the *RAN Paging Priority IE* is included in the PDU SESSION RESOURCE MODIFY REQUEST message, the NG-RAN node may use it to determine a priority for paging the UE in RRC_INACTIVE state.

For each PDU session, if the *Network Instance IE* is included in the *PDU Session Resource Modify Request Transfer IE* contained in the PDU SESSION RESOURCE MODIFY REQUEST message, the NG-RAN node shall, if supported, use it as specified in TS 23.501 [9].

For each PDU session included in the *PDU Session Resource Modify Request List IE*:

- For each QoS flow included in the *QoS Flow Add or Modify Request List IE*, based on the *QoS Flow Level QoS Parameters IE*, the NG-RAN node may establish, modify or release the DRB configuration and may change allocation of resources on NG or Uu accordingly. The NG-RAN node shall associate each QoS flow accepted to setup or modify with a DRB of the PDU session. The associated DRB for the QoS flow accepted to modify may not change.
- For each QoS flow included in the *QoS Flow to Release List IE*, the NG-RAN node shall de-associate the QoS flow with the previously associated DRB.
- The NG-RAN node shall pass the *NAS-PDU IE* received for the PDU session to the UE when modifying the PDU session configuration. The NG-RAN node does not send the NAS PDUs associated to the failed PDU sessions to the UE.
- The NG-RAN node may change allocation of resources on NG according to the requested target configuration.
- If the *PDU Session Aggregate Maximum Bit Rate IE* is included in the *PDU Session Resource Modify Request Transfer IE*, the NG-RAN node shall store and use the received PDU Session Aggregate Maximum Bit Rate value when enforcing traffic policing for non-GBR QoS flows for the concerned UE as specified in TS 23.501 [9].

- If the *UL NG-U UP TNL Information IE* is included in the *PDU Session Resource Modify Request Transfer IE*, the NG-RAN node shall update the transport layer information for the uplink data accordingly for the concerned transport bearer identified by the *DL NG-U UP TNL Information IE* included in the *PDU Session Resource Modify Request Transfer IE* for the concerned PDU session.
- If the *Additional UL NG-U UP TNL Information IE* is included in the *PDU Session Resource Modify Request Transfer IE*, the NG-RAN node may allocate resources for an additional NG-U transport bearer for some or all of the QoS flows present in the *QoS Flow Add or Modify Request List IE* and it shall indicate these QoS flows in the *Additional QoS Flow per TNL Information IE* in the *PDU Session Resource Modify Response Transfer IE*. In case the *Additional QoS Flow per TNL Information IE* is not included the SMF shall consider the proposed additional UL NG-U UP TNL information as available again.

The NG-RAN node shall report to the AMF, in the PDU SESSION RESOURCE MODIFY RESPONSE message, the result for each PDU session requested to be modified listed in the PDU SESSION RESOURCE MODIFY REQUEST message:

- For each PDU session which is successfully modified, the *PDU Session Resource Modify Response Transfer IE* shall be included containing:
 1. The list of QoS flows which have been successfully setup or modified, if any, in the *QoS Flow Add or Modify Response List IE* in case the PDU Session Resource Modify procedure is triggered by QoS flow setup or modification.
 2. The list of QoS flows which have failed to be setup or modified, if any, in the *QoS Flow Failed to Add or Modify List IE* in case the PDU Session Resource Modify procedure is triggered by QoS flow setup or modification.
- For each PDU session which failed to be modified, the *PDU Session Resource Modify Unsuccessful Transfer IE* shall be included containing the failure cause.

Upon reception of the PDU SESSION RESOURCE MODIFY RESPONSE message the AMF shall, for each PDU session indicated in the *PDU Session ID IE*, transfer transparently the *PDU Session Resource Modify Response Transfer IE* or *PDU Session Resource Modify Unsuccessful Transfer IE* to each SMF associated with the concerned PDU session.

The NG-RAN node shall, if supported, report in the PDU SESSION RESOURCE MODIFY RESPONSE message location information of the UE in the *User Location Information IE*.

For a PDU session or a QoS flow which failed to be modified, the NG-RAN node shall fall back to the configuration of the PDU session or the QoS flow as it was configured prior to the reception of the PDU SESSION RESOURCE MODIFY REQUEST message.

Upon reception of the PDU SESSION RESOURCE MODIFY REQUEST message to setup a QoS flow for IMS voice, if the NG-RAN node is not able to support IMS voice, the NG-RAN node shall initiate EPS fallback or RAT fallback for IMS voice procedure as specified in TS 23.501 [9] and report unsuccessful establishment of the QoS flow in the *PDU Session Resource Modify Response Transfer IE* with cause value "IMS voice EPS fallback or RAT fallback triggered".

If the *User Location Information IE* is included in the PDU SESSION RESOURCE MODIFY RESPONSE message, the AMF shall handle this information as specified in TS 23.501 [9].

Interactions with Handover Preparation procedure:

If a handover becomes necessary during the PDU Session Resource Modify procedure, the NG-RAN node may interrupt the ongoing PDU Session Resource Modify procedure and initiate the Handover Preparation procedure as follows:

1. The NG-RAN node shall send the PDU SESSION RESOURCE MODIFY RESPONSE message in which the NG-RAN node shall indicate, if necessary, all the PDU sessions failed with an appropriate cause value, e.g. "NG intra-system handover triggered", "NG inter-system handover triggered" or "Xn handover triggered".
2. The NG-RAN node shall trigger the handover procedure.

8.2.3.3 Unsuccessful Operation

The unsuccessful operation is specified in the successful operation section.

8.2.3.4 Abnormal Conditions

If the NG-RAN node receives a PDU SESSION RESOURCE MODIFY REQUEST message containing several *PDU Session ID* IEs (in the *PDU Session Resource Modify Request List* IE) set to the same value, the NG-RAN node shall report the modification of the corresponding PDU sessions as failed in the PDU SESSION RESOURCE MODIFY RESPONSE message with an appropriate cause value.

If the NG-RAN node receives a PDU SESSION RESOURCE MODIFY REQUEST message containing some *PDU Session ID* IEs (in the *PDU Session Resource Modify Request List* IE) that the NG-RAN node does not recognize, the NG-RAN node shall report the corresponding invalid PDU sessions as failed in the PDU SESSION RESOURCE MODIFY RESPONSE message with an appropriate cause value.

8.2.4 PDU Session Resource Notify

8.2.4.1 General

The purpose of the PDU Session Resource Notify procedure is to notify that the already established QoS flow(s) or PDU session(s) for a given UE are released or not fulfilled anymore or fulfilled again by the NG-RAN node for which notification control is requested. The procedure uses UE-associated signalling.

8.2.4.2 Successful Operation

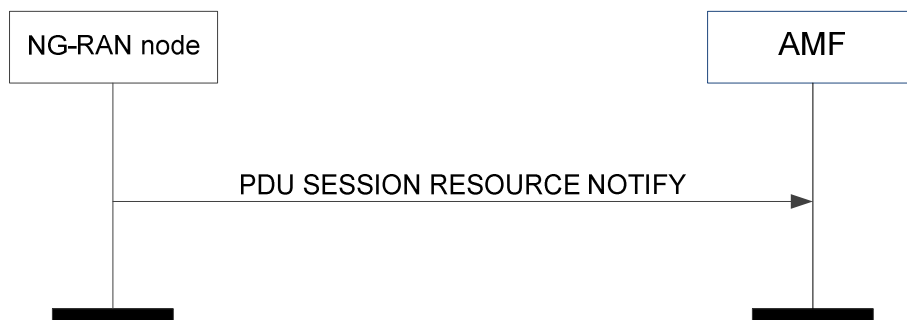


Figure 8.2.4.2-1: PDU session resource notify

The NG-RAN node initiates the procedure by sending a PDU SESSION RESOURCE NOTIFY message.

The PDU SESSION RESOURCE NOTIFY message shall contain the information of PDU session resources or QoS flows which are released or not fulfilled anymore or fulfilled again by the NG-RAN node.

- For each PDU session for which some QoS flows are released or not fulfilled anymore or fulfilled again by the NG-RAN node, the *PDU Session Resource Notify Transfer* IE shall be included containing:
 1. The list of QoS flows which are released by the NG-RAN node, if any, in the *QoS Flow Released List* IE.
 2. The list of GBR QoS flows which are not fulfilled anymore or fulfilled again by the NG-RAN node, if any, in the *QoS Flow Notify List* IE together with the *Notification Cause* IE.
- For each PDU session resource which is released by the NG-RAN node, the *PDU Session Resource Notify Released Transfer* IE shall be included containing the release cause in the *Cause* IE.

The NG-RAN node shall, if supported, report in the PDU SESSION RESOURCE NOTIFY message location information of the UE in the *User Location Information* IE.

Upon reception of the PDU SESSION RESOURCE NOTIFY message, the AMF shall, for each PDU session indicated in the *PDU Session ID* IE, transfer transparently the *PDU Session Resource Notify Transfer* IE or *PDU Session Resource Notify Released Transfer* IE to the SMF associated with the concerned PDU session. Upon reception of *PDU Session Resource Notify Transfer* IE, the SMF normally initiate the appropriate release or modify procedure on the core network side for the PDU session(s) or QoS flow(s) identified as not fulfilled anymore.

If the *User Location Information* IE is included in the PDU SESSION RESOURCE NOTIFY message, the AMF shall handle this information as specified in TS 23.501 [9].

8.2.4.3 Abnormal Conditions

Void.

8.2.5 PDU Session Resource Modify Indication

8.2.5.1 General

The purpose of the PDU Session Resource Modify Indication procedure is for the NG-RAN node to request modification of the established PDU session(s). The procedure uses UE-associated signalling.

8.2.5.2 Successful Operation

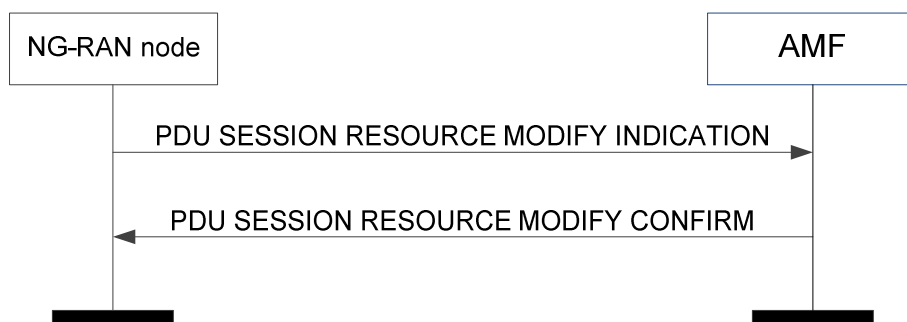


Figure 8.2.5.2-1: PDU session resource modify indication: successful operation

The NG-RAN node initiates the procedure by sending a PDU SESSION RESOURCE MODIFY INDICATION message. Upon reception of the PDU SESSION RESOURCE MODIFY INDICATION message, the AMF shall, for each PDU session indicated in the *PDU Session ID* IE, transparently transfer the *PDU Session Resource Modify Indication Transfer* IE to the SMF associated with the concerned PDU session.

- If the *DL UP TNL Information* IE is included in the *PDU Session Resource Modify Indication Transfer* IE in the PDU SESSION RESOURCE MODIFY INDICATION message, it shall be considered by the SMF as the new DL transport layer address(es) for the PDU session.

The AMF shall report to the NG-RAN node in the PDU SESSION MODIFY RESOURCE CONFIRM message the result for each PDU session listed in PDU SESSION RESOURCE MODIFY INDICATION message:

- For each PDU session which is successfully modified, the *PDU Session Resource Modify Confirm Transfer* IE shall be included containing:
 1. The list of QoS flows which have been successfully modified in the *QoS Flow Modify Confirm List* IE.
 2. The list of QoS flows which have failed to be modified, if any, in the *QoS Flow Failed to Modify List* IE.
 3. If more than one DL transport layer address was included in the *PDU Session Resource Modify Indication Transfer* IE, the mapping between each DL transport layer address and the corresponding UL transport layer address assigned by the 5GC shall be indicated in the *TNL Mapping List* IE.
- For each PDU session which failed to be modified, the *PDU Session Resource Modify Failed Transfer* IE shall be included to report the failure cause.

Upon reception of the *PDU Session Resource Modify Confirm Transfer* IE for each PDU session listed in the PDU SESSION RESOURCE MODIFY CONFIRM message:

- If the *QoS Flow Failed To Modify List* IE is included, the NG-RAN node shall either
 1. de-associate the corresponding DRB for the concerned QoS flow, or
 2. keep the previous transport layer information before sending the PDU SESSION RESOURCE MODIFY INDICATION unchanged for the concerned QoS flow.

Upon reception of the *PDU Session Resource Modify Failed Transfer IE* for each PDU session listed in the PDU SESSION RESOURCE MODIFY CONFIRM message, the NG-RAN node shall either:

1. release all corresponding NG-RAN configuration and resources for the concerned PDU session, or
2. keep the previous transport layer information before sending the PDU SESSION RESOURCE MODIFY INDICATION unchanged for the concerned PDU session.

8.2.5.3 Unsuccessful Operation

The unsuccessful operation is specified in the successful operation section.

8.2.5.4 Abnormal Conditions

Void.

8.3 UE Context Management Procedures

8.3.1 Initial Context Setup

8.3.1.1 General

The purpose of the Initial Context Setup procedure is to establish the necessary overall initial UE context at the NG-RAN node, when required, including PDU session context, the Security Key, Mobility Restriction List, UE Radio Capability and UE Security Capabilities, etc. The AMF may initiate the Initial Context Setup procedure if a UE-associated logical NG-connection exists for the UE or if the AMF has received the *RAN UE NGAP ID IE* in an INITIAL UE MESSAGE message or if the NG-RAN node has already initiated a UE-associated logical NG-connection by sending an INITIAL UE MESSAGE message via another NG interface instance. The procedure uses UE-associated signalling.

8.3.1.2 Successful Operation

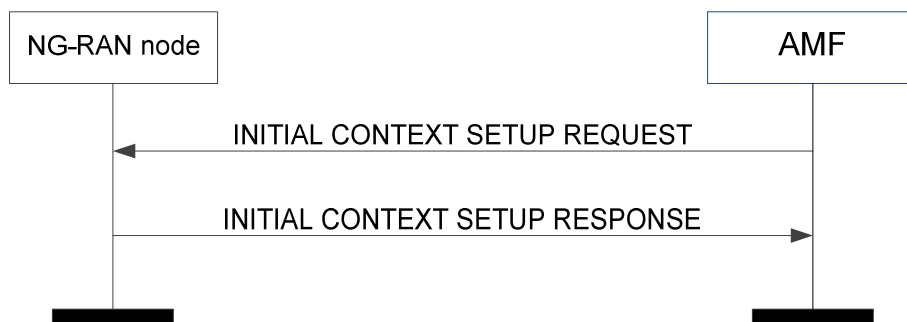


Figure 8.3.1.2-1: Initial context setup: successful operation

In case of the establishment of a PDU session the 5GC shall be prepared to receive user data before the INITIAL CONTEXT SETUP RESPONSE message has been received by the AMF. If no UE-associated logical NG-connection exists, the UE-associated logical NG-connection shall be established at reception of the INITIAL CONTEXT SETUP REQUEST message.

The INITIAL CONTEXT SETUP REQUEST message shall contain the *Index to RAT/Frequency Selection Priority IE*, if available in the AMF.

If the *NAS-PDU IE* is included in the INITIAL CONTEXT SETUP REQUEST message, the NG-RAN node shall pass it transparently towards the UE.

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

Upon receipt of the INITIAL CONTEXT SETUP REQUEST message the NG-RAN node shall

- attempt to execute the requested PDU session configuration;

- store the received UE Aggregate Maximum Bit Rate in the UE context, and use the received UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE;
- store the received Mobility Restriction List in the UE context;
- store the received UE Radio Capability in the UE context;
- store the received Index to RAT/Frequency Selection Priority in the UE context and use it as defined in TS 23.501 [9];
- store the received UE Security Capabilities in the UE context;
- store the received Security Key in the UE context and, if the NG-RAN node is required to activate security for the UE, take this security key into use.

For the Initial Context Setup an initial value for the Next Hop Chaining Count is stored in the UE context.

If the *PDU Session Resource Setup Request List* IE is contained in the INITIAL CONTEXT SETUP REQUEST message, the NG-RAN node shall behave the same as defined in the PDU Session Resource Setup procedure. The NG-RAN node shall report to the AMF in the INITIAL CONTEXT SETUP RESPONSE message the result for each PDU session resource requested to be setup as defined in the PDU Session Resource Setup procedure.

Upon reception of the INITIAL CONTEXT SETUP RESPONSE message the AMF shall, for each PDU session indicated in the *PDU Session ID* IE, transfer transparently the *PDU Session Resource Setup Response Transfer* IE or *PDU Session Resource Setup Unsuccessful Transfer* IE to the SMF associated with the concerned PDU session. In case the splitting PDU session is not used by the NG-RAN node, the SMF should remove the Additional Transport Layer Information, if any.

The NG-RAN node shall use the information in the *Mobility Restriction List* IE if present in the INITIAL CONTEXT SETUP REQUEST message to

- determine a target for subsequent mobility action for which the NG-RAN node provides information about the target of the mobility action towards the UE;
- select a proper SCG during dual connectivity operation;
- assign proper RNA(s) for the UE when moving the UE to RRC_INACTIVE state.

If the *Mobility Restriction List* IE is not contained in the INITIAL CONTEXT SETUP REQUEST message, the NG-RAN node shall consider that no roaming and no access restriction apply to the UE. The NG-RAN node shall also consider that no roaming and no access restriction apply to the UE when:

- one of the QoS flows includes a particular ARP value (TS 23.501 [9]).

If the *Trace Activation* IE is included in the INITIAL CONTEXT SETUP REQUEST message the NG-RAN node shall, if supported, initiate the requested trace function as described in TS 32.422 [11].

If the *UE Security Capabilities* IE included in the INITIAL CONTEXT SETUP REQUEST message only contains the EIA0 or NIA0 algorithm as defined in TS 33.501 [13] and if the EIA0 or NIA0 algorithm is defined in the configured list of allowed integrity protection algorithms in the NG-RAN node (TS 33.501 [13]), the NG-RAN node shall take it into use and ignore the keys received in the *Security Key* IE.

If the *Core Network Assistance Information* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the NG-RAN node shall, if supported, store this information in the UE context and use it for e.g. the RRC_INACTIVE state decision and RNA configuration for the UE and RAN paging if any for a UE in RRC_INACTIVE state, as specified in TS 38.300 [8].

If the *RRC Inactive Transition Report Request* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the NG-RAN node shall, if supported, store this information in the UE context.

If the *Emergency Fallback Indicator* IE is included in the INITIAL CONTEXT SETUP REQUEST message, it indicates that the UE context to be set up is subject to emergency service fallback as described in TS 23.501 [9] and the NG-RAN node may, if supported, take the appropriate mobility actions.

If the *Old AMF* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the NG-RAN node shall consider that this UE-associated logical NG-connection was redirected to this AMF from another AMF identified by the *Old AMF* IE.

Interactions with Initial UE Message procedure:

The NG-RAN node shall use the *AMF UE NGAP ID* IE and *RAN UE NGAP ID* IE received in the INITIAL CONTEXT SETUP REQUEST message as identification of the logical connection even if the *RAN UE NGAP ID* IE had been allocated in an INITIAL UE MESSAGE message sent over a different NG interface instance.

Interactions with RRC Inactive Transition Report procedure:

If the *RRC Inactive Transition Report Request* IE is included in the INITIAL CONTEXT SETUP REQUEST message and set to "subsequent state transition report", the NG-RAN node shall, if supported, send the RRC INACTIVE TRANSITION REPORT message to the AMF to report the RRC state of the UE when the UE enters or leaves RRC_INACTIVE state.

8.3.1.3 Unsuccessful Operation

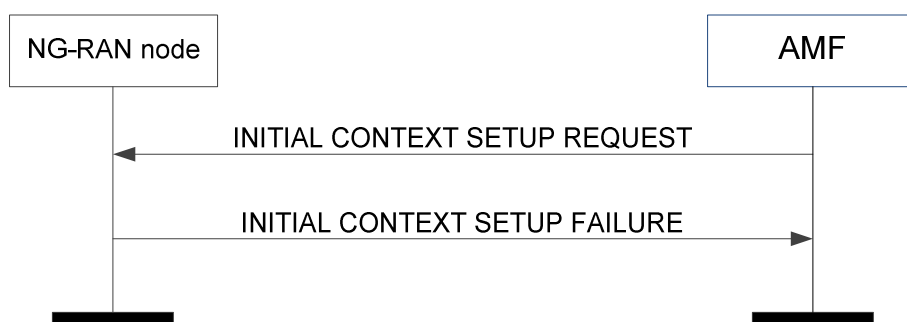


Figure 8.3.1.3-1: Initial context setup: unsuccessful operation

If the NG-RAN node is not able to establish an NG UE context, it shall consider the procedure as failed and reply with the INITIAL CONTEXT SETUP FAILURE message.

If the *PDU Session Resource Setup Request List* IE is contained in the INITIAL CONTEXT SETUP REQUEST message, the NG-RAN node shall report to the AMF, in the INITIAL CONTEXT SETUP FAILURE message, the unsuccessful establishment result for each PDU session resource requested to be setup as defined in the PDU Session Resource Setup procedure.

Upon reception of the INITIAL CONTEXT SETUP RESPONSE message the AMF shall, for each PDU session indicated in the *PDU Session ID* IE, transfer transparently the *PDU Session Resource Setup Response Transfer* IE or *PDU Session Resource Setup Unsuccessful Transfer* IE to the SMF associated with the concerned PDU session. In case the splitting PDU session is not used by the NG-RAN node, the SMF should remove the Additional Transport Layer Information, if any.

8.3.1.4 Abnormal Conditions

If the supported algorithms for encryption defined in the *Encryption Algorithms* IE in the *UE Security Capabilities* IE, plus the mandated support of EEA0 and NEA0 in all UEs (TS 33.501 [13]), do not match any allowed algorithms defined in the configured list of allowed encryption algorithms in the NG-RAN node (TS 33.501 [13]), the NG-RAN node shall reject the procedure using the INITIAL CONTEXT SETUP FAILURE message.

If the supported algorithms for integrity defined in the *Integrity Protection Algorithms* IE in the *UE Security Capabilities* IE, plus the mandated support of the EIA0 and NIA0 algorithm in all UEs (TS 33.501 [13]), do not match any allowed algorithms defined in the configured list of allowed integrity protection algorithms in the NG-RAN node (TS 33.501 [13]), the NG-RAN node shall reject the procedure using the INITIAL CONTEXT SETUP FAILURE message.

8.3.2 UE Context Release Request (NG-RAN node initiated)

8.3.2.1 General

The purpose of the UE Context Release Request procedure is to enable the NG-RAN node to request the AMF to release the UE-associated logical NG-connection due to NG-RAN node generated reasons. The procedure uses UE-associated signalling.

8.3.2.2 Successful Operation

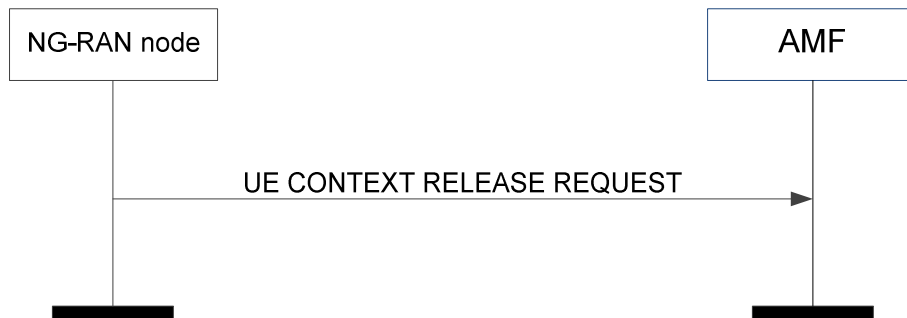


Figure 8.3.2.2-1: UE context release request

The NG-RAN node controlling a UE-associated logical NG-connection initiates the procedure by sending a UE CONTEXT RELEASE REQUEST message towards the affected AMF.

The UE CONTEXT RELEASE REQUEST message shall indicate the appropriate cause value, e.g., "TXnRELOC_{overall} Expiry", "Redirection", for the requested UE-associated logical NG-connection release.

Interactions with UE Context Release procedure:

The UE Context Release procedure should be initiated upon reception of a UE CONTEXT RELEASE REQUEST message.

8.3.2.3 Abnormal Conditions

Void.

8.3.3 UE Context Release (AMF initiated)

8.3.3.1 General

The purpose of the UE Context Release procedure is to enable the AMF to order the release of the UE-associated logical NG-connection due to various reasons, e.g., completion of a transaction between the UE and the 5GC, or release of the old UE-associated logical NG-connection when the UE has initiated the establishment of a new UE-associated logical NG-connection, etc. The procedure uses UE-associated signalling.

8.3.3.2 Successful Operation

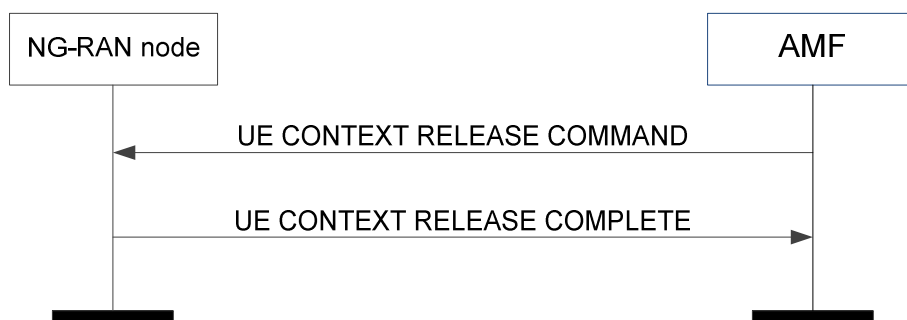


Figure 8.3.3.2-1: UE context release: successful operation

The AMF initiates the procedure by sending the UE CONTEXT RELEASE COMMAND message to the NG-RAN node.

The UE CONTEXT RELEASE COMMAND message shall contain both the AMF UE NGAP ID IE and the RAN UE NGAP ID IE if available, otherwise the message shall contain the AMF UE NGAP ID IE.

Upon reception of the UE CONTEXT RELEASE COMMAND message, the NG-RAN node shall release all related signalling and user data transport resources and reply with the UE CONTEXT RELEASE COMPLETE message.

If the *User Location Information* IE is included in the UE CONTEXT RELEASE COMPLETE message, the AMF shall handle this information as specified in TS 23.502 [10].

If the *Information on Recommended Cells and RAN Nodes for Paging* IE is included in the UE CONTEXT RELEASE COMPLETE message, the AMF shall, if supported, store it and may use it for subsequent paging.

8.3.3.3 Unsuccessful Operation

Not applicable.

8.3.3.4 Abnormal Conditions

If the UE Context Release procedure is not initiated towards the NG-RAN node before the expiry of the timer $T_{NG_RELOC_Overall}$, the NG-RAN node shall request the AMF to release the UE context.

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

8.3.4 UE Context Modification

8.3.4.1 General

The purpose of the UE Context Modification procedure is to partly modify the established UE context. The procedure uses UE-associated signalling.

8.3.4.2 Successful Operation

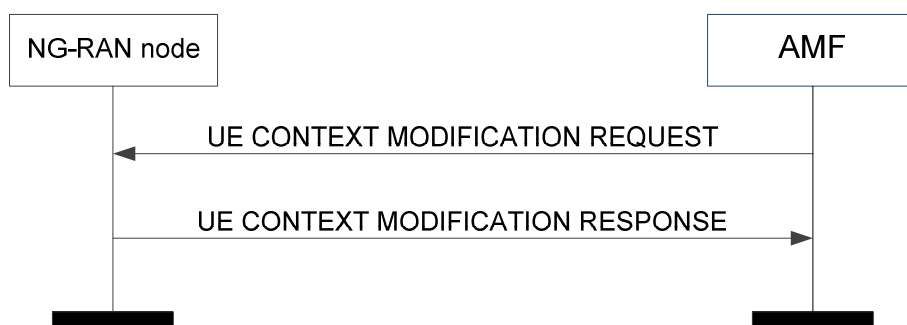


Figure 8.3.4.2-1: UE context modification: successful operation

Upon receipt of the UE CONTEXT MODIFICATION REQUEST message the NG-RAN node shall

- store the received *Security Key* IE and, if the NG-RAN node is required to activate security for the UE, take this security key into use.
- store the *UE Security Capabilities* IE and take them into use together with the received keys according to TS 33.501 [13].
- store the *Index to RAT/Frequency Selection Priority* IE and use it as defined in TS 23.501 [9].

If the *RAN Paging Priority* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node may use it to determine a priority for paging the UE in RRC_INACTIVE state.

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

- replace the previously provided UE Aggregate Maximum Bit Rate by the received UE Aggregate Maximum Bit Rate in the UE context;
- use the received UE Aggregate Maximum Bit Rate for all non-GBR QoS flows for the concerned UE as specified in TS 23.501 [9].

If the *Core Network Assistance Information* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node shall, if supported, store this information in the UE context and use it for e.g. the RRC_INACTIVE state decision and RNA configuration for the UE and RAN paging if any for a UE in RRC_INACTIVE state, as specified in TS 38.300 [8].

If the *RRC Inactive Transition Report Request* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node shall, if supported, store this information in the UE context and report to the AMF the *User Location Information* IE and the *RRC State* IE in the UE CONTEXT MODIFICATION RESPONSE message.

If the *RRC Inactive Transition Report Request* IE is included in the UE CONTEXT MODIFICATION REQUEST message and set to "cancel report", the NG-RAN node shall, if supported, stop reporting to the AMF the RRC state of the UE.

The NG-RAN node shall report, in the UE CONTEXT MODIFICATION RESPONSE message to the AMF, the successful update of the UE context.

If the *Emergency Fallback Indicator* IE is included in the UE CONTEXT MODIFICATION REQUEST message, it indicates that the concerned UE context is subject to emergency service fallback as described in TS 23.501 [9] and the NG-RAN node may, if supported, take the appropriate mobility actions taking into account the *Emergency Service Target CN* IE if provided.

If the *New AMF UE NGAP ID* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node shall use the received value for future signalling with the AMF.

Interactions with RRC Inactive Transition Report procedure:

If the *RRC Inactive Transition Report Request* IE is included in the UE CONTEXT MODIFICATION REQUEST message and set to "single RRC connected state report", the NG-RAN node shall, if supported and if the UE is in RRC_INACTIVE state, send one subsequent RRC INACTIVE TRANSITION REPORT message to the AMF when the RRC state transitions to RRC_CONNECTED state.

If the *RRC Inactive Transition Report Request* IE is included in the UE CONTEXT MODIFICATION REQUEST message and set to "subsequent state transition report", the NG-RAN node shall, if supported, send the RRC INACTIVE TRANSITION REPORT message to the AMF to report the RRC state of the UE when the UE enters or leaves RRC_INACTIVE state.

8.3.4.3 Unsuccessful Operation

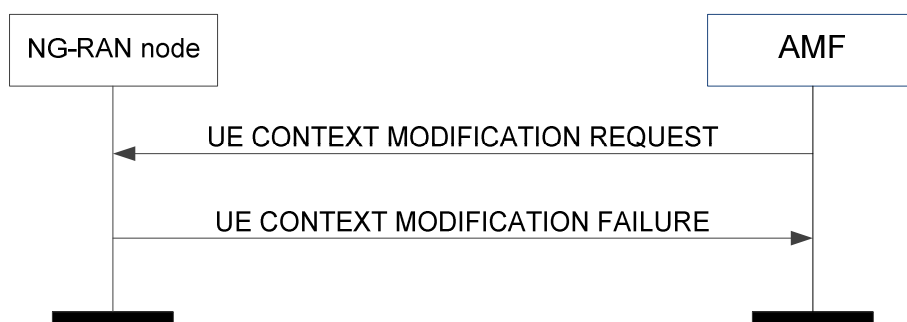


Figure 8.3.4.3-1: UE context modification: unsuccessful operation

In case the UE context update cannot be performed successfully, the NG-RAN node shall respond with the UE CONTEXT MODIFICATION FAILURE message to the AMF with an appropriate cause value in the *Cause* IE.

8.3.4.4 Abnormal Conditions

If the UE CONTEXT MODIFICATION REQUEST message including the *New AMF UE NGAP ID* IE is received after the NG-RAN node has initiated another class 1 NGAP EP, the NG-RAN node shall be prepared to receive the response message containing an AMF UE NGAP ID with the value received in the *New AMF UE NGAP ID* IE.

8.3.5 RRC Inactive Transition Report

8.3.5.1 General

The purpose of the RRC Inactive Transition Report procedure is to notify the AMF when the UE enters or leaves RRC_INACTIVE state. The procedure uses UE-associated signalling.

8.3.5.2 Successful Operation

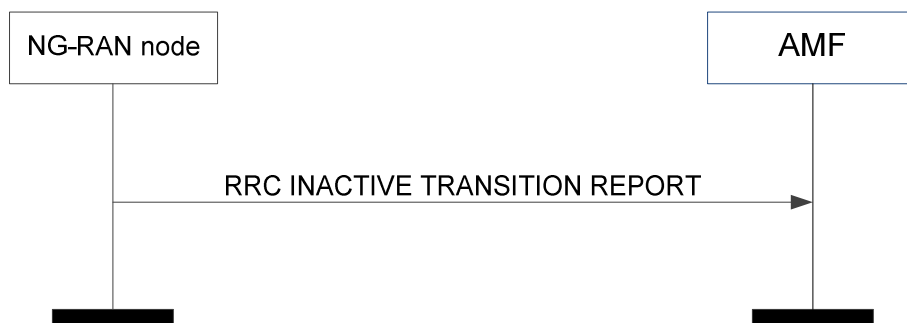


Figure 8.3.5.2-1: RRC Inactive transition report

The NG-RAN node initiates the procedure by sending an RRC INACTIVE TRANSITION REPORT message to the AMF. Upon reception of the RRC INACTIVE TRANSITION REPORT message, the AMF shall take appropriate actions based on the information indicated by the *RRC State* IE.

8.3.5.3 Abnormal Conditions

Void.

8.4 UE Mobility Management Procedures

8.4.1 Handover Preparation

8.4.1.1 General

The purpose of the Handover Preparation procedure is to request the preparation of resources at the target side via the 5GC. There is only one Handover Preparation procedure ongoing at the same time for a certain UE.

8.4.1.2 Successful Operation

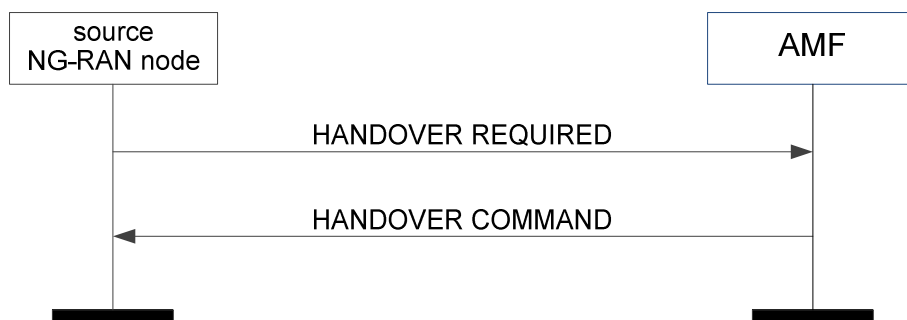


Figure 8.4.1.2-1: Handover preparation: successful operation

The source NG-RAN node initiates the handover preparation by sending the HANOVER REQUIRED message to the serving AMF. When the source NG-RAN node sends the HANOVER REQUIRED message, it shall start the timer $TNG_{RELOCprep}$. The source NG-RAN node shall indicate the appropriate cause value for the handover in the *Cause IE*.

Upon reception of the HANOVER REQUIRED message the AMF shall, for each PDU session indicated in the *PDU Session ID IE*, transparently transfer the *Handover Required Transfer IE* to the SMF associated with the concerned PDU session.

In case of intra-system handover, the information in the *Source to Target Transparent Container IE* shall be encoded according to the definition of the *Source NG-RAN node to Target NG-RAN node Transparent Container IE*.

If the *DL Forwarding IE* is included for a given QoS flow in the *PDU Session Resource Information Item IE* within the *Source NG-RAN node to Target NG-RAN node Transparent Container IE* of the HANOVER REQUIRED message and it is set to "DL forwarding proposed", it indicates that the source NG-RAN node proposes forwarding of downlink data for that QoS flow.

If the *DRBs to QoS Flows Mapping List IE* is included in the *PDU Session Resource Information Item IE* within the *Source NG-RAN node to Target NG-RAN node Transparent Container IE* of the HANOVER REQUIRED message, it implicitly indicates that the source NG-RAN node proposes forwarding of downlink data for those DRBs.

If the *QoS Flow Mapping Indication IE* for a QoS flow is included in the *Associated QoS Flow List IE* within the *DRBs to QoS Flows Mapping List IE* within the *Source NG-RAN node to Target NG-RAN node Transparent Container IE* of the HANOVER REQUIRED message, it indicates that the source NG-RAN node has mapped only the uplink or downlink of the QoS flow to the DRB.

If the HANOVER COMMAND message contains the *DL Forwarding UP TNL Information IE* for a given DRB within the *Handover Command Transfer IE*, the source NG-RAN node shall consider that the forwarding of downlink data for this DRB is accepted by the target NG-RAN node. If the HANOVER COMMAND message contains the *UL Forwarding UP TNL Information IE* for a given DRB in the *Data Forwarding Response DRB List IE* within the *Handover Command Transfer IE*, it means the target NG-RAN node has requested the forwarding of uplink data for this DRB.

In case of inter-system handover to LTE, the information in the *Source to Target Transparent Container IE* shall be encoded according to the *Source eNB to Target eNB Transparent Container IE* definition as specified in TS 36.413 [16].

If the *Direct Forwarding Path Availability IE* is included in the HANOVER REQUIRED message the AMF shall handle it as specified in TS 23.502 [10].

If the *Direct Forwarding Path Availability IE* is included within the *Handover Required Transfer IE* of the HANOVER REQUIRED message the SMF shall handle it as specified in TS 23.502 [10].

When the preparation, including the reservation of resources at the target side is ready, the AMF responds with the HANOVER COMMAND message to the source NG-RAN node.

Upon reception of the HANOVER COMMAND message the source NG-RAN node shall stop the timer $TNG_{RELOCprep}$ and start the timer $TNG_{RELOCoverall}$.

If there are any PDU Sessions that could not be admitted in the target, they shall be indicated in the *PDU Session Resources to Release List IE*.

If the HANOVER COMMAND message contains the *QoS Flow to be Forwarded List IE* within the *Handover Command Transfer IE* for a given PDU session, then the source NG-RAN node should initiate data forwarding for the listed QoS flows as specified in TS 38.300 [8].

If the *Target to Source Transparent Container IE* has been received by the AMF from the handover target then the transparent container shall be included in the HANOVER COMMAND message.

In case of inter-system handover to LTE, the information in the *Target to Source Transparent Container IE* shall be encoded according to the definition of the *Target eNB to Source eNB Transparent Container IE* as specified in TS 36.413 [16].

If the *Index to RAT/Frequency Selection Priority IE* is contained in the *Source NG-RAN Node to Target NG-RAN Node Transparent Container IE*, the target NG-RAN node shall store the content of the received *Index to RAT/Frequency Selection Priority IE* in the UE context and use it as defined in TS 23.501 [9].

Interactions with other NGAP procedures:

If, after a HANOVER REQUIRED message is sent and before the Handover Preparation procedure is terminated, the source NG-RAN node receives an AMF initiated PDU Session Management procedure on the same UE-associated signalling connection, the source NG-RAN node shall either:

1. Cancel the Handover Preparation procedure by executing the Handover Cancellation procedure with an appropriate cause value. After successful completion of the Handover Cancellation procedure, the source NG-RAN node shall continue the AMF initiated PDU Session Management procedure.

or

2. Terminate the AMF initiated PDU Session Management procedure by sending the appropriate response message with an appropriate cause value, e.g. "NG intra-system handover triggered" or "NG inter-system handover triggered" to the AMF and then the source NG-RAN node shall continue with the handover procedure.

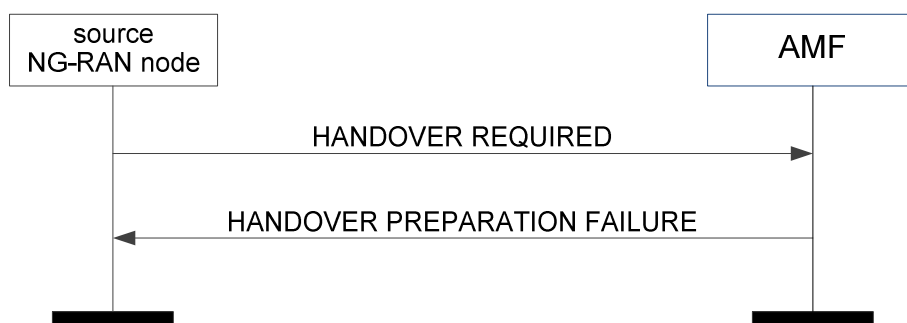
8.4.1.3 Unsuccessful Operation

Figure 8.4.1.3-1: Handover preparation: unsuccessful operation

If the 5GC or the target side is not able to accept any of the PDU session resources or a failure occurs during the Handover Preparation, the AMF sends the HANOVER PREPARATION FAILURE message with an appropriate cause value to the source NG-RAN node.

Interaction with Handover Cancel procedure:

If there is no response from the AMF to the HANOVER REQUIRED message before timer $T_{NG_{RELOC}_{prep}}$ expires in the source NG-RAN node, the source NG-RAN node should cancel the Handover Preparation procedure by initiating the Handover Cancel procedure with the appropriate value for the *Cause* IE. The source NG-RAN node shall ignore any HANOVER COMMAND message or HANOVER PREPARATION FAILURE message received after the initiation of the Handover Cancel procedure.

8.4.1.4 Abnormal Conditions

If the NG-RAN node receives at least one PDU Session ID included in the *PDU Session Resource Handover List* IE without at least one valid associated GTP tunnel address pair (in either UL or DL), then the NG-RAN node shall consider it as a logical error and act as described in subclause 10.4. A GTP tunnel address pair is considered valid if both the *GTP-TEID* IE and the *Endpoint IP Address* IE are present.

8.4.2 Handover Resource Allocation**8.4.2.1 General**

The purpose of the Handover Resource Allocation procedure is to reserve resources at the target NG-RAN node for the handover of a UE.

8.4.2.2 Successful Operation



Figure 8.4.2.2-1: Handover resource allocation: successful operation

The AMF initiates the procedure by sending the HANOVER REQUEST message to the target NG-RAN node.

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.

Upon receipt of the HANOVER REQUEST message the target NG-RAN node shall

- attempt to execute the requested PDU session configuration and associated security;
- store the UE Aggregate Maximum Bit Rate in the UE context, and use the received UE Aggregate Maximum Bit Rate for all non-GBR QoS flows for the concerned UE as specified in TS 23.501 [9];
- store the received Mobility Restriction List in the UE context;
- store the received UE Security Capabilities in the UE context;
- store the received Security Context in the UE context and take it into use as defined in TS 33.501 [13].

Upon reception of the *UE History Information* IE, which is included within the *Source to Target Transparent Container* IE of the HANOVER REQUEST message, the target NG-RAN node shall collect the information defined as mandatory in the *UE History Information* IE and shall, if supported, collect the information defined as optional in the *UE History Information* IE, for as long as the UE stays in one of its cells, and store the collected information to be used for future handover preparations.

Upon receiving the *PDU Session Resource Setup List* IE contained in the HANOVER REQUEST message, the target NG-RAN node shall behave the same as defined in the PDU Session Resource Setup procedure. The target NG-RAN node shall report to the AMF in the HANOVER REQUEST ACKNOWLEDGE message the result for each PDU session resource requested to be setup. In particular, for each PDU session resource successfully setup, it shall include the *Handover Request Acknowledge Transfer* IE containing the following information:

- The list of QoS flows which have been successfully established in the *QoS Flow Setup Response List* IE.
- The *Data Forwarding Accepted* IE if the data forwarding for the QoS flow is accepted.
- The list of QoS flows which have failed to be established, if any, in the *QoS Flow Failed to Setup List* IE.
- The UP transport layer information to be used for the PDU session.
- The security result associated to the PDU session.

For each PDU session resource which failed to be setup, the *Handover Resource Allocation Unsuccessful Transfer* IE shall be included in the HANOVER REQUEST ACKNOWLEDGE message containing a cause value that should be precise enough to enable the SMF to know the reason for the unsuccessful establishment.

Upon reception of the HANOVER REQUEST ACKNOWLEDGE message the AMF shall, for each PDU session indicated in the *PDU Session ID* IE, transfer transparently the *Handover Request Acknowledge Transfer* IE or *Handover Resource Allocation Unsuccessful Transfer* IE to the SMF associated with the concerned PDU session.

If the HANOVER REQUEST message contains the *Data Forwarding Not Possible* IE associated with a given PDU session within the *Handover Request Transfer* IE set to "data forwarding not possible", the target NG-RAN node may

not include the *DL Forwarding UP TNL Information IE* and for intra-system handover the *Data Forwarding Response DRB List IE* within the *Handover Request Acknowledge Transfer IE* in the HANDOVER REQUEST ACKNOWLEDGE message for that PDU session.

In case of intra-system handover, if the target NG-RAN node accepts the downlink data forwarding for at least one QoS flow for which the *DL Forwarding IE* is set to "DL forwarding proposed", it may include the *DL Forwarding UP TNL Information IE* in the *Handover Request Acknowledge Transfer IE* for the PDU session within the *PDU Session Resource Admitted List IE* of the HANDOVER REQUEST ACKNOWLEDGE message.

In case of intra-system handover, if the target NG-RAN node accepts the data forwarding for a successfully configured DRB, the target NG-RAN node may include the *DL Forwarding UP TNL Information IE* for the DRB within the *Data Forwarding Response DRB List IE* within *Handover Request Acknowledge Transfer IE* of the HANDOVER REQUEST ACKNOWLEDGE message.

If the HANDOVER REQUEST ACKNOWLEDGE message contains the *UL Forwarding UP TNL Information IE* for a given DRB in the *Data Forwarding Response DRB List IE* within the *Handover Request Acknowledge Transfer IE*, it indicates the target NG-RAN node has requested the forwarding of uplink data for the DRB.

In case of inter-system handover from E-UTRAN, the target NG-RAN node includes the *Data Forwarding Accepted IE* for each QoS flow that the *DL Forwarding IE* is set to "DL forwarding proposed" for the corresponding E-RAB in the *Source NG-RAN Node to Target NG-RAN Node Transparent Container IE* and that the target NG-RAN node has admitted the proposed forwarding of downlink data for the QoS flow. If the target NG-RAN node accepts the downlink data forwarding for at least one QoS flow of an admitted PDU session it shall include the *DL Forwarding UP TNL Information IE* in the *PDU Session Resource Setup Response Transfer IE* for that PDU session within the *PDU Session Resources Admitted List IE* of the HANDOVER REQUEST ACKNOWLEDGE message.

The target NG-RAN node shall use the information in the *Mobility Restriction List IE* if present in the HANDOVER REQUEST message to

- determine a target for subsequent mobility action for which the target NG-RAN node provides information about the target of the mobility action towards the UE;
- select a proper SCG during dual connectivity operation;
- assign proper RNA(s) for the UE when moving the UE to RRC_INACTIVE state.

If the *Mobility Restriction List IE* is not contained in the HANDOVER REQUEST message, the target NG-RAN node shall consider that no roaming and no access restriction apply to the UE. The target NG-RAN node shall also consider that no roaming and no access restriction apply to the UE when:

- one of the QoS flows includes a particular ARP value (TS 23.501 [9]).

If the *Trace Activation IE* is included in the HANDOVER REQUEST message the target NG-RAN node shall, if supported, initiate the requested trace function as described in TS 32.422 [11].

If the *Location Reporting Request Type IE* is included in the HANDOVER REQUEST message, the target NG-RAN node should perform the requested location reporting functionality for the UE as described in subclause 8.12.

If the *Core Network Assistance Information IE* is included in the HANDOVER REQUEST message, the target NG-RAN node shall, if supported, store this information in the UE context and use it for e.g. the RRC_INACTIVE state decision and RNA configuration for the UE and RAN paging if any for a UE in RRC_INACTIVE state, as specified in TS 38.300 [8].

If the *New Security Context Indicator IE* is included in the HANDOVER REQUEST message, the target NG-RAN node shall use the information as specified in TS 33.501 [13].

If the *NASC IE* is included in the HANDOVER REQUEST message, the target NG-RAN node shall use it towards the UE as specified in TS 33.501 [13].

If the *RRC Inactive Transition Report Request IE* is included in the HANDOVER REQUEST message, the NG-RAN node shall, if supported, store this information in the UE context.

After all necessary resources for the admitted PDU session resources have been allocated, the target NG-RAN node shall generate the HANDOVER REQUEST ACKNOWLEDGE message.

Interactions with RRC Inactive Transition Report procedure:

If the *RRC Inactive Transition Report Request* IE is included in the HANOVER REQUEST message and set to "subsequent state transition report", the NG-RAN node shall, if supported, send the RRC INACTIVE TRANSITION REPORT message to the AMF to report the RRC state of the UE when the UE enters or leaves RRC_INACTIVE state.

8.4.2.3 Unsuccessful Operation



Figure 8.4.2.3-1: Handover resource allocation: unsuccessful operation

If the target NG-RAN node does not admit any of the PDU session resources, or a failure occurs during the Handover Preparation, it shall send the HANOVER FAILURE message to the AMF with an appropriate cause value.

8.4.2.4 Abnormal Conditions

If the supported algorithms for encryption defined in the *Encryption Algorithms* IE in the *UE Security Capabilities* IE, plus the mandated support of EEA0 and NEA0 in all UEs (TS 33.501 [13]), do not match any allowed algorithms defined in the configured list of allowed encryption algorithms in the NG-RAN node (TS 33.501 [13]), the target NG-RAN node shall reject the procedure using the HANOVER FAILURE message.

If the supported algorithms for integrity defined in the *Integrity Protection Algorithms* IE in the *UE Security Capabilities* IE, plus the mandated support of the EIA0 and NIA0 algorithm in all UEs (TS 33.501 [13]), do not match any allowed algorithms defined in the configured list of allowed integrity protection algorithms in the NG-RAN node (TS 33.501 [13]), the target NG-RAN node shall reject the procedure using the HANOVER FAILURE message.

If the target NG-RAN node receives a HANOVER REQUEST message which does not contain the *Mobility Restriction List* IE, and the serving PLMN cannot be determined otherwise by the NG-RAN node, the target NG-RAN node shall reject the procedure using the HANOVER FAILURE message.

If the target NG-RAN node receives a HANOVER REQUEST message containing the *Mobility Restriction List* IE, and the serving PLMN indicated is not supported by the target cell, the target NG-RAN node shall reject the procedure using the HANOVER FAILURE message.

8.4.3 Handover Notification

8.4.3.1 General

The purpose of the Handover Notification procedure is to indicate to the AMF that the UE has arrived to the target cell and the NG-based handover has been successfully completed.

8.4.3.2 Successful Operation



Figure 8.4.3.2-1: Handover notification

The target NG-RAN node shall send the HANDOVER NOTIFY message to the AMF when the UE has been identified in the target cell and the NG-based handover has been successfully completed.

8.4.3.3 Abnormal Conditions

Void.

8.4.4 Path Switch Request

8.4.4.1 General

The purpose of the Path Switch Request procedure is to request the switch of the downlink termination point of the NG-U transport bearer towards a new termination point.

8.4.4.2 Successful Operation

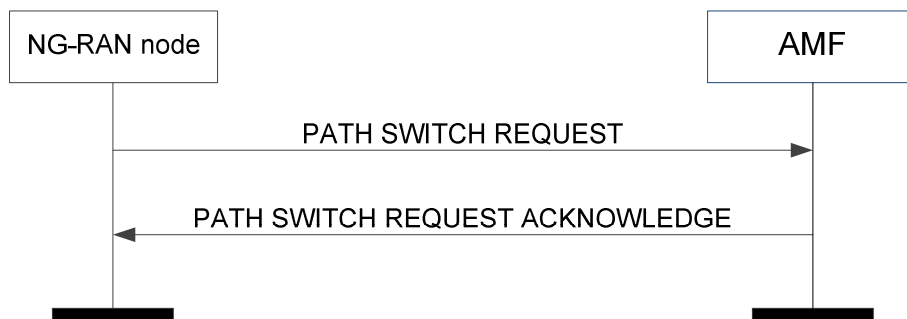


Figure 8.4.4.2-1: Path switch request: successful operation

The NG-RAN node initiates the procedure by sending the PATH SWITCH REQUEST message to the AMF. Upon reception of the PATH SWITCH REQUEST message the AMF shall, for each PDU session indicated in the *PDU Session ID* IE, transparently transfer the *Path Switch Request Transfer* IE to the SMF associated with the concerned PDU session.

After all necessary updates including the UP path switch have been successfully completed in the 5GC for at least one of the PDU session resources included in the PATH SWITCH REQUEST, the AMF shall send the PATH SWITCH REQUEST ACKNOWLEDGE message to the NG-RAN node and the procedure ends.

The list of accepted QoS flows shall be included in the PATH SWITCH REQUEST message within the *Path Switch Request Transfer* IE. The SMF shall handle this information as specified in TS 23.502 [10].

The list of PDU sessions which failed to be setup, if any, shall be included in the PATH SWITCH REQUEST message within the *Path Switch Request Setup Failed Transfer* IE. The AMF shall handle this information as specified in TS 23.502 [10].

For each PDU session for which the *User Plane Security Information* IE is included in the *Path Switch Request Transfer* IE of the PATH SWITCH REQUEST message, the SMF shall behave as specified in TS 33.501 [13] and may

send back the *Security Indication* IE within the *Path Switch Request Acknowledge Transfer* IE of the PATH SWITCH REQUEST ACKNOWLEDGE message.

For each PDU session for which the *DL NG-U TNL Information Reused* IE set to "true" is included in the *Path Switch Request Transfer* IE of the PATH SWITCH REQUEST message, the SMF shall, if supported, consider that the DL TNL information contained in the *DL NG-U UP TNL Information* IE has been reused.

If the *Security Indication* IE is included within the *Path Switch Request Acknowledge Transfer* IE of the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall behave as specified in TS 33.501 [13].

If the *UL NG-U UP TNL Information* IE is included within the *Path Switch Request Acknowledge Transfer* IE of the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall store this information and use it as the uplink termination point for the user plane data for this PDU session.

If the *Core Network Assistance Information* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall, if supported, store this information in the UE context and use it for e.g. the RRC_INACTIVE state decision and RNA configuration for the UE and RAN paging if any for a UE in RRC_INACTIVE state, as specified in TS 38.300 [8].

If the *RRC Inactive Transition Report Request* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall, if supported, store this information in the UE context.

If the *New Security Context Indicator* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall use the information as specified in TS 33.501 [13].

Upon reception of the PATH SWITCH REQUEST ACKNOWLEDGE message the NG-RAN node shall store the received *Security Context* IE in the UE context and the NG-RAN node shall use it as specified in TS 33.501 [13].

If the *UE Security Capabilities* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall handle it accordingly (TS 33.501 [13]).

If the *PDU Session Resource Released List* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall release the corresponding QoS flows and regard the PDU session(s) indicated in the *PDU Session Resource Released List* IE as being released. The appropriate cause value for each PDU session released is included in the *Path Switch Request Unsuccessful Transfer* IE contained in the PATH SWITCH REQUEST ACKNOWLEDGE message.

Interactions with RRC Inactive Transition Report procedure:

If the *RRC Inactive Transition Report Request* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message and set to "single RRC connected state report", the NG-RAN node shall, if supported, send one RRC INACTIVE TRANSITION REPORT message to the AMF to report the RRC state of the UE.

If the *RRC Inactive Transition Report Request* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message and set to "subsequent state transition report", the NG-RAN node shall, if supported, send one RRC INACTIVE TRANSITION REPORT message to the AMF to report the RRC state of the UE and subsequent RRC INACTIVE TRANSITION REPORT messages to report the RRC state of the UE when the UE enters or leaves RRC_INACTIVE state.

8.4.4.3 Unsuccessful Operation

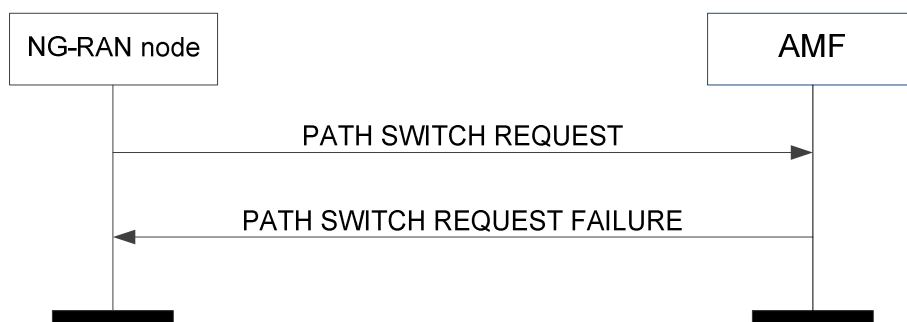


Figure 8.4.4.3-1: Path switch request: unsuccessful operation

If the 5GC fails to switch the downlink termination point of the NG-U transport bearer towards a new termination point for all PDU session resources, the AMF shall send the PATH SWITCH REQUEST FAILURE message to the NG-RAN node.

The NG-RAN node shall release the corresponding QoS flows and regard the PDU session(s) indicated in the *PDU Session Resource Released List* IE included in the PATH SWITCH REQUEST FAILURE message as being released.

The appropriate cause value for each PDU session released is included in the *Path Switch Request Unsuccessful Transfer* IE contained in the PATH SWITCH REQUEST FAILURE message.

8.4.4.4 Abnormal Conditions

If the AMF receives a PATH SWITCH REQUEST message containing several *PDU Session ID* IEs (in the *PDU Session Resource to be Switched in Downlink List* IE) set to the same value, the AMF shall send the PATH SWITCH REQUEST FAILURE message to the NG-RAN node.

8.4.5 Handover Cancellation

8.4.5.1 General

The purpose of the Handover Cancellation procedure is to enable a source NG-RAN node to cancel an ongoing handover preparation or an already prepared handover. The procedure uses UE-associated signalling.

8.4.5.2 Successful Operation

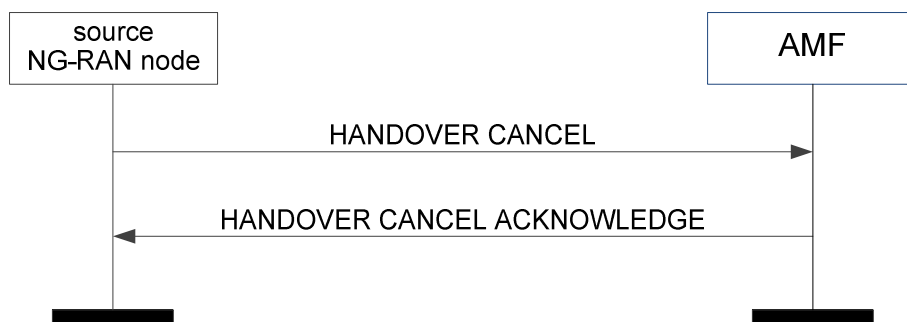


Figure 8.4.5.2-1: Handover cancel: successful operation

The source NG-RAN node initiates the procedure by sending a HANOVER CANCEL message to the AMF.

8.4.5.3 Unsuccessful Operation

Not applicable.

8.4.5.4 Abnormal Conditions

If the source NG-RAN node becomes aware of the fact that an expected HANOVER CANCEL ACKNOWLEDGE message is missing, the source NG-RAN node shall consider the Handover Cancellation procedure as successfully terminated.

8.4.6 Uplink RAN Status Transfer

8.4.6.1 General

The purpose of the Uplink RAN Status Transfer procedure is to enable lossless NG-based handover. The procedure uses UE-associated signalling.

8.4.6.2 Successful Operation

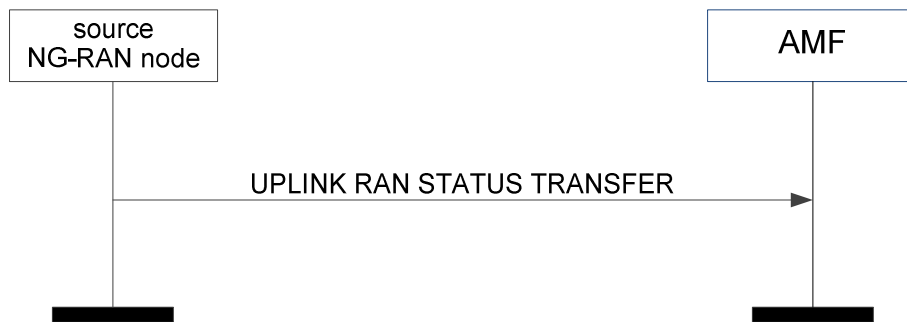


Figure 8.4.6.2-1: Uplink RAN status transfer

The source NG-RAN node initiates the procedure by stopping the assigning of PDCP-SNs to downlink SDUs and sending the UPLINK RAN STATUS TRANSFER message to the AMF at the point in time when it considers the transmitter/receiver status to be frozen.

For each DRB for which PDCP-SN and HFN status preservation applies, the source NG-RAN node shall include the *DRB ID IE*, the *UL COUNT Value IE* and the *DL COUNT Value IE* within the *DRBs Subject to Status Transfer List IE* in the *RAN Status Transfer Transparent Container IE* of the UPLINK RAN STATUS TRANSFER message.

The source NG-RAN node may also include in the UPLINK RAN STATUS TRANSFER message the missing and the received uplink SDUs in the *Receive Status of UL PDCP SDUs IE* for each DRB for which the source NG-RAN node has accepted the request from the target NG-RAN node for uplink forwarding.

8.4.6.3 Abnormal Conditions

Void.

8.4.7 Downlink RAN Status Transfer

8.4.7.1 General

The purpose of the Downlink RAN Status Transfer procedure is to enable lossless NG-based handover. The procedure uses UE-associated signalling.

8.4.7.2 Successful Operation

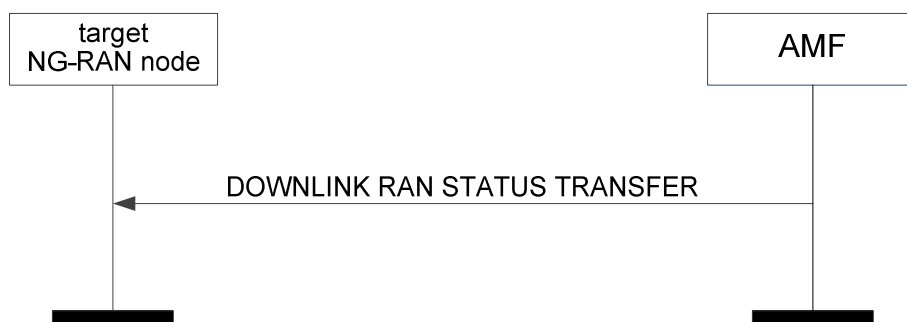


Figure 8.4.7.2-1: Downlink RAN status transfer

The AMF initiates the procedure by sending the DOWNLINK RAN STATUS TRANSFER message to the target NG-RAN node. The target NG-RAN node using Full Configuration for this handover as per TS 38.300 [8] shall ignore the information received in this message.

For each DRB in the *DRBs Subject to Status Transfer List IE* within the *RAN Status Transfer Transparent Container IE*, the target NG-RAN node shall not deliver any uplink packet which has a PDCP-SN lower than the value of the *UL Count Value IE*.

For each DRB in the *DRBs Subject to Status Transfer List* IE within the *RAN Status Transfer Transparent Container* IE, the target NG-RAN node shall use the value of the *DL COUNT Value* IE for the first downlink packet for which there is no PDCP-SN yet assigned.

If the *Receive Status of UL PDCP SDUs* IE is included for at least one DRB in the *RAN Status Transfer Transparent Container* IE of the DOWNLINK RAN STATUS TRANSFER message, the target NG-RAN node may use it in a Status Report message sent to the UE over the radio interface.

8.4.7.3 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.

8.5 Paging Procedures

8.5.1 Paging

8.5.1.1 General

The purpose of the Paging procedure is to enable the AMF to page a UE in the specific NG-RAN node.

8.5.1.2 Successful Operation

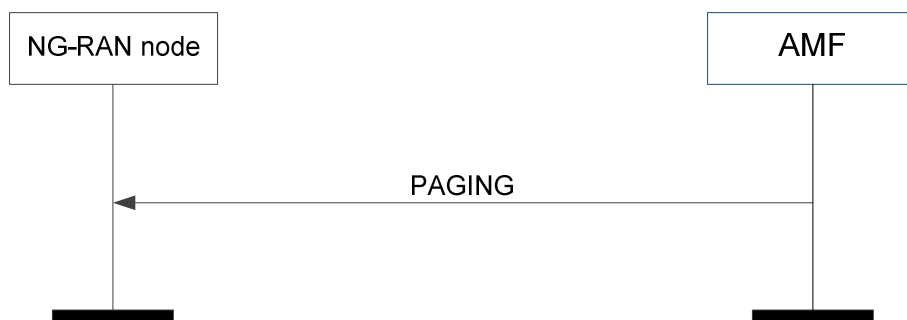


Figure 8.5.1.2-1: Paging

The AMF initiates the Paging procedure by sending the PAGING message to the NG-RAN node.

At the reception of the PAGING message, the NG-RAN node shall perform paging of the UE in cells which belong to tracking areas as indicated in the *TAI List for Paging* IE.

If the *Paging DRX* IE is included in the PAGING message, the NG-RAN node shall use it according to TS 38.304 [12] and TS 36.304 [29].

For each cell that belongs to any of the tracking areas indicated in the *TAI List for Paging* IE, the NG-RAN node shall generate one page on the radio interface.

If the *Paging Priority* IE is included in the PAGING message, the NG-RAN node may use it according to TS 23.501 [9].

If the *UE Radio Capability for Paging* IE is included in the PAGING message, the NG-RAN node may use it to apply specific paging schemes.

If the *Assistance Data for Recommended Cells* IE is included in the *Assistance Data for Paging* IE it may be used, together with the *Paging Attempt Information* IE if also present, according to TS 38.300 [8].

If the *Next Paging Area Scope* IE is included in the *Paging Attempt Information* IE it may be used for paging the UE according to TS 38.300 [8].

If the *Paging Origin* IE is included in the PAGING message, the NG-RAN node shall transfer it to the UE according to TS 38.331 [18] and TS 36.331 [21].

8.5.1.3 Abnormal Conditions

Void.

8.6 Transport of NAS Messages Procedures

8.6.1 Initial UE Message

8.6.1.1 General

The Initial UE Message procedure is used when the NG-RAN node has received from the radio interface the first uplink NAS message transmitted on an RRC connection to be forwarded to an AMF.

8.6.1.2 Successful Operation



Figure 8.6.1.2-1: Initial UE message

The NG-RAN node initiates the procedure by sending an INITIAL UE MESSAGE message to the AMF. The NG-RAN node shall allocate a unique RAN UE NGAP ID to be used for the UE and the NG-RAN node shall include this identity in the INITIAL UE MESSAGE message.

The *NAS-PDU* IE contains a UE – AMF message that is transferred without interpretation in the NG-RAN node.

In case of network sharing, the selected PLMN is indicated by the *PLMN Identity* IE within the *TAI* IE included in the INITIAL UE MESSAGE message.

When the NG-RAN node has received from the radio interface the *5G-S-TMSI* IE, it shall include it in the INITIAL UE MESSAGE message.

If the *AMF Set ID* IE is included in the INITIAL UE MESSAGE message this indicates that the message is a rerouted message and the AMF shall, if supported, use the IE as described in TS 23.502 [10].

If the *UE Context Request* IE is included in the INITIAL UE MESSAGE message the AMF shall trigger an Initial Context Setup procedure towards the NG-RAN node.

If the *Allowed NSSAI* IE is included in the INITIAL UE MESSAGE message the AMF shall use the IE as defined in TS 23.502 [10].

8.6.1.3 Abnormal Conditions

If the 5G-S-TMSI is not received by the AMF in the INITIAL UE MESSAGE message whereas expected, the AMF shall consider the procedure as failed.

8.6.2 Downlink NAS Transport

8.6.2.1 General

The Downlink NAS Transport procedure is used when the AMF only needs to send a NAS message transparently via the NG-RAN node to the UE, and a UE-associated logical NG-connection exists for the UE or the AMF has received the *RAN UE NGAP ID* IE in an INITIAL UE MESSAGE message or if the NG-RAN node has already initiated a UE-associated logical NG-connection by sending an INITIAL UE MESSAGE message via another NG interface instance.

8.6.2.2 Successful Operation

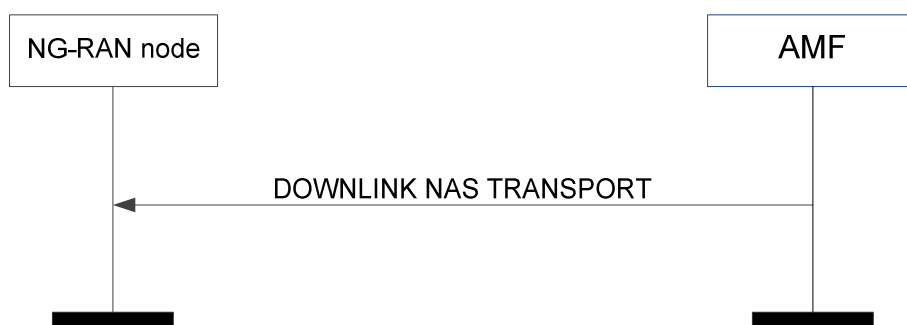


Figure 8.6.2.2-1: Downlink NAS transport

The AMF initiates the procedure by sending a DOWNLINK NAS TRANSPORT message to the NG-RAN node. If the UE-associated logical NG-connection is not established, the AMF shall allocate a unique AMF UE NGAP ID to be used for the UE and include that in the DOWNLINK NAS TRANSPORT message; by receiving the *AMF UE NGAP ID* IE in the DOWNLINK NAS TRANSPORT message, the NG-RAN node establishes the UE-associated logical NG-connection.

If the *RAN Paging Priority* IE is included in the DOWNLINK NAS TRANSPORT message, the NG-RAN node may use it to determine a priority for paging the UE in RRC_INACTIVE state.

The *NAS-PDU* IE contains an AMF – UE message that is transferred without interpretation in the NG-RAN node.

If the *Mobility Restriction List* IE is contained in the DOWNLINK NAS TRANSPORT message, the NG-RAN node shall store this information in the UE context. The NG-RAN node shall use the information in the *Mobility Restriction List* IE if present in the DOWNLINK NAS TRANSPORT message to:

- determine a target for subsequent mobility action for which the NG-RAN node provides information about the target of the mobility action towards the UE;
- select a proper SCG during dual connectivity operation;
- assign proper RNA(s) for the UE when moving the UE to RRC_INACTIVE state.

If the *Mobility Restriction List* IE is not contained in the DOWNLINK NAS TRANSPORT message and there is no previously stored mobility restriction information, the NG-RAN node shall consider that no roaming and no access restriction apply to the UE.

If the *Index to RAT/Frequency Selection Priority* IE is included in the DOWNLINK NAS TRANSPORT message, the NG-RAN node shall, if supported, use it as defined in TS 23.501 [9].

If the *UE Aggregate Maximum Bit Rate* IE is included in the DOWNLINK NAS TRANSPORT message, the NG-RAN node shall store the UE Aggregate Maximum Bit Rate in the UE context, and use the received UE Aggregate Maximum Bit Rate for all non-GBR QoS flows for the concerned UE as specified in TS 23.501 [9].

If the *Old AMF* IE is included in the DOWNLINK NAS TRANSPORT message, the NG-RAN node shall consider that this UE-associated logical NG-connection was redirected to this AMF from another AMF identified by the *Old AMF* IE.

Interactions with Initial UE Message procedure:

The NG-RAN node shall use the *AMF UE NGAP ID* IE and *RAN UE NGAP ID* IE received in the DOWNLINK NAS TRANSPORT message as identification of the logical connection even if the *RAN UE NGAP ID* IE had been allocated in an INITIAL UE MESSAGE message sent over a different NG interface instance.

8.6.2.3 Abnormal Conditions

Void.

8.6.3 Uplink NAS Transport

8.6.3.1 General

The Uplink NAS Transport procedure is used when the NG-RAN node has received from the radio interface a NAS message to be forwarded to the AMF to which a UE-associated logical NG-connection for the UE exists.

8.6.3.2 Successful Operation



Figure 8.6.3.2-1: Uplink NAS transport

The NG-RAN node initiates the procedure by sending an UPLINK NAS TRANSPORT message to the AMF. The NG-RAN node shall include the TAI and CGI of the current cell in the *User Location Information* IE of every UPLINK NAS TRANSPORT message.

The *NAS-PDU* IE contains a UE – AMF message that is transferred without interpretation in the NG-RAN node.

8.6.3.3 Abnormal Conditions

Void.

8.6.4 NAS Non Delivery Indication

8.6.4.1 General

The NAS Non Delivery Indication procedure is used when the NG-RAN node decides not to start the delivery of a NAS message that has been received over a UE-associated logical NG-connection or the NG-RAN node is unable to ensure that the message has been received by the UE.

8.6.4.2 Successful Operation

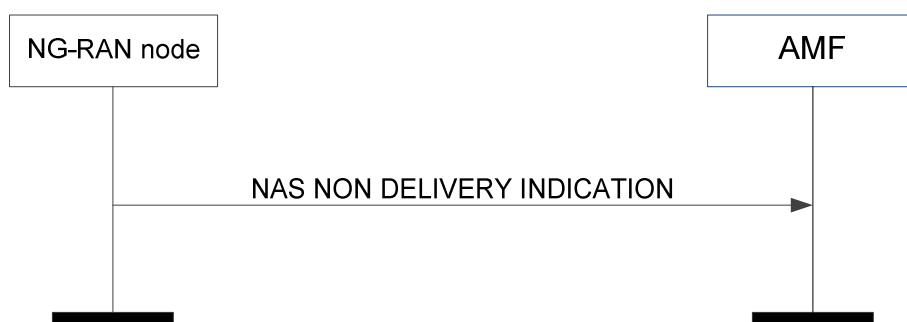


Figure 8.6.4.2-1: NAS non delivery indication

The NG-RAN node initiates the procedure by sending a NAS NON DELIVERY INDICATION message to the AMF. The NG-RAN node shall report the non-delivery of a NAS message by including the non-delivered NAS message within the *NAS-PDU* IE and an appropriate cause value within the *Cause* IE, e.g., "NG intra system handover triggered", "NG inter system handover triggered" or "Xn handover triggered".

8.6.4.3 Abnormal Conditions

Void.

8.6.5 Reroute NAS Request

8.6.5.1 General

The purpose of the Reroute NAS Request procedure is to enable the AMF to request for a rerouting of the INITIAL UE MESSAGE message to another AMF.

8.6.5.2 Successful Operation

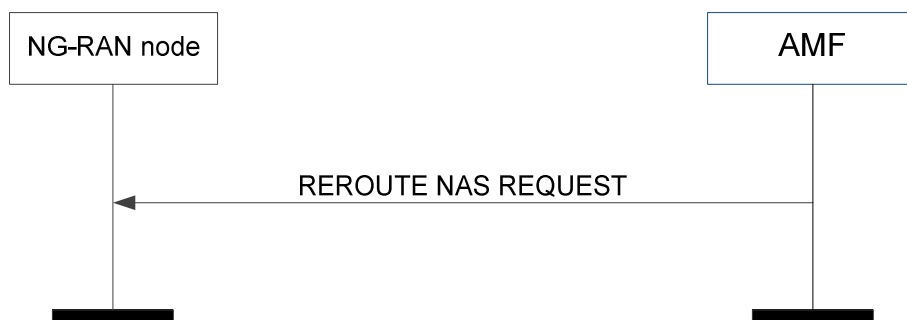


Figure 8.6.5.2-1: Reroute NAS request

The AMF initiates the procedure by sending a REROUTE NAS REQUEST message to the NG-RAN node. The NG-RAN node shall, if supported, reroute the INITIAL UE MESSAGE message to an AMF indicated by the *AMF Set ID* IE as described in TS 23.501 [9].

If the *Allowed NSSAI* IE is included in the REROUTE NAS REQUEST message, then the NG-RAN node shall propagate it in the rerouted INITIAL UE MESSAGE message as defined in TS 23.502 [10].

8.6.5.3 Abnormal Conditions

Void.

8.7 Interface Management Procedures

8.7.1 NG Setup

8.7.1.1 General

The purpose of the NG Setup procedure is to exchange application level data needed for the NG-RAN node and the AMF to correctly interoperate on the NG-C interface. This procedure shall be the first NGAP procedure triggered after the TNL association has become operational. The procedure uses non-UE associated signalling.

This procedure erases any existing application level configuration data in the two nodes, replaces it by the one received and clears AMF overload state information at the NG-RAN node. This procedure also re-initialises the NGAP UE-related contexts (if any) and erases all related signalling connections in the two nodes like an NG Reset procedure would do.

8.7.1.2 Successful Operation

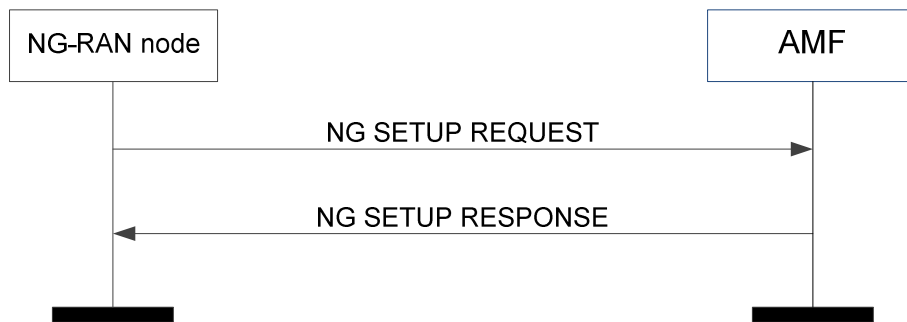


Figure 8.7.1.2-1: NG setup: successful operation

The NG-RAN node initiates the procedure by sending an NG SETUP REQUEST message including the appropriate data to the AMF. The AMF responds with an NG SETUP RESPONSE message including the appropriate data.

8.7.1.3 Unsuccessful Operation

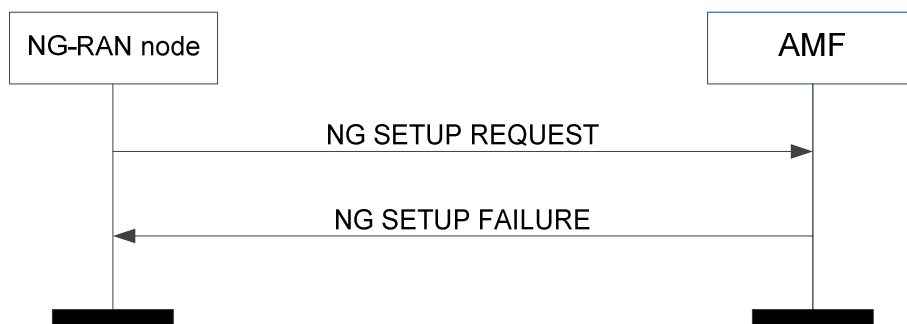


Figure 8.7.1.3-1: NG setup: unsuccessful operation

If the AMF cannot accept the setup, it should respond with an NG SETUP FAILURE message and appropriate cause value.

If the NG SETUP FAILURE message includes the *Time to Wait* IE, the NG-RAN node shall wait at least for the indicated time before reinitiating the NG Setup procedure towards the same AMF.

8.7.1.4 Abnormal Conditions

If the NG-RAN node initiates the procedure by sending an NG SETUP REQUEST message including the *PLMN Identity* IEs and none of the PLMNs provided by the NG-RAN node is identified by the AMF, then the AMF shall reject the NG Setup procedure with an appropriate cause value.

8.7.2 RAN Configuration Update

8.7.2.1 General

The purpose of the RAN Configuration Update procedure is to update application level configuration data needed for the NG-RAN node and the AMF to interoperate correctly on the NG-C interface. This procedure does not affect existing UE-related contexts, if any.

8.7.2.2 Successful Operation

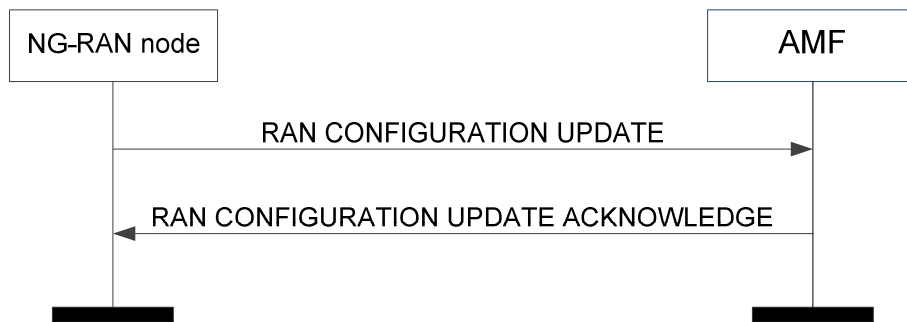


Figure 8.7.2.2-1: RAN configuration update: successful operation

The NG-RAN node initiates the procedure by sending a RAN CONFIGURATION UPDATE message to the AMF including an appropriate set of updated configuration data that it has just taken into operational use. The AMF responds with a RAN CONFIGURATION UPDATE ACKNOWLEDGE message to acknowledge that it successfully updated the configuration data.

If the *TAI Slice Support List* IE is included in the RAN CONFIGURATION UPDATE message, the AMF shall store the received values and use them for subsequent registration area management of the UE.

8.7.2.3 Unsuccessful Operation

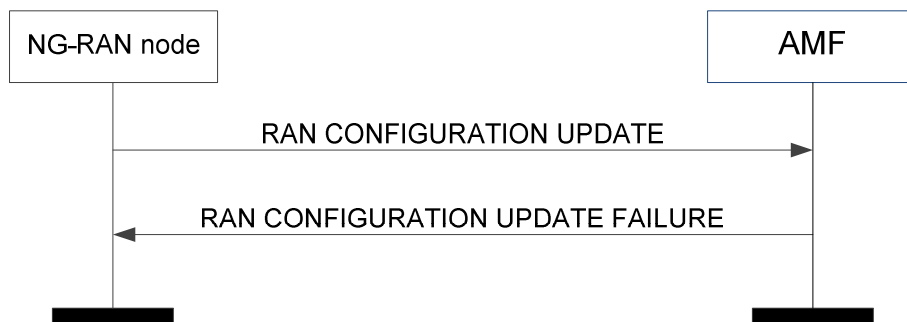


Figure 8.7.2.3-1: RAN configuration update: unsuccessful operation

If the AMF cannot accept the update, it shall respond with a RAN CONFIGURATION UPDATE FAILURE message and appropriate cause value.

8.7.2.4 Abnormal Conditions

If the NG-RAN node, after initiating the RAN Configuration Update procedure, receives neither a RAN CONFIGURATION UPDATE ACKNOWLEDGE nor a RAN CONFIGURATION UPDATE FAILURE message, the NG-RAN node may reinitiate a further RAN Configuration Update procedure towards the same AMF, provided that the content of the new RAN CONFIGURATION UPDATE message is identical to the content of the previously unacknowledged RAN CONFIGURATION UPDATE message.

8.7.3 AMF Configuration Update

8.7.3.1 General

The purpose of the AMF Configuration Update procedure is to update application level configuration data needed for the NG-RAN node and AMF to interoperate correctly on the NG-C interface. This procedure does not affect existing UE-related contexts, if any.

8.7.3.2 Successful Operation

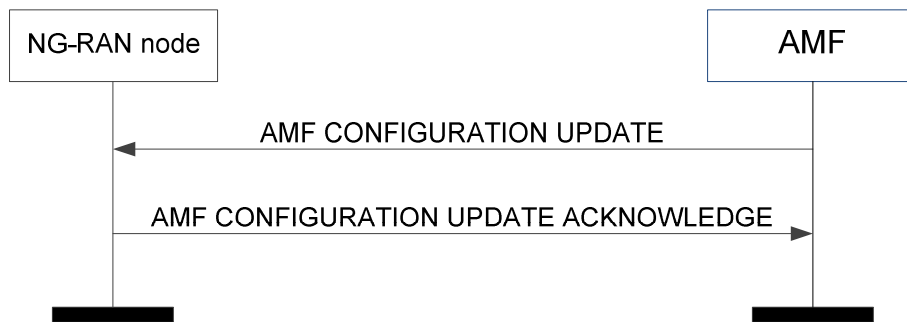


Figure 8.7.3.2-1: AMF configuration update: successful operation

The AMF initiates the procedure by sending an AMF CONFIGURATION UPDATE message including the appropriate updated configuration data to the NG-RAN node. The NG-RAN node responds with an AMF CONFIGURATION UPDATE ACKNOWLEDGE message to acknowledge that it successfully updated the configuration data.

If the *Slice Support List* IE is included in the AMF CONFIGURATION UPDATE message, the NG-RAN node shall overwrite the list of supported AMF slices for the PLMN Identity affected by the new list and use the received values for further network slice selection and AMF selection.

If the *AMF TNL Association to Add List* IE is included in the AMF CONFIGURATION UPDATE message, the NG-RAN node shall, if supported, use it to establish the TNL association(s) with the AMF. The NG-RAN node shall report to the AMF, in the AMF CONFIGURATION UPDATE ACKNOWLEDGE message, the successful establishment of the TNL association(s) with the AMF as follows:

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

If the *AMF TNL Association to Remove List* IE is included in the AMF CONFIGURATION UPDATE message the NG-RAN node shall, if supported, initiate removal of the TNL association(s) indicated by the received AMF Transport Layer information towards the AMF.

If the *AMF Name* IE is included in the AMF CONFIGURATION UPDATE message, the NG-RAN node shall overwrite the previously stored AMF name and use it to identify the AMF.

If the *Served GUAMI List* IE is included in the AMF CONFIGURATION UPDATE message, the NG-RAN node shall overwrite the whole list of GUAMIs served by the AMF by the new list and use the received values for further AMF management as defined in TS 23.501 [9].

If the *Relative AMF Capacity* IE is included in the AMF CONFIGURATION UPDATE message, the NG-RAN node may use it as defined in TS 23.501 [9].

If the *AMF TNL Association to Update List* IE is included in the AMF CONFIGURATION UPDATE message the NG-RAN node shall, if supported, update the TNL association(s) indicated by the received AMF Transport Layer information towards the AMF.

If the *TNL Association Usage* IE or the *TNL Address Weight Factor* IE is included in the *AMF TNL Association to Add List* IE or the *AMF TNL Association to Update List* IE, the NG-RAN node shall, if supported, consider it as defined in TS 23.502 [10].

8.7.3.3 Unsuccessful Operation

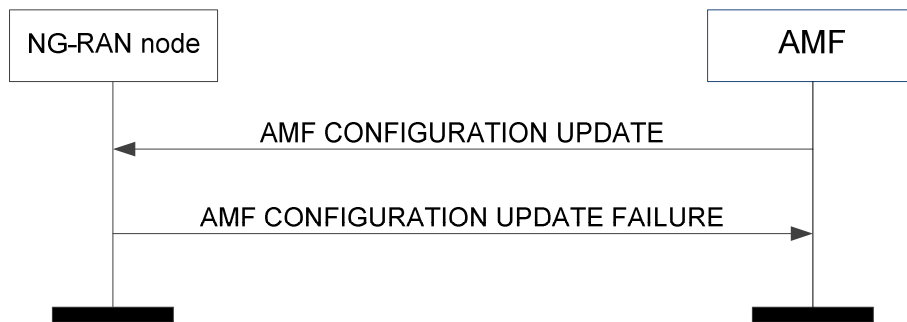


Figure 8.7.3.3-1: AMF configuration update: unsuccessful operation

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

8.7.3.4 Abnormal Conditions

If the AMF receives neither an AMF CONFIGURATION UPDATE ACKNOWLEDGE nor an AMF CONFIGURATION UPDATE FAILURE message, the AMF may reinitiate the AMF Configuration Update procedure towards the same NG-RAN node provided that the content of the new AMF CONFIGURATION UPDATE message is identical to the content of the previously unacknowledged AMF CONFIGURATION UPDATE message.

8.7.4 NG Reset

8.7.4.1 General

The purpose of the NG Reset procedure is to initialise or re-initialise the RAN, or part of RAN NGAP UE-related contexts, in the event of a failure in the 5GC or vice versa. This procedure does not affect the application level configuration data exchanged during, e.g., the NG Setup procedure. The procedure uses non-UE associated signalling.

8.7.4.2 Successful Operation

8.7.4.2.1 NG Reset initiated by the AMF

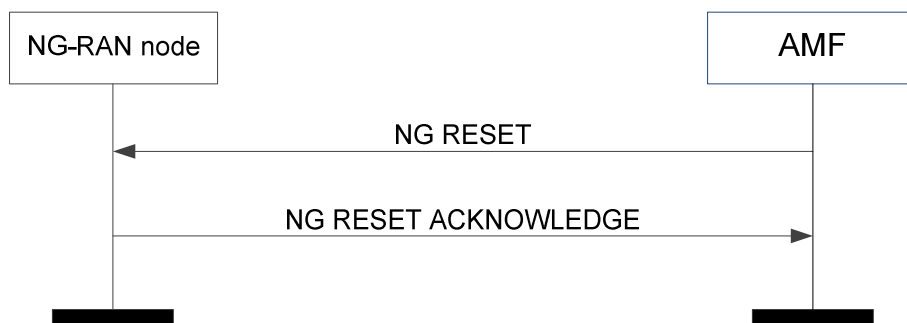


Figure 8.7.4.2.1-1: NG reset initiated by the AMF: successful operation

In the event of a failure at the AMF which has resulted in the loss of some or all transaction reference information, an NG RESET message shall be sent to the NG-RAN node.

At reception of the NG RESET message the NG-RAN node shall release all allocated resources on NG and Uu related to the UE association(s) indicated explicitly or implicitly in the NG RESET message and remove the indicated UE contexts including NGAP ID.

After the NG-RAN node has released all assigned NG resources and the UE NGAP IDs for all indicated UE associations which can be used for new UE-associated logical NG-connections over the NG interface, the NG-RAN node shall respond with the NG RESET ACKNOWLEDGE message. The NG-RAN node does not need to wait for the release of radio resources to be completed before returning the NG RESET ACKNOWLEDGE message.

If the NG RESET message contains the *UE-associated Logical NG-connection List IE*, then:

- The NG-RAN node shall use the *AMF UE NGAP ID IE* and/or the *RAN UE NGAP ID IE* to explicitly identify the UE association(s) to be reset.
- The NG-RAN node shall include in the NG RESET ACKNOWLEDGE message, for each UE association to be reset, the *UE-associated Logical NG-connection Item IE* in the *UE-associated Logical NG-connection List IE*. The *UE-associated Logical NG-connection Item IE*s shall be in the same order as received in the NG RESET message and shall include also unknown UE-associated logical NG-connections. Empty *UE-associated Logical NG-connection Item IE*s, received in the NG RESET message, may be omitted in the NG RESET ACKNOWLEDGE message.
- If the *AMF UE NGAP ID IE* is included in the *UE-associated Logical NG-connection Item IE* for a UE association, the NG-RAN node shall include the *AMF UE NGAP ID IE* in the corresponding *UE-associated Logical NG-connection Item IE* in the NG RESET ACKNOWLEDGE message.
- If the *RAN UE NGAP ID IE* is included in the *UE-associated Logical NG-connection Item IE* for a UE association, the NG-RAN node shall include the *RAN UE NGAP ID IE* in the corresponding *UE-associated Logical NG-connection Item IE* in the NG RESET ACKNOWLEDGE message.

Interactions with other procedures:

If the NG RESET message is received, any other ongoing procedure (except for another NG Reset procedure) on the same NG interface related to a UE association, indicated explicitly or implicitly in the NG RESET message, shall be aborted.

8.7.4.2.2 NG Reset initiated by the NG-RAN node

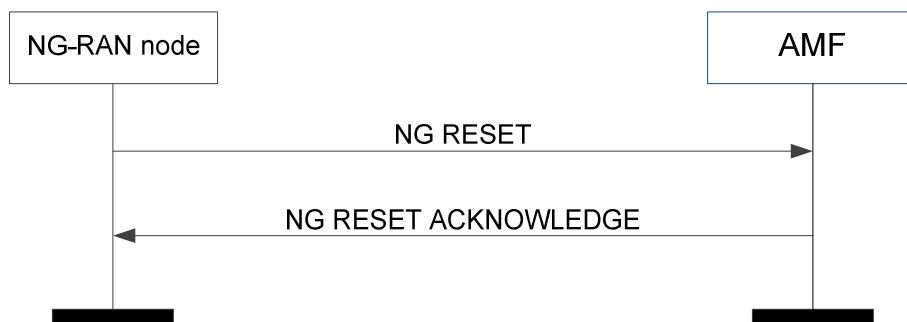


Figure 8.7.4.2.2-1: NG reset initiated by the NG-RAN node: successful operation

In the event of a failure at the NG-RAN node which has resulted in the loss of some or all transaction reference information, an NG RESET message shall be sent to the AMF.

At reception of the NG RESET message the AMF shall release all allocated resources on NG related to the UE association(s) indicated explicitly or implicitly in the NG RESET message and remove the NGAP ID for the indicated UE associations.

After the AMF has released all assigned NG resources and the UE NGAP IDs for all indicated UE associations which can be used for new UE-associated logical NG-connections over the NG interface, the AMF shall respond with the NG RESET ACKNOWLEDGE message.

If the NG RESET message contains the *UE-associated Logical NG-connection List IE*, then:

- The AMF shall use the *AMF UE NGAP ID IE* and/or the *RAN UE NGAP ID IE* to explicitly identify the UE association(s) to be reset.
- The AMF shall include in the NG RESET ACKNOWLEDGE message, for each UE association to be reset, the *UE-associated Logical NG-connection Item IE* in the *UE-associated Logical NG-connection List IE*. The *UE-associated Logical NG-connection Item IE*s shall be in the same order as received in the NG RESET message and shall include also unknown UE-associated logical NG-connections. Empty *UE-associated Logical NG-connection Item IE*s, received in the NG RESET message, may be omitted in the NG RESET ACKNOWLEDGE message.

- If the *AMF UE NGAP ID IE* is included in the *UE-associated Logical NG-connection Item IE* for a UE association, the AMF shall include the *AMF UE NGAP ID IE* in the corresponding *UE-associated Logical NG-connection Item IE* in the NG RESET ACKNOWLEDGE message.
- If the *RAN UE NGAP ID IE* is included in a *UE-associated Logical NG-connection Item IE* for a UE association, the AMF shall include the *RAN UE NGAP ID IE* in the corresponding *UE-associated Logical NG-connection Item IE* in the NG RESET ACKNOWLEDGE message.

Interactions with other procedures:

If the NG RESET message is received, any other ongoing procedure (except for another NG Reset procedure) on the same NG interface related to a UE association, indicated explicitly or implicitly in the NG RESET message, shall be aborted.

8.7.4.3 Unsuccessful Operation

Not applicable.

8.7.4.4 Abnormal Conditions

8.7.4.4.1 Abnormal Condition at the 5GC

If the NG RESET message includes the *UE-associated Logical NG-connection List IE*, but neither the *AMF UE NGAP ID IE* nor the *RAN UE NGAP ID IE* is present for a *UE-associated Logical NG-connection Item IE*, then the AMF shall ignore the *UE-associated Logical NG-connection Item IE*. The AMF may return the empty *UE-associated Logical NG-connection Item IE* in the *UE-associated Logical NG-connection List IE* in the NG RESET ACKNOWLEDGE message.

8.7.4.4.2 Abnormal Condition at the NG-RAN

If the NG RESET message includes the *UE-associated Logical NG-connection List IE*, but neither the *AMF UE NGAP ID IE* nor the *RAN UE NGAP ID IE* is present for a *UE-associated Logical NG-connection Item IE*, then the NG-RAN node shall ignore the *UE-associated Logical NG-connection Item IE*. The NG-RAN node may return the empty *UE-associated Logical NG-connection Item IE* in the *UE-associated Logical NG-connection List IE* in the NG RESET ACKNOWLEDGE message.

8.7.4.4.3 Crossing of NG RESET Messages

If an NG Reset procedure is ongoing in the NG-RAN node and the NG-RAN node receives an NG RESET message from the peer entity on the same NG interface related to one or several UE associations previously requested to be reset, indicated explicitly or implicitly in the received NG RESET message, the NG-RAN node shall respond with the NG RESET ACKNOWLEDGE message as described in 8.7.4.2.1.

If an NG Reset procedure is ongoing in the AMF and the AMF receives an NG RESET message from the peer entity on the same NG interface related to one or several UE associations previously requested to be reset, indicated explicitly or implicitly in the received NG RESET message, the AMF shall respond with the NG RESET ACKNOWLEDGE message as described in 8.7.4.2.2.

8.7.5 Error Indication

8.7.5.1 General

The Error Indication procedure is initiated by a node in order 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.

8.7.5.2 Successful Operation

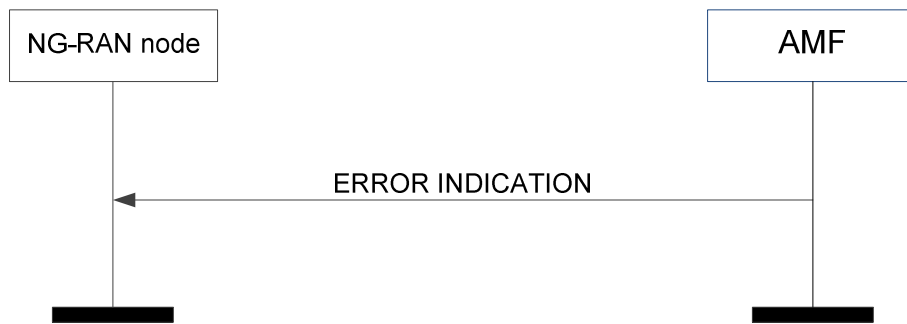


Figure 8.7.5.2-1: Error indication initiated by the AMF

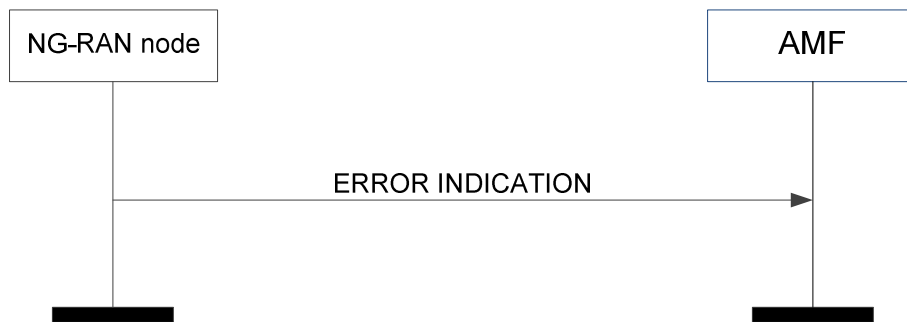


Figure 8.7.5.2-2: Error indication initiated by the NG-RAN node

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

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 utilising UE-associated signalling the *AMF UE NGAP ID IE* and the *RAN UE NGAP ID IE* shall be included in the ERROR INDICATION message. If one or both of the *AMF UE NGAP ID IE* and the *RAN UE NGAP ID IE* are not correct, the cause shall be set to an appropriate value, e.g., "Unknown or already allocated AMF UE NGAP ID", "Unknown or already allocated RAN UE NGAP ID" or "Unknown or inconsistent pair of UE NGAP ID".

8.7.5.3 Abnormal Conditions

Void.

8.7.6 AMF Status Indication

8.7.6.1 General

The purpose of the AMF Status Indication procedure is to support AMF management functions.

8.7.6.2 Successful Operation

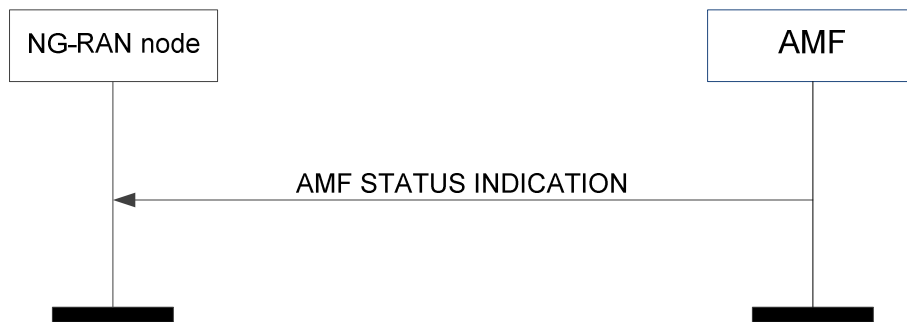


Figure 8.7.6.2-1: AMF status indication

The AMF initiates the procedure by sending an AMF STATUS INDICATION message to the NG-RAN node.

Upon receipt of the AMF STATUS INDICATION message, the NG-RAN node shall consider the indicated GUAMI(s) will be unavailable and perform AMF reselection as defined in TS 23.501 [9].

The NG-RAN node shall, if supported, act accordingly as specified in TS 23.501 [9], based on the presence or absence of the *Timer Approach for GUAMI Removal* IE.

If the *Backup AMF Name* IE is included in the AMF STATUS INDICATION message, the NG-RAN node shall, if supported, perform AMF reselection considering the AMF as indicated by the *Backup AMF Name* IE.

8.7.6.3 Abnormal Conditions

Void.

8.7.7 Overload Start

8.7.7.1 General

The purpose of the Overload Start procedure is to inform an NG-RAN node to reduce the signalling load towards the concerned AMF. The procedure uses non-UE associated signalling.

8.7.7.2 Successful Operation



Figure 8.7.7.2-1: Overload start

The NG-RAN node receiving the OVERLOAD START message shall assume the AMF from which it receives the message as being in an overloaded state.

If the *Overload Action* IE is included the *AMF Overload Response* IE within the OVERLOAD START message, the NG-RAN node shall use it to identify the related signalling traffic. When the *Overload Action* IE is set to

- "reject RRC connection establishments for non-emergency mobile originated data transfer" (i.e., reject traffic corresponding to RRC cause "mo-data", "mo-SMS", "mo-VideoCall" and "mo-VoiceCall" in TS 38.331 [18] or "mo-data" and "mo-VoiceCall" in TS 36.331 [21]), or

- "reject RRC connection establishments for signalling" (i.e., reject traffic corresponding to RRC cause "mo-data", "mo-SMS", "mo-signalling", "mo-VideoCall" and "mo-VoiceCall" in TS 38.331 [18] or "mo-data", "mo-signalling" and "mo-VoiceCall" in TS 36.331 [21]), or
- "only permit RRC connection establishments for emergency sessions and mobile terminated services" (i.e., only permit traffic corresponding to RRC cause "emergency" and "mt-Access" in TS 38.331 [18] or in TS 36.331 [21]), or
- "only permit RRC connection establishments for high priority sessions and mobile terminated services" (i.e., only permit traffic corresponding to RRC cause "highPriorityAccess", "mps-PriorityAccess", "mcs-PriorityAccess" and "mt-Access" in TS 38.331 [18] or "highPriorityAccess" and "mt-Access" in TS 36.331 [21]),

the NG-RAN node shall:

- if the *AMF Traffic Load Reduction Indication* IE is included in the OVERLOAD START message, reduce the signalling traffic by the indicated percentage,
- otherwise ensure that only the signalling traffic not indicated as to be rejected is sent to the AMF.

If the *Overload Start NSSAI List* IE is included in the OVERLOAD START message, the NG-RAN node shall:

- if the *Slice Traffic Load Reduction Indication* IE is present, reduce the signalling traffic by the indicated percentage for the UE(s) whose requested NSSAI only include S-NSSAI(s) contained in the *Overload Start NSSAI List* IE, and the signalling traffic indicated as to be reduced by the *Overload Action* IE in the *Slice Overload Response* IE if the IE is present,
- otherwise ensure that only the signalling traffic from UE(s) whose requested NSSAI includes S-NSSAI(s) other than the ones contained in the *Overload Start NSSAI List* IE, or the signalling traffic not indicated as to be reduced by the *Overload Action* IE in the *Slice Overload Response* IE for the UE(s) if the requested NSSAI matched, is sent to the AMF.

If an overload control is ongoing and the NG-RAN node receives a further OVERLOAD START message, the NG-RAN node shall replace the contents of the previously received information with the new one.

8.7.7.3 Abnormal Conditions

Void.

8.7.8 Overload Stop

8.7.8.1 General

The purpose of the Overload Stop procedure is to signal to an NG-RAN node the AMF is connected to that the overload situation at the AMF has ended and normal operation shall resume. The procedure uses non-UE associated signalling.

8.7.8.2 Successful Operation



Figure 8.7.8.2-1: Overload stop

The NG-RAN node receiving the OVERLOAD STOP message shall assume that the overload situation at the AMF from which it receives the message has ended and shall resume normal operation for the applicable traffic towards this AMF.

8.7.8.3 Abnormal Conditions

Void.

8.8 Configuration Transfer Procedures

8.8.1 Uplink RAN Configuration Transfer

8.8.1.1 General

The purpose of the Uplink RAN Configuration Transfer procedure is to transfer RAN configuration information from the NG-RAN node to the AMF. The AMF does not interpret the transferred RAN configuration information. This procedure uses non-UE associated signalling.

8.8.1.2 Successful Operation

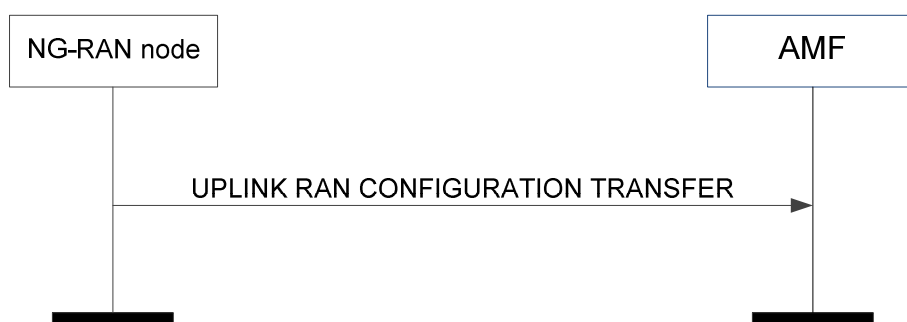


Figure 8.8.1.2-1: Uplink RAN configuration transfer

The NG-RAN node initiates the procedure by sending the UPLINK RAN CONFIGURATION TRANSFER message to the AMF.

If the AMF receives the *SON Configuration Transfer IE*, it shall transparently transfer the *SON Configuration Transfer IE* towards the NG-RAN node indicated in the *Target RAN Node ID IE* which is included in the *SON Configuration Transfer IE*.

8.8.1.3 Abnormal Conditions

Void.

8.8.2 Downlink RAN Configuration Transfer

8.8.2.1 General

The purpose of the Downlink RAN Configuration Transfer procedure is to transfer RAN configuration information from the AMF to the NG-RAN node. This procedure uses non-UE associated signalling.

8.8.2.2 Successful Operation

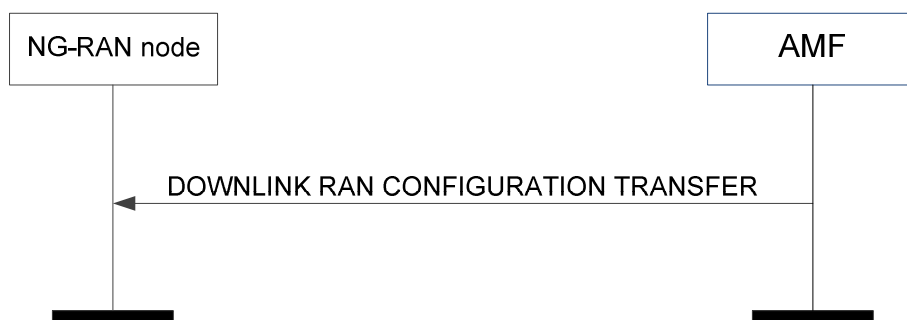


Figure 8.8.2.2-1: Downlink RAN configuration transfer

The procedure is initiated with an DOWNLINK RAN CONFIGURATION TRANSFER message sent from the AMF to the NG-RAN node.

If the NG-RAN node receives, in the *SON Configuration Transfer* IE, the *SON Information* IE containing the *SON Information Request* IE, it may transfer back the requested information towards the NG-RAN node indicated in the *Source RAN Node ID* IE of the *SON Configuration Transfer* IE by initiating the Uplink RAN Configuration Transfer procedure.

If the NG-RAN node receives, in the *SON Configuration Transfer* IE, the *Xn TNL Configuration Info* IE containing the *Xn Extended Transport Layer Addresses* IE, it may use it as part of its ACL functionality configuration actions, if such ACL functionality is deployed.

If the NG-RAN node receives, in the *SON Configuration Transfer* IE, the *SON Information* IE containing the *SON Information Reply* IE including the *Xn TNL Configuration Info* IE as an answer to a former request, it may use it to initiate the Xn TNL establishment.

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

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

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

If the NG-RAN node is configured to use one IPsec tunnel for all NG and Xn traffic (IPsec star topology) then the traffic to the peer NG-RAN node shall be routed through this IPsec tunnel and the *IP-Sec Transport Layer Address* IE shall be ignored.

8.8.2.3 Abnormal Conditions

Void.

8.9 Warning Message Transmission Procedures

8.9.1 Write-Replace Warning

8.9.1.1 General

The purpose of Write-Replace Warning procedure is to start or overwrite the broadcasting of warning messages. The procedure uses non UE-associated signalling.

8.9.1.2 Successful Operation

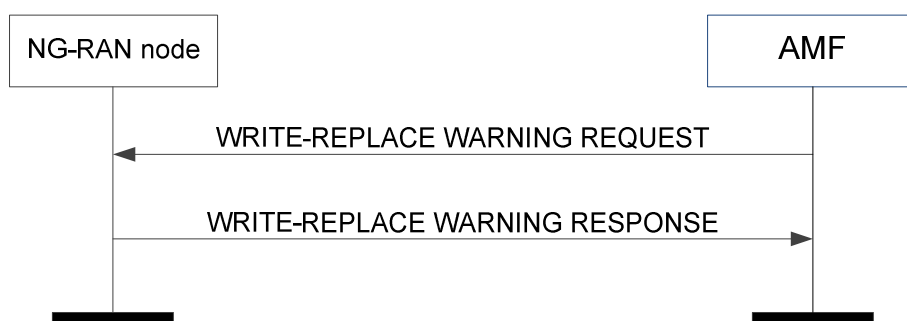


Figure 8.9.1.2-1: Write-Replace Warning procedure: successful operation

The AMF initiates the procedure by sending a WRITE-REPLACE WARNING REQUEST message to the NG-RAN node.

Upon receipt of the WRITE-REPLACE WARNING REQUEST message, the NG-RAN node shall prioritise its resources to process the warning message.

If, in a certain area, broadcast of a warning message is already ongoing and the NG-RAN node receives a WRITE-REPLACE WARNING REQUEST message with *Message Identifier* IE and/or *Serial Number* IE which are different from those in the warning message being broadcast, and if the *Concurrent Warning Message Indicator* IE is not present, the NG-RAN node shall replace the warning message being broadcast with the newly received one for that area.

If the NG-RAN node receives a WRITE-REPLACE WARNING REQUEST message with a warning message identified by the *Message Identifier* IE and *Serial Number* IE and if there are no prior warning messages being broadcast in any of the warning areas indicated in the *Warning Area List* IE, the NG-RAN node shall broadcast the received warning message for those area(s).

If, in a certain area, broadcast of one or more warning messages are already ongoing and the NG-RAN node receives a WRITE-REPLACE WARNING REQUEST message with a *Message Identifier* IE and/or *Serial Number* IE which are different from those in any of the warning messages being broadcast, and if the *Concurrent Warning Message Indicator* IE is present, the NG-RAN node shall schedule the received warning message for broadcast, for that area.

If the *Concurrent Warning Message Indicator* IE is present and if a value "0" is received in the *Number of Broadcasts Requested* IE, the NG-RAN node shall broadcast the received warning message indefinitely until requested otherwise to stop broadcasting, except if the *Repetition Period* IE is set to "0".

If, in a certain area, broadcast of one or more warning messages are already ongoing and the NG-RAN node receives a WRITE-REPLACE WARNING REQUEST message with *Message Identifier* IE and *Serial Number* IE which correspond to one of the warning messages already being broadcast in that area, the NG-RAN node shall not start a new broadcast or replace an existing one but it shall still reply by sending a WRITE-REPLACE WARNING RESPONSE message which includes the *Broadcast Completed Area List* IE set according to the ongoing broadcast.

If the *Warning Area List* IE is not included in the WRITE-REPLACE WARNING REQUEST message, the NG-RAN node shall broadcast the indicated message in all of the cells within the NG-RAN node.

If the *Warning Type* IE is included in the WRITE-REPLACE WARNING REQUEST message, the NG-RAN node shall broadcast the Primary Notification irrespective of the setting of the *Repetition Period* IE and the *Number of Broadcasts Requested* IE, and process the Primary Notification according to TS 36.331 [21] and TS 38.331 [18].

If the *Warning Security Information* IE is included in the WRITE-REPLACE WARNING REQUEST message, the NG-RAN node shall send this IE together with the *Warning Type* IE in the Primary Notification.

If the *Data Coding Scheme* IE and the *Warning Message Contents* IE are both included in the WRITE-REPLACE WARNING REQUEST message, the NG-RAN node shall schedule a broadcast of the warning message according to the value of the *Repetition Period* IE and the *Number of Broadcasts Requested* IE and process the warning message according to TS 36.331 [21] and TS 38.331 [18].

If the *Warning Area Coordinates* IE is included in the WRITE-REPLACE WARNING REQUEST message, the NG-RAN node shall send this IE together with the warning message being broadcast according to TS 36.331 [21] and TS 38.331 [18].

The NG-RAN node acknowledges the WRITE-REPLACE WARNING REQUEST message by sending a WRITE-REPLACE WARNING RESPONSE message to the AMF.

If the *Broadcast Completed Area List* IE is not included in the WRITE-REPLACE WARNING RESPONSE message, the AMF shall consider that the broadcast is unsuccessful in all the cells within the NG-RAN node.

8.9.1.3 Unsuccessful Operation

Not applicable.

8.9.1.4 Abnormal Conditions

If the *Concurrent Warning Message Indicator* IE is not present and if a value "0" is received in the *Number of Broadcasts Requested* IE, the NG-RAN node shall not broadcast the received secondary notification.

If the *Concurrent Warning Message Indicator* IE is included and if a value "0" is received in the *Repetition Period* IE, the NG-RAN node shall not broadcast the received warning message except if the *Number of Broadcasts Requested* IE is set to "1".

If the *Concurrent Warning Message Indicator* IE is not included and if a value "0" is received in the *Repetition Period* IE, the NG-RAN node shall not broadcast the received secondary notification except if the *Number of Broadcast Requested* IE is set to "1".

8.9.2 PWS Cancel

8.9.2.1 General

The purpose of the PWS Cancel procedure is to cancel an already ongoing broadcast of a warning message. The procedure uses non UE-associated signalling.

8.9.2.2 Successful Operation

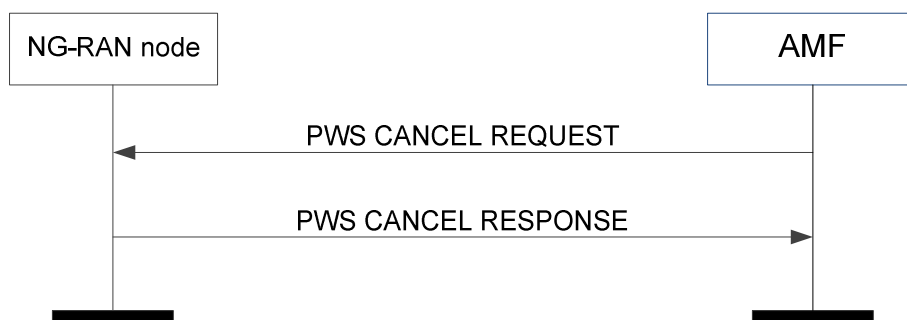


Figure 8.9.2.2-1: PWS Cancel procedure: successful operation

The AMF initiates the procedure by sending a PWS CANCEL REQUEST message to the NG-RAN node.

If the NG-RAN node receives a PWS CANCEL REQUEST message and broadcast of the warning message identified by the *Message Identifier* and *Serial Number* IE is ongoing in an area indicated within the *Warning Area List* IE, the NG-RAN node shall stop broadcasting the warning message within that area and discard the warning message for that area.

If the *Warning Area List* IE is not included in the PWS CANCEL REQUEST message, the NG-RAN node shall stop broadcasting and discard the warning message identified by the *Message Identifier* IE and the *Serial Number* IE in all of the cells in the NG-RAN node.

The NG-RAN node shall acknowledge the PWS CANCEL REQUEST message by sending the PWS CANCEL RESPONSE message, with the *Message Identifier* IE and the *Serial Number* IE copied from the PWS CANCEL REQUEST message and shall, if there is an area to report where an ongoing broadcast was stopped successfully, include the *Broadcast Cancelled Area List* IE.

If an area included in the *Warning Area List* IE in the PWS CANCEL REQUEST message does not appear in the *Broadcast Cancelled Area List* IE, the AMF shall consider that the NG-RAN node had no ongoing broadcast to stop for the same *Message Identifier* and *Serial Number* in that area.

If the *Broadcast Cancelled Area List* IE is not included in the PWS CANCEL RESPONSE message, the AMF shall consider that the NG-RAN node had no ongoing broadcast to stop for the same *Message Identifier* and *Serial Number*.

If the *Cancel-All Warning Messages Indicator* IE is present in the PWS CANCEL REQUEST message, then the NG-RAN node shall stop broadcasting and discard all warning messages for the area as indicated in the *Warning Area List* IE or in all the cells of the NG-RAN node if the *Warning Area List* IE is not included. The NG-RAN node shall acknowledge the PWS CANCEL REQUEST message by sending the PWS CANCEL RESPONSE message, with the *Message Identifier* IE and the *Serial Number* IE copied from the PWS CANCEL REQUEST message and shall, if there is an area to report where an ongoing broadcast was stopped successfully, include the *Broadcast Cancelled Area List* IE with the *Number of Broadcasts* IE set to 0.

8.9.2.3 Unsuccessful Operation

Not applicable.

8.9.2.4 Abnormal Conditions

Void.

8.9.3 PWS Restart Indication

8.9.3.1 General

The purpose of the PWS Restart Indication procedure is to inform the AMF that PWS information for some or all cells of the NG-RAN node may be reloaded from the CBC if needed. The procedure uses non UE-associated signalling.

8.9.3.2 Successful Operation

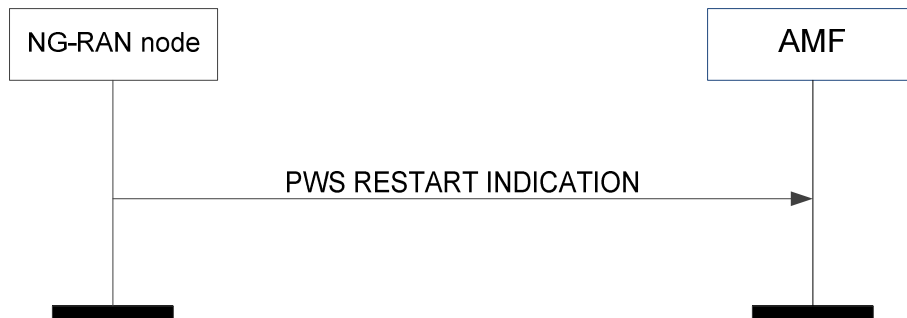


Figure 8.9.3.2-1: PWS restart indication

The NG-RAN node initiates the procedure by sending a PWS RESTART INDICATION message to the AMF. On receipt of a PWS RESTART INDICATION message, the AMF shall act as defined in TS 23.007 [20].

If the Emergency Area ID is available, the NG-RAN node shall also include it in the *Emergency Area ID List for Restart IE*.

8.9.3.3 Abnormal Conditions

Void.

8.9.4 PWS Failure Indication

8.9.4.1 General

The purpose of the PWS Failure Indication procedure is to inform the AMF that ongoing PWS operation for one or more cells of the NG-RAN node has failed. The procedure uses non UE-associated signalling.

8.9.4.2 Successful Operation

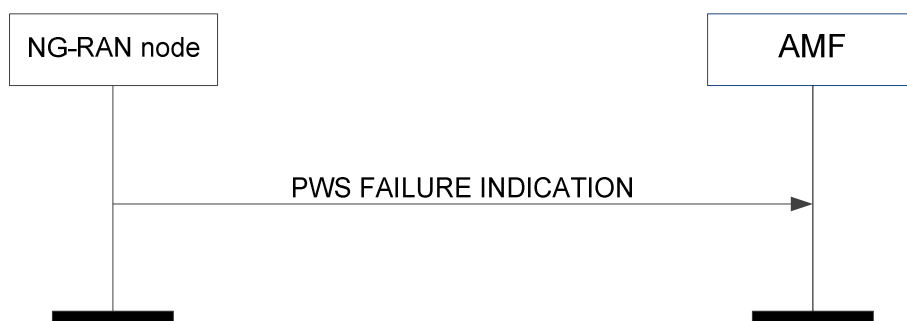


Figure 8.9.4.2-1: PWS failure indication

The NG-RAN node initiates the procedure by sending a PWS FAILURE INDICATION message to the AMF. On receipt of a PWS FAILURE INDICATION message, the AMF shall act as defined in TS 23.041 [22].

8.9.4.3 Abnormal Conditions

Void.

8.10 NRPPa Transport Procedures

8.10.1 General

The purpose of the NRPPa Transport procedure is to carry NRPPa signalling (defined in TS 38.455 [19]) between the NG-RAN node and the LMF over the NG interface as defined in TS 38.455 [19]. The procedure may use UE-associated signalling or non-UE associated signalling. The UE-associated signalling is used to support E-CID positioning of a specific UE. The non-UE associated signalling is used to obtain assistance data from an NG-RAN node to support OTDOA positioning for any UE.

8.10.2 Successful Operations

8.10.2.1 DOWNLINK UE ASSOCIATED NRPPa TRANSPORT

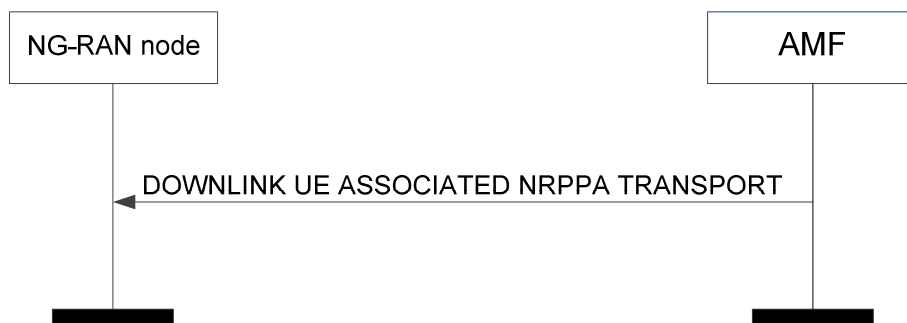


Figure 8.10.2.1-1: Downlink UE-associated NRPPa transport

The AMF initiates the procedure by sending the DOWNLINK UE ASSOCIATED NRPPa TRANSPORT message to the NG-RAN node.

8.10.2.2 UPLINK UE ASSOCIATED NRPPa TRANSPORT

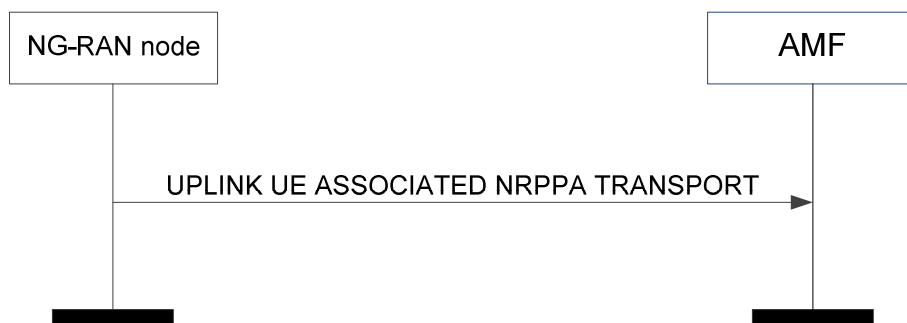


Figure 8.10.2.2-1: Uplink UE-associated NRPPa transport

The NG-RAN node initiates the procedure by sending the UPLINK UE ASSOCIATED NRPPa TRANSPORT message to the AMF.

8.10.2.3 DOWNLINK NON UE ASSOCIATED NRPPA TRANSPORT



Figure 8.10.2.3-1: Downlink non UE-associated NRPPa transport

The AMF initiates the procedure by sending the DOWNLINK NON UE ASSOCIATED NRPPA TRANSPORT message to the NG-RAN node.

8.10.2.4 UPLINK NON UE ASSOCIATED NRPPA TRANSPORT

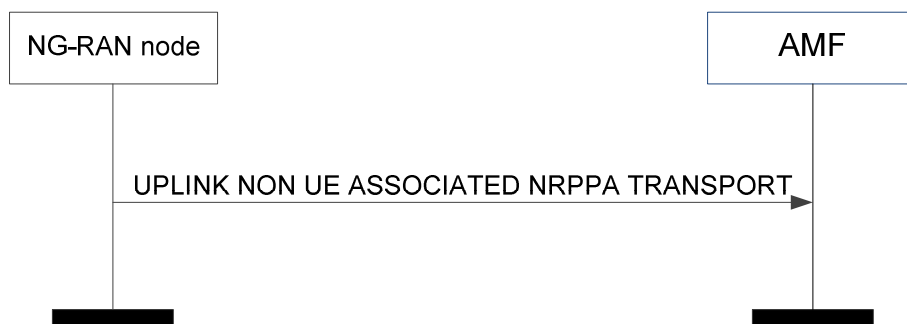


Figure 8.10.2.4-1: Uplink non UE-associated NRPPa transport

The NG-RAN node initiates the procedure by sending the UPLINK NON UE ASSOCIATED NRPPA TRANSPORT message to the AMF.

8.10.3 Unsuccessful Operations

Not applicable.

8.10.4 Abnormal Conditions

If an AMF receives an UPLINK UE ASSOCIATED NRPPA TRANSPORT message with an unknown Routing ID for the UE, the AMF shall ignore the message.

If an AMF receives an UPLINK NON UE ASSOCIATED NRPPA TRANSPORT message indicating an unknown or unreachable Routing ID, the AMF shall ignore the message.

8.11 Trace Procedures

8.11.1 Trace Start

8.11.1.1 General

The purpose of the Trace Start procedure is to allow the AMF to request the NG-RAN node to initiate a trace session for a UE. The procedure uses UE-associated signalling. If no UE-associated logical NG-connection exists, the UE-associated logical NG-connection shall be established as part of the procedure.

8.11.1.2 Successful Operation



Figure 8.11.1.2-1: Trace start

The AMF initiates the procedure by sending a TRACE START message. Upon reception of the TRACE START message, the NG-RAN node shall initiate the requested trace session as described in TS 32.422 [11].

Interactions with other procedures:

If the NG-RAN node is not able to initiate the trace session due to ongoing handover of the UE to another NG-RAN node, the NG-RAN node shall initiate a Trace Failure Indication procedure with the appropriate cause value.

8.11.1.3 Abnormal Conditions

Void.

8.11.2 Trace Failure Indication

8.11.2.1 General

The purpose of the Trace Failure Indication procedure is to allow the NG-RAN node to inform the AMF that a Trace Start procedure or a Deactivate Trace procedure has failed due to an interaction with a handover procedure. The procedure uses UE-associated signalling.

8.11.2.2 Successful Operation

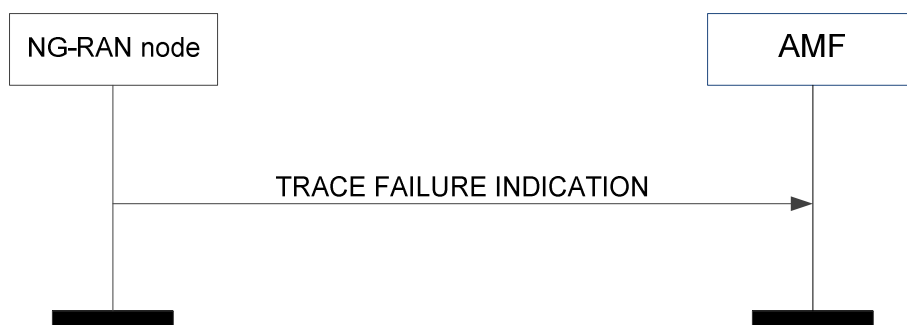


Figure 8.11.2.2-1: Trace failure indication

The NG-RAN node initiates the procedure by sending a TRACE FAILURE INDICATION message. Upon reception of the TRACE FAILURE INDICATION message, the AMF shall take appropriate actions based on the failure reason indicated by the *Cause* IE.

8.11.2.3 Abnormal Conditions

Void.

8.11.3 Deactivate Trace

8.11.3.1 General

The purpose of the Deactivate Trace procedure is to allow the AMF to request the NG-RAN node to stop the trace session for the indicated trace reference. The procedure uses UE-associated signalling.

8.11.3.2 Successful Operation



Figure 8.11.3.2-1: Deactivate trace

The AMF initiates the procedure by sending a DEACTIVATE TRACE message to the NG-RAN node as described in TS 32.422 [11]. Upon reception of the DEACTIVATE TRACE message, the NG-RAN node shall stop the trace session for the indicated trace reference in the *NG-RAN Trace ID* IE.

Interactions with other procedures:

If the NG-RAN node is not able to stop the trace session due to ongoing handover of the UE to another NG-RAN node, the NG-RAN node shall initiate a Trace Failure Indication procedure with the appropriate cause value.

8.11.3.3 Abnormal Conditions

Void.

8.11.4 Cell Traffic Trace

8.11.4.1 General

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

8.11.4.2 Successful Operation

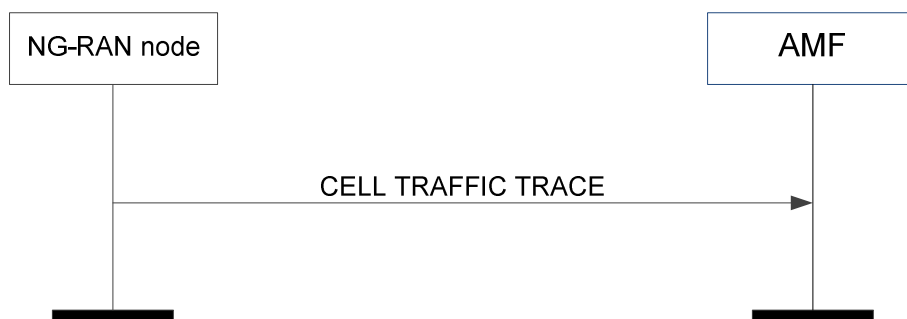


Figure 8.11.4.2-1: Cell traffic trace

The NG-RAN node initiates the procedure by sending a CELL TRAFFIC TRACE message.

8.11.4.3 Abnormal Conditions

Void.

8.12 Location Reporting Procedures

8.12.1 Location Reporting Control

8.12.1.1 General

The purpose of the Location Reporting Control procedure is to allow the AMF to request the NG-RAN node to report the UE's current location, or the UE's last known location with time stamp, or the UE's presence in the area of interest while in CM-CONNECTED state as specified in TS 23.501 [9] and TS 23.502 [10]. The procedure uses UE-associated signalling.

8.12.1.2 Successful Operation

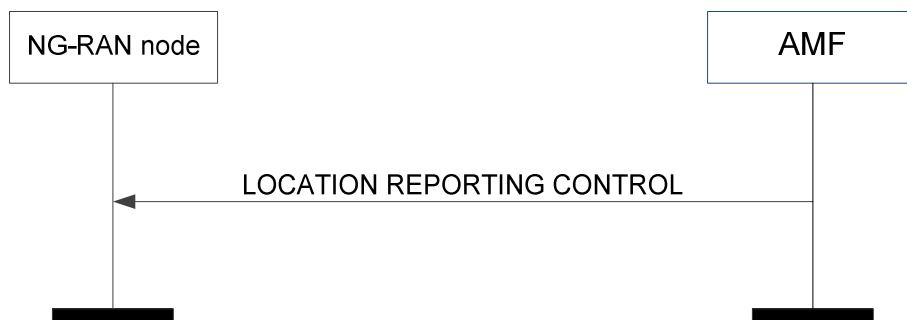


Figure 8.12.1.2-1: Location reporting control

The AMF initiates the procedure by sending a LOCATION REPORTING CONTROL message to the NG-RAN node. On receipt of the LOCATION REPORTING CONTROL message the NG-RAN node shall perform the requested location reporting control action for the UE.

The *Location Reporting Request Type* IE indicates to the NG-RAN node whether:

- to report directly;
- to report upon change of serving cell;
- to report UE presence in the area of interest;
- to stop reporting at change of serving cell;
- to stop reporting UE presence in the area of interest;
- to cancel location reporting for the UE.

If the *Area Of Interest List* IE is included in the *Location Reporting Request Type* IE in the LOCATION REPORTING CONTROL message, the NG-RAN node shall store this information and use it to track the UE's presence in the area of interest as defined in TS 23.502 [10].

8.12.1.3 Abnormal Conditions

Void.

8.12.2 Location Reporting Failure Indication

8.12.2.1 General

The purpose of the Location Reporting Failure Indication procedure is to allow the NG-RAN node to inform the AMF that the Location Reporting Control procedure has failed. The procedure uses UE-associated signalling.

8.12.2.2 Successful Operation

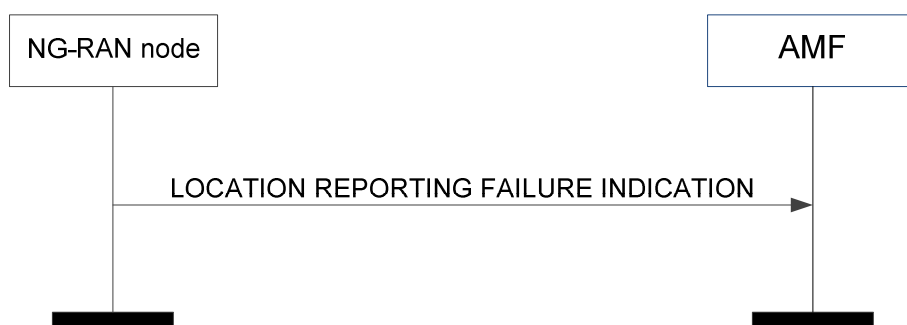


Figure 8.12.2.2-1: Location reporting failure indication

The NG-RAN node initiates the procedure by sending a LOCATION REPORTING FAILURE INDICATION message to the AMF. Upon reception of the LOCATION REPORTING FAILURE INDICATION message the AMF shall, based on the failure reason indicated by the *Cause* IE, take appropriate action.

8.12.2.3 Abnormal Conditions

Void.

8.12.3 Location Report

8.12.3.1 General

The purpose of the Location Report procedure is to provide the UE's current location, the UE's last known location with time stamp, or the UE's presence in the area of interest to the AMF. The procedure uses UE-associated signalling.

8.12.3.2 Successful Operation



Figure 8.12.3.2-1: Location report

The NG-RAN node initiates the procedure by sending a LOCATION REPORT message to the AMF. The LOCATION REPORT message may be used as a response to the LOCATION REPORTING CONTROL message.

8.12.3.3 Abnormal Conditions

Void.

8.13 UE TNLA Binding Procedures

8.13.1 UE TNLA Binding Release

8.13.1.1 General

The purpose of the UE TNLA Binding Release procedure is to request the NG-RAN node to release the NGAP UE TNLA binding, while requesting the NG-RAN node to maintain NG-U (user plane connectivity) and UE context information as specified in TS 23.502 [10]. The procedure uses UE-associated signalling.

8.13.1.2 Successful Operation



Figure 8.13.1.2-1: UE TNLA binding release request

At reception of the UE TNLA BINDING RELEASE REQUEST message, the NG-RAN node shall release the UE TNLA binding for the UE indicated in the UE TNLA BINDING RELEASE REQUEST message. The NG-RAN node shall keep the NG-U (user plane connectivity) and UE context information for the UE.

Interactions with other procedures:

If the UE TNLA BINDING RELEASE REQUEST message is received, any other ongoing procedure (except for the NG Reset procedure or another UE TNLA Binding Release procedure) on the same NG interface related to the UE indicated in the UE TNLA BINDING RELEASE REQUEST message shall be aborted.

8.13.1.3 Abnormal Conditions

Void.

8.14 UE Radio Capability Management Procedures

8.14.1 UE Radio Capability Info Indication

8.14.1.1 General

The purpose of the UE Radio Capability Info Indication procedure is to enable the NG-RAN node to provide to the AMF UE radio capability-related information. The procedure uses UE-associated signalling.

8.14.1.2 Successful Operation

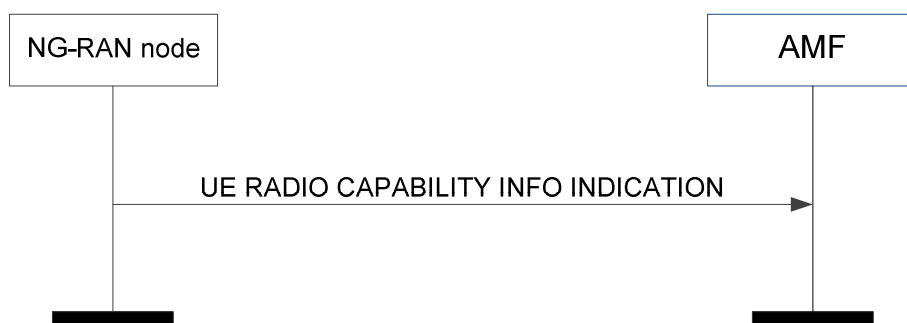


Figure 8.14.1.2-1: UE radio capability info indication

The NG-RAN node controlling a UE-associated logical NG connection initiates the procedure by sending a UE RADIO CAPABILITY INFO INDICATION message to the AMF including the UE radio capability information.

The UE RADIO CAPABILITY INFO INDICATION message may also include paging specific UE radio capability information within the *UE Radio Capability for Paging* IE.

The UE radio capability information received by the AMF shall replace previously stored corresponding UE radio capability information in the AMF for the UE, as described in TS 23.501 [9].

8.14.1.3 Abnormal Conditions

Void.

8.14.2 UE Radio Capability Check

8.14.2.1 General

The purpose of the UE Radio Capability Check procedure is for the AMF to request the NG-RAN node to derive and provide an indication to the AMF on whether the UE radio capabilities are compatible with the network configuration for IMS voice. The procedure uses UE-associated signalling.

8.14.2.2 Successful Operation

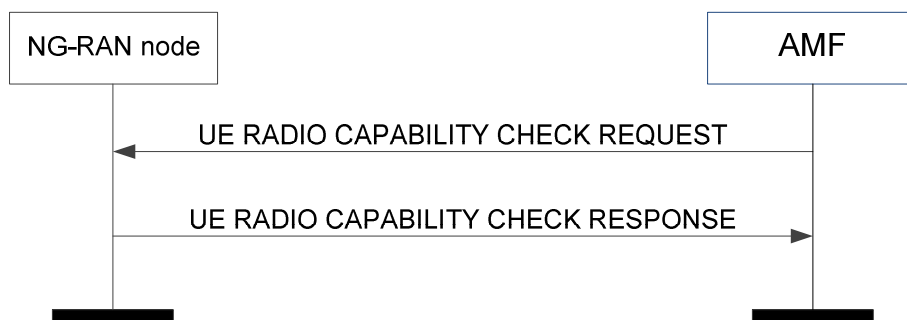


Figure 8.14.2.2-1: UE radio capability check procedure: successful operation

The AMF initiates the procedure by sending a UE RADIO CAPABILITY CHECK REQUEST message. If the UE-associated logical NG-connection is not established, the AMF shall allocate a unique AMF UE NGAP ID to be used for the UE and include the *AMF UE NGAP ID IE* in the UE RADIO CAPABILITY CHECK REQUEST message; by receiving the *AMF UE NGAP ID IE* in the UE RADIO CAPABILITY CHECK REQUEST message, the NG-RAN node establishes the UE-associated logical NG-connection.

Upon receipt of the UE RADIO CAPABILITY CHECK REQUEST message, the NG-RAN node checks whether the UE radio capabilities are compatible with the network configuration for IMS voice, and responds with a UE RADIO CAPABILITY CHECK RESPONSE message, as defined in TS 23.502 [10].

If the *UE Radio Capability IE* is contained in the UE RADIO CAPABILITY CHECK REQUEST message, the NG-RAN node shall use it to determine the value of the *IMS Voice Support Indicator IE* to be included in the UE RADIO CAPABILITY CHECK RESPONSE message.

8.14.2.3 Unsuccessful Operation

Not applicable.

8.14.2.4 Abnormal Conditions

Void.

9 Elements for NGAP Communication

9.0 General

Subclauses 9.2 and 9.3 present the NGAP message and IE definitions in tabular format. The corresponding ASN.1 definition is presented in subclause 9.4. In case there is contradiction between the tabular format and the ASN.1 definition, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional IEs, where the tabular format shall take precedence.

The messages have been defined in accordance to the guidelines specified in TR 25.921 [7].

When specifying IEs which are to be represented by bitstrings, 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 bitstrings from other specifications, the first bit of the bitstring contains the first bit of the concerned information;

9.1 Tabular Format Contents

9.1.1 Presence

All IEs are marked mandatory, optional or conditional according to table 9.1.1-1.

Table 9.1.1-1: Meaning of content within "Presence" column

Abbreviation	Meaning
M	IEs marked as Mandatory (M) shall always be included in the message.
O	IEs marked as Optional (O) may or may not be included in the message.
C	IEs marked as Conditional (C) shall be included in a message only if the condition is satisfied. Otherwise the IE shall not be included.

9.1.2 Criticality

Each IE or group of IEs may have criticality information applied to it according to table 9.1.2-1.

Table 9.1.2-1: Meaning of content within "Criticality" column

Abbreviation	Meaning
-	No criticality information is applied explicitly.
YES	Criticality information is applied. This is usable only for non-repeatable IEs
GLOBAL	The IE and all its repetitions together have one common criticality information. This is usable only for repeatable IEs.
EACH	Each repetition of the IE has its own criticality information. It is not allowed to assign different criticality values to the repetitions. This is usable only for repeatable IEs.

9.1.3 Range

The Range column indicates the allowed number of copies of repetitive IEs/IE groups.

9.1.4 Assigned Criticality

The Assigned Criticality column provides the actual criticality information as defined in subclause 10.3.2, if applicable.

9.2 Message Functional Definition and Content

9.2.1 PDU Session Management Messages

9.2.1.1 PDU SESSION RESOURCE SETUP REQUEST

This message is sent by the AMF and is used to request the NG-RAN node to assign resources on Uu and NG-U for one or several PDU session resources.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
RAN Paging Priority	O		9.3.3.15		YES	ignore
NAS-PDU	O		9.3.3.4		YES	reject
PDU Session Resource Setup Request List		1			YES	reject
>PDU Session Resource Setup Request Item		1..<maxno ofPDUSessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session NAS-PDU	O		NAS-PDU 9.3.3.4		-	
>>S-NSSAI	M		9.3.1.24		-	
>>PDU Session Resource Setup Request Transfer	M		OCTET STRING	Containing the <i>PDU Session Resource Setup Request Transfer</i> IE specified in subclause 9.3.4.1.	-	

Range bound	Explanation
maxnoofPDUSessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.1.2 PDU SESSION RESOURCE SETUP RESPONSE

This message is sent by the NG-RAN node as a response to the request to assign resources on Uu and NG-U for one or several PDU session resources.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
PDU Session Resource Setup Response List		0..1			YES	ignore
>PDU Session Resource Setup Response Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Setup Response Transfer	M		OCTET STRING	Containing the <i>PDU Session Resource Setup Response Transfer</i> IE specified in subclause 9.3.4.2.	-	
PDU Session Resource Failed to Setup List		0..1			YES	ignore
>PDU Session Resource Failed to Setup Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Setup Unsuccessful Transfer	M		OCTET STRING	Containing the <i>PDU Session Resource Setup Unsuccessful Transfer</i> IE specified in subclause 9.3.4.16.	-	
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.1.3 PDU SESSION RESOURCE RELEASE COMMAND

This message is sent by the AMF and is used to request the NG-RAN node to release already established PDU session resources for a given UE.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
RAN Paging Priority	O		9.3.3.15		YES	ignore
NAS-PDU	O		9.3.3.4		YES	ignore
PDU Session Resource to Release List		1			YES	reject
>PDU Session Resource to Release Item		1..<maxno ofPDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Release Command Transfer	M		OCTET STRING	Containing the <i>PDU Session Resource Release Command Transfer</i> IE specified in subclause 9.3.4.12.	-	

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.1.4 PDU SESSION RESOURCE RELEASE RESPONSE

This message is sent by the NG-RAN node as a response to the request to release already established PDU session resources for a given UE.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
PDU Session Resource Released List		1			YES	ignore
>PDU Session Resource Released Item		1..<maxno ofPDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Release Response Transfer	M		OCTET STRING	Containing the <i>PDU Session Resource Release Response Transfer</i> IE specified in subclause 9.3.4.21.	-	
User Location Information	O		9.3.1.16		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.1.5 PDU SESSION RESOURCE MODIFY REQUEST

This message is sent by the AMF and is used to request the NG-RAN node to enable modifications of already established PDU session resources for a given UE.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
RAN Paging Priority	O		9.3.3.15		YES	ignore
PDU Session Resource Modify Request List		1			YES	reject
>PDU Session Resource Modify Request Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>NAS-PDU	O		9.3.3.4		-	
>>PDU Session Resource Modify Request Transfer	M		OCTET STRING	Containing the PDU Session Resource Modify Request Transfer IE specified in subclause 9.3.4.3.	-	

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.1.6 PDU SESSION RESOURCE MODIFY RESPONSE

This message is sent by the NG-RAN node and is used to report the outcome of the request from the PDU SESSION RESOURCE MODIFY REQUEST message.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
PDU Session Resource Modify Response List		0..1			YES	ignore
>PDU Session Resource Modify Response Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Modify Response Transfer	M		OCTET STRING	Containing the <i>PDU Session Resource Modify Response Transfer</i> IE specified in subclause 9.3.4.4.	-	
PDU Session Resource Failed to Modify List		0..1			YES	ignore
>PDU Session Resource Failed to Modify Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Modify Unsuccessful Transfer	M		OCTET STRING	Containing the <i>PDU Session Resource Modify Unsuccessful Transfer</i> IE specified in subclause 9.3.4.17.	-	
User Location Information	O		9.3.1.16		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.1.7 PDU SESSION RESOURCE NOTIFY

This message is sent by the NG-RAN node to notify that the QoS requirements of already established GBR QoS flow(s) for which notification control has been requested are either not fulfilled anymore or fulfilled again by the NG-RAN node. This message can also be sent by the NG-RAN node to notify that PDU session resource(s) for a given UE are released.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
PDU Session Resource Notify List		0..1			YES	reject
>PDU Session Resource Notify Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Notify Transfer	M		OCTET STRING	Containing the PDU Session Resource Notify Transfer IE specified in subclause 9.3.4.5.	-	
PDU Session Resource Released List		0..1			YES	ignore
>PDU Session Resource Released Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Notify Released Transfer	M		OCTET STRING	Containing the PDU Session Resource Notify Released Transfer IE specified in subclause 9.3.4.13.	-	
User Location Information	O		9.3.1.16		YES	ignore

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.1.8 PDU SESSION RESOURCE MODIFY INDICATION

This message is sent by the NG-RAN node and is used to request the AMF to enable modifications of already established PDU session resources for a given UE.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
PDU Session Resource Modify Indication List		1			YES	reject
>PDU Session Resource Modify Indication Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Modify Indication Transfer	M		OCTET STRING	Containing the PDU Session Resource Modify Indication Transfer IE specified in subclause 9.3.4.6.	-	

Range bound	Explanation
maxnoofPDUSessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.1.9 PDU SESSION RESOURCE MODIFY CONFIRM

This message is sent by the AMF and is used to confirm the outcome of the request from the PDU SESSION RESOURCE MODIFY INDICATION message.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
PDU Session Resource Modify Confirm List		1			YES	ignore
>PDU Session Resource Modify Confirm Item		1..<maxno ofPDUSessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Modify Confirm Transfer	M		OCTET STRING	Containing the <i>PDU Session Resource Modify Confirm Transfer</i> IE specified in subclause 9.3.4.7.	-	
PDU Session Resource Failed to Modify List		0..1			YES	ignore
>PDU Session Resource Failed to Modify Item		1..<maxno ofPDUSessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Modify Indication Unsuccessful Transfer	M		OCTET STRING	Containing the <i>PDU Session Resource Modify Indication Unsuccessful Transfer</i> IE specified in subclause 9.3.4.22.	-	
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofPDUSessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.2 UE Context Management Messages

9.2.2.1 INITIAL CONTEXT SETUP REQUEST

This message is sent by the AMF to request the setup of a UE context.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
Old AMF	O		AMF Name 9.3.3.22		YES	reject
UE Aggregate Maximum Bit Rate	C-ifPDUsessionResourceSetup		9.3.1.58		YES	reject
Core Network Assistance Information	O		9.3.1.15		YES	ignore
GUAMI	M		9.3.3.3		YES	reject
PDU Session Resource Setup Request List		0..1			YES	reject
>PDU Session Resource Setup Request Item		1..<maxno ofPDUsessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>NAS-PDU	O		9.3.3.4		-	
>>S-NSSAI	M		9.3.1.24		-	
>>PDU Session Resource Setup Request Transfer	M		OCTET STRING	Containing the <i>PDU Session Resource Setup Request Transfer</i> IE specified in subclause 9.3.4.1.	-	
Allowed NSSAI	M		9.3.1.31	Indicates the S-NSSAIs permitted by the network	YES	reject
UE Security Capabilities	M		9.3.1.86		YES	reject
Security Key	M		9.3.1.87		YES	reject
Trace Activation	O		9.3.1.14		YES	ignore
Mobility Restriction List	O		9.3.1.85		YES	ignore
UE Radio Capability	O		9.3.1.74		YES	ignore
Index to RAT/Frequency Selection Priority	O		9.3.1.61		YES	ignore
Masked IMEISV	O		9.3.1.54		YES	ignore
NAS-PDU	O		9.3.3.4		YES	ignore
Emergency Fallback Indicator	O		9.3.1.26		YES	reject
RRC Inactive Transition Report Request	O		9.3.1.91		YES	ignore
UE Radio Capability for Paging	O		9.3.1.68		YES	ignore

Range bound	Explanation
maxnoofPDUsessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

Condition	Explanation
ifPDUsessionResourceSetup	This IE shall be present if the <i>PDU Session Resource Setup List</i> IE is present.

9.2.2.2 INITIAL CONTEXT SETUP RESPONSE

This message is sent by the NG-RAN node to confirm the setup of a UE context.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
PDU Session Resource Setup Response List		0..1			YES	ignore
>PDU Session Resource Setup Response Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Setup Response Transfer	M		OCTET STRING	Containing the <i>PDU Session Resource Setup Response Transfer</i> IE specified in subclause 9.3.4.2.	-	
PDU Session Resource Failed to Setup List		0..1			YES	ignore
>PDU Session Resource Failed to Setup Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Setup Unsuccessful Transfer	M		OCTET STRING	Containing the <i>PDU Session Resource Setup Unsuccessful Transfer</i> IE specified in subclause 9.3.4.16.	-	
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.2.3 INITIAL CONTEXT SETUP FAILURE

This message is sent by the NG-RAN node to indicate that the setup of the UE context was unsuccessful.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
PDU Session Resource Failed to Setup List		0..1			YES	ignore
>PDU Session Resource Failed to Setup Item		1..<maxno ofPDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>PDU Session Resource Setup Unsuccessful Transfer	M		OCTET STRING	Containing the <i>PDU Session Resource Setup Unsuccessful Transfer</i> IE specified in subclause 9.3.4.16.	-	
Cause	M		9.3.1.2		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.2.4 UE CONTEXT RELEASE REQUEST

This message is sent by the NG-RAN node to request the release of the UE-associated logical NG-connection over the NG interface.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
PDU Session Resource List		0..1			YES	reject
>PDU Session Resource Item		1..<maxno ofPDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
Cause	M		9.3.1.2		YES	ignore

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.2.5 UE CONTEXT RELEASE COMMAND

This message is sent by the AMF to request the release of the UE-associated logical NG-connection over the NG interface.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
CHOICE UE NGAP IDs	M				YES	reject
>UE NGAP ID pair						
>>AMF UE NGAP ID	M		9.3.3.1		-	
>>RAN UE NGAP ID	M		9.3.3.2		-	
>AMF UE NGAP ID						
>>AMF UE NGAP ID	M		9.3.3.1		-	
Cause	M		9.3.1.2		YES	ignore

9.2.2.6 UE CONTEXT RELEASE COMPLETE

This message is sent by the NG-RAN node to confirm the release of the UE-associated logical NG-connection over the NG interface.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
User Location Information	O		9.3.1.16		YES	ignore
Information on Recommended Cells and RAN Nodes for Paging	O		9.3.1.100		YES	ignore
PDU Session Resource List		0..1			YES	reject
>PDU Session Resource Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.2.7 UE CONTEXT MODIFICATION REQUEST

This message is sent by the AMF to provide UE Context information changes to the NG-RAN node.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
RAN Paging Priority	O		9.3.3.15		YES	ignore
Security Key	O		9.3.1.87		YES	reject
Index to RAT/Frequency Selection Priority	O		9.3.1.61		YES	ignore
UE Aggregate Maximum Bit Rate	O		9.3.1.58		YES	ignore
UE Security Capabilities	O		9.3.1.86		YES	reject
Core Network Assistance Information	O		9.3.1.15		YES	ignore
Emergency Fallback Indicator	O		9.3.1.26		YES	reject
New AMF UE NGAP ID	O		AMF UE NGAP ID 9.3.3.1		YES	ignore
RRC Inactive Transition Report Request	O		9.3.1.91		YES	ignore

9.2.2.8 UE CONTEXT MODIFICATION RESPONSE

This message is sent by the NG-RAN node to confirm the performed UE context updates.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
RRC State	O		9.3.1.92		YES	ignore
User Location Information	O		9.3.1.16		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.2.9 UE CONTEXT MODIFICATION FAILURE

This message is sent by the NG-RAN node in case the performed UE context update is not successful.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
Cause	M		9.3.1.2		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.2.10 RRC INACTIVE TRANSITION REPORT

This message is sent by the NG-RAN node to notify the 5GC the UE enters or leaves RRC_INACTIVE state.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
RRC State	M		9.3.1.92		YES	ignore
User Location Information	M		9.3.1.16		YES	ignore

9.2.3 UE Mobility Management Messages

9.2.3.1 HANDOVER REQUIRED

This message is sent by the source NG-RAN node to the AMF to request the preparation of resources at the target.

Direction: NG-RAN node → AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
Handover Type	M		9.3.1.22		YES	reject
Cause	M		9.3.1.2		YES	ignore
Target ID	M		9.3.1.25		YES	reject
Direct Forwarding Path Availability	O		9.3.1.64		YES	ignore
PDU Session Resource List		1			YES	reject
>PDU Session Resource Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>Handover Required Transfer	M		OCTET STRING	Containing the <i>Handover Required Transfer</i> IE specified in subclause 9.3.4.14.	-	
Source to Target Transparent Container	M		9.3.1.20		YES	reject

Range bound	Explanation
maxnoofPDUSessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.3.2 HANDOVER COMMAND

This message is sent by the AMF to inform the source NG-RAN node that resources for the handover have been prepared at the target side.

Direction: AMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
Handover Type	M		9.3.1.22		YES	reject
NAS Security Parameters from NG-RAN	C-iftoEPS		9.3.3.26	The NG-RAN node shall use this IE as specified in TS 33.501 [13].	YES	reject
PDU Session Resource Handover List		1			YES	ignore
>PDU Session Resource Handover Item		1..<maxno ofPDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>Handover Command Transfer	M		OCTET STRING	Containing the <i>Handover Command Transfer</i> IE specified in subclause 9.3.4.10.	-	
PDU Session Resource to Release List		0..1			YES	ignore
>PDU Session Resource to Release Item		1..<maxno ofPDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>Handover Preparation Unsuccessful Transfer	M		OCTET STRING	Containing the <i>Handover Preparation Unsuccessful Transfer</i> IE specified in subclause 9.3.4.18.	-	
Target to Source Transparent Container	M		9.3.1.21		YES	reject
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

Condition	Explanation
iftoEPS	This IE shall be present if the <i>Handover Type</i> IE is set to the value "5GStoEPS".

9.2.3.3 HANDOVER PREPARATION FAILURE

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

Direction: AMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
Cause	M		9.3.1.2		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.3.4 HANDOVER REQUEST

This message is sent by the AMF to the target NG-RAN node to request the preparation of resources.

Direction: AMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	reject
Handover Type	M		9.3.1.22		YES	reject
Cause	M		9.3.1.2		YES	ignore
UE Aggregate Maximum Bit Rate	M		9.3.1.58		YES	reject
Core Network Assistance Information	O		9.3.1.15		YES	ignore
UE Security Capabilities	M		9.3.1.86		YES	reject
Security Context	M		9.3.1.88		YES	reject
New Security Context Indicator	O		9.3.1.55		YES	reject
NASC	O		NAS-PDU 9.3.3.4	Containing either the "Intra N1 mode NAS transparent container" or the "S1 mode to N1 mode NAS transparent container" specified in TS 24.501 [26].	YES	reject
PDU Session Resource Setup List		1			YES	reject
>PDU Session Resource Setup Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>S-NSSAI	M		9.3.1.24		-	
>>Handover Request Transfer	M		OCTET STRING	Containing the PDU Session Resource Setup Request Transfer IE specified in subclause 9.3.4.1.	-	
Allowed NSSAI	M		9.3.1.31	Indicates the S-NSSAIs permitted by the network.	YES	reject
Trace Activation	O		9.3.1.14		YES	ignore
Masked IMEISV	O		9.3.1.54		YES	ignore
Source to Target Transparent Container	M		9.3.1.20		YES	reject
Mobility Restriction List	O		9.3.1.85		YES	ignore
Location Reporting Request Type	O		9.3.1.65		YES	ignore
RRC Inactive Transition Report Request	O		9.3.1.91		YES	ignore
GUAMI	M		9.3.3.3		YES	reject

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.3.5 HANDOVER REQUEST ACKNOWLEDGE

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

Direction: NG-RAN node → AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2	Allocated at the target NG-RAN node.	YES	ignore
PDU Session Resource Admitted List		1			YES	ignore
>PDU Session Resource Admitted Item		1..<maxno ofPDUSessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>Handover Request Acknowledge Transfer	M		OCTET STRING	Containing the <i>Handover Request Acknowledge Transfer</i> IE specified in subclause 9.3.4.11.	-	
PDU Session Resource Failed to Setup List		0..1			YES	ignore
>PDU Session Resource Failed to Setup Item		1..<maxno ofPDUSessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>Handover Resource Allocation Unsuccessful Transfer	M		OCTET STRING	Containing the <i>Handover Resource Allocation Unsuccessful Transfer</i> IE specified in subclause 9.3.4.19.	-	
Target to Source Transparent Container	M		9.3.1.21		YES	reject
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofPDUSessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.3.6 HANDOVER FAILURE

This message is sent by the target NG-RAN node to inform the AMF that the preparation of resources has failed.

Direction: NG-RAN node → AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
Cause	M		9.3.1.2		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.3.7 HANDOVER NOTIFY

This message is sent by the target NG-RAN node to inform the AMF that the UE has been identified in the target cell and the handover has been completed.

Direction: NG-RAN node → AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
User Location Information	M		9.3.1.16		YES	ignore

9.2.3.8 PATH SWITCH REQUEST

This message is sent by the NG-RAN node to inform the AMF of the new serving NG-RAN node and to transfer some NG-U DL tunnel termination point(s) to the SMF via the AMF for one or multiple PDU session resources.

Direction: NG-RAN node → AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
Source AMF UE NGAP ID	M		AMF UE NGAP ID 9.3.3.1		YES	reject
User Location Information	M		9.3.1.16		YES	ignore
UE Security Capabilities	M		9.3.1.86		YES	ignore
PDU Session Resource to be Switched in Downlink List		1			YES	reject
>PDU Session Resource to be Switched in Downlink Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>Path Switch Request Transfer	M		OCTET STRING	Containing the <i>Path Switch Request Transfer</i> IE specified in subclause 9.3.4.8.	-	
PDU Session Resource Failed to Setup List		0..1			YES	ignore
>PDU Session Resource Failed to Setup Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>Path Switch Request Setup Failed Transfer	M		OCTET STRING	Containing the <i>Path Switch Request Setup Failed Transfer</i> IE specified in subclause 9.3.4.15.	-	

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.3.9 PATH SWITCH REQUEST ACKNOWLEDGE

This message is sent by the AMF to inform the NG-RAN node that the path switch has been successfully completed in the 5GC.

Direction: AMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
UE Security Capabilities	O		9.3.1.86		YES	reject
Security Context	M		9.3.1.88		YES	reject
New Security Context Indicator	O		9.3.1.55		YES	reject
PDU Session Resource Switched List		1			YES	ignore
>PDU Session Resource Switched Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>Path Switch Request Acknowledge Transfer	M		OCTET STRING	Containing the <i>Path Switch Request Acknowledge Transfer</i> IE specified in subclause 9.3.4.9.	-	
PDU Session Resource Released List		0..1			YES	ignore
>PDU Session Resource Released Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>Path Switch Request Unsuccessful Transfer	M		OCTET STRING	Containing the <i>Path Switch Request Unsuccessful Transfer</i> IE specified in subclause 9.3.4.20.	-	
Allowed NSSAI	M		9.3.1.31	Indicates the S-NSSAIs permitted by the network.	YES	reject
Core Network Assistance Information	O		9.3.1.15		YES	ignore
RRC Inactive Transition Report Request	O		9.3.1.91		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.3.10 PATH SWITCH REQUEST FAILURE

This message is sent by the AMF to inform the NG-RAN node that a failure has occurred in the 5GC during the Path Switch Request procedure.

Direction: AMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
PDU Session Resource Released List		1			YES	ignore
>PDU Session Resource Released Item		1..<maxno of PDU Sessions>			-	
>>PDU Session ID	M		9.3.1.50		-	
>>Path Switch Request Unsuccessful Transfer	M		OCTET STRING	Containing the PDU session <i>Path Switch Request Unsuccessful Transfer</i> IE specified in subclause 9.3.4.20.	-	
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.

9.2.3.11 HANDOVER CANCEL

This message is sent by the source NG-RAN node to the AMF to request the cancellation of an ongoing handover.

Direction: NG-RAN node → AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
Cause	M		9.3.1.2		YES	ignore

9.2.3.12 HANDOVER CANCEL ACKNOWLEDGE

This message is sent by the AMF to the source NG-RAN node to confirm that the ongoing handover was cancelled.

Direction: AMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.3.13 UPLINK RAN STATUS TRANSFER

Direction: NG-RAN node → AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
RAN Status Transfer Transparent Container	M		9.3.1.108		YES	reject

9.2.3.14 DOWNLINK RAN STATUS TRANSFER

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
RAN Status Transfer Transparent Container	M		9.3.1.108		YES	reject

9.2.4 Paging Messages

9.2.4.1 PAGING

This message is sent by the AMF and is used to page a UE in one or several tracking areas.

Direction: AMF → gNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
UE Paging Identity	M		9.3.3.18		YES	ignore
Paging DRX	O		9.3.1.90		YES	ignore
TAI List for Paging		1			YES	ignore
>TAI List for Paging Item		1..<maxno ofTAIforPaging>			-	
>>TAI	M		9.3.3.11		-	
Paging Priority	O		9.3.1.78		YES	ignore
UE Radio Capability for Paging	O		9.3.1.68		YES	ignore
Assistance Data for Paging	O		9.3.1.69		YES	ignore
Paging Origin	O		9.3.3.22		YES	ignore

Range bound	Explanation
maxnoofTAIforPaging	Maximum no. of TAIs for paging. Value is 16.

9.2.5 NAS Transport Messages

9.2.5.1 INITIAL UE MESSAGE

This message is sent by the NG-RAN node to transfer the initial layer 3 message to the AMF over the NG interface.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	reject
NAS-PDU	M		9.3.3.4		YES	reject
User Location Information	M		9.3.1.16		YES	reject
RRC Establishment Cause	M		9.3.1.111		YES	ignore
5G-S-TMSI	O		9.3.3.20		YES	reject
AMF Set ID	O		9.3.3.12		YES	ignore
UE Context Request	O		ENUMERATED (requested, ...)	Indicates that a UE context including security information needs to be setup at the NG-RAN.	YES	ignore
Allowed NSSAI	O		9.3.1.31		YES	reject

9.2.5.2 DOWNLINK NAS TRANSPORT

This message is sent by the AMF and is used for carrying NAS information over the NG interface.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
Old AMF	O		AMF Name 9.3.3.22		YES	reject
RAN Paging Priority	O		9.3.3.15		YES	ignore
NAS-PDU	M		9.3.3.4		YES	reject
Mobility Restriction List	O		9.3.1.85		YES	ignore
Index to RAT/Frequency Selection Priority	O		9.3.1.61		YES	ignore
UE Aggregate Maximum Bit Rate	O		9.3.1.58		YES	ignore
Allowed NSSAI	O		9.3.1.31	Indicates the S-NSSAIs permitted by the network.	YES	reject

9.2.5.3 UPLINK NAS TRANSPORT

This message is sent by the NG-RAN node and is used for carrying NAS information over the NG interface.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
NAS-PDU	M		9.3.3.4		YES	reject
User Location Information	M		9.3.1.16		YES	ignore

9.2.5.4 NAS NON DELIVERY INDICATION

This message is sent by the NG-RAN node and is used for reporting the non-delivery of a NAS PDU previously received within a DOWNLINK NAS TRANSPORT message over the NG interface.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
NAS-PDU	M		9.3.3.4		YES	ignore
Cause	M		9.3.1.2		YES	ignore

9.2.5.5 REROUTE NAS REQUEST

This message is sent by the AMF in order to request for a rerouting of the INITIAL UE MESSAGE to another AMF.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
AMF UE NGAP ID	O		9.3.3.1		YES	ignore
NGAP Message	M		OCTET STRING	Contains the INITIAL UE MESSAGE	YES	reject
AMF Set ID	M		9.3.3.12		YES	reject
Allowed NSSAI	O		9.3.1.31		YES	reject

9.2.6 Interface Management Messages

9.2.6.1 NG SETUP REQUEST

This message is sent by the NG-RAN node to transfer application layer information for an NG-C interface instance.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Global RAN Node ID	M		9.3.1.5		YES	reject
RAN Node Name	O		PrintableString (SIZE(1..150, ...))		YES	ignore
Supported TA List		1		Supported TAs in the NG-RAN node.	YES	reject
>Supported TA Item		1..<maxno ofTACs>			-	
>>TAC	M		9.3.3.10	Broadcast TAC	-	
>>Broadcast PLMN List		1			-	
>>>Broadcast PLMN Item		1..<maxno ofBPLMNs >			-	
>>>>PLMN Identity	M		9.3.3.5	Broadcast PLMN	-	
>>>>TAI Slice Support List	M		Slice Support List 9.3.1.17	Supported S-NSSAIs per TA.	-	
Default Paging DRX	M		Paging DRX 9.3.1.90		YES	ignore

Range bound	Explanation
maxnoofTACs	Maximum no. of TACs. Value is 256.
maxnoofBPLMNs	Maximum no. of Broadcast PLMNs. Value is 12.

9.2.6.2 NG SETUP RESPONSE

This message is sent by the AMF to transfer application layer information for an NG-C interface instance.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF Name	M		9.3.3.21		YES	reject
Served GUAMI List		1			YES	reject
>Served GUAMI Item		1..<maxno ofServedG UAMIs>			-	
>>GUAMI	M		9.3.3.3		-	
>>Backup AMF Name	O		AMF Name 9.3.3.21		-	
Relative AMF Capacity	M		9.3.1.32		YES	ignore
PLMN Support List		1			YES	reject
>PLMN Support Item		1..<maxno ofPLMNs>			-	
>>PLMN Identity	M		9.3.3.5		-	
>>Slice Support List	M		9.3.1.17	Supported S-NSSAIs per PLMN	-	
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofServedGUAMIs	Maximum no. of GUAMIs served by an AMF. Value is 256.
maxnoofPLMNs	Maximum no. of PLMNs per message. Value is 12.

9.2.6.3 NG SETUP FAILURE

This message is sent by the AMF to indicate NG setup failure.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Cause	M		9.3.1.2		YES	ignore
Time to Wait	O		9.3.1.56		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.6.4 RAN CONFIGURATION UPDATE

This message is sent by the NG-RAN node to transfer updated application layer information for an NG-C interface instance.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
RAN Node Name	O		PrintableString (SIZE(1..150, ...))		YES	ignore
Supported TA List		0..1		Supported TAs in the NG-RAN node.	YES	reject
>Supported TA Item		1..<maxno ofTACs>			-	
>>TAC	M		9.3.3.10	Broadcast TAC	-	
>>>Broadcast PLMN List		1			-	
>>>>Broadcast PLMN Item		1..<maxno ofBPLMNs >			-	
>>>>PLMN Identity	M		9.3.3.5	Broadcast PLMN	-	
>>>>TAI Slice Support List	M		Slice Support List 9.3.1.17	Supported S-NSSAIs per TA.	-	
Default Paging DRX	O		Paging DRX 9.3.1.90		YES	ignore

Range bound	Explanation
<i>maxnoofTACs</i>	Maximum no. of TACs. Value is 256.
<i>maxnoofBPLMNs</i>	Maximum no. of Broadcast PLMNs. Value is 12.

9.2.6.5 RAN CONFIGURATION UPDATE ACKNOWLEDGE

This message is sent by the AMF to acknowledge the NG-RAN node transfer of updated information for an NG-C interface instance.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.6.6 RAN CONFIGURATION UPDATE FAILURE

This message is sent by the AMF to indicate RAN configuration update failure.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Cause	M		9.3.1.2		YES	ignore
Time to Wait	O		9.3.1.56		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.6.7 AMF CONFIGURATION UPDATE

This message is sent by the AMF to transfer updated information for an NG-C interface instance.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF Name	O		9.3.3.21		YES	reject
Served GUAMI List		0..1			YES	reject
>Served GUAMI Item		1..<maxno ofServedGUAMIs>			-	
>>GUAMI	M		9.3.3.3		-	
>>Backup AMF Name	O		AMF Name 9.3.3.21		-	
Relative AMF Capacity	O		9.3.1.32		YES	ignore
PLMN Support List		0..1			YES	reject
>PLMN Support Item		1..<maxno ofPLMNs>			-	
>>PLMN Identity	M		9.3.3.5		-	
>>Slice Support List	M		9.3.1.17	Supported S-NSSAIs per PLMN	-	
AMF TNL Association to Add List		0..1			YES	ignore
>AMF TNL Association to Add Item		1..<maxno ofTNLAAssociations>			-	
>>AMF TNL Association Address	M		CP Transport Layer Information 9.3.2.6	AMF Transport Layer information used to set up the new TNL association.	-	
>>TNL Association Usage	O		9.3.2.9		-	
>>TNL Address Weight Factor	M		9.3.2.10		-	
AMF TNL Association to Remove List		0..1			YES	ignore
>AMF TNL Association to Remove Item		1..<maxno ofTNLAAssociations>			-	
>>AMF TNL Association Address	M		CP Transport Layer Information 9.3.2.6	AMF Transport Layer information used to identify the TNL association to be removed.	-	
AMF TNL Association to Update List		0..1			YES	ignore
>AMF TNL Association to Update Item		1..<maxno ofTNLAAssociations>			-	
>>AMF TNL Association Address	M		CP Transport Layer Information 9.3.2.6	AMF Transport Layer information used to identify the TNL association to be updated.	-	
>>TNL Association Usage	O		9.3.2.9		-	
>>TNL Address Weight Factor	O		9.3.2.10		-	

Range bound	Explanation
maxnoofServedGUAMIs	Maximum no. of GUAMIs served by an AMF. Value is 256.
maxnoofPLMNs	Maximum no. of PLMNs per message. Value is 12.
maxnoofTNLAAssociations	Maximum no. of TNL Associations between the NG-RAN node and the AMF. Value is 32.

9.2.6.8 AMF CONFIGURATION UPDATE ACKNOWLEDGE

This message is sent by the NG-RAN node to acknowledge the AMF transfer of updated information for an NG-C interface instance.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF TNL Association Setup List		0..1			YES	ignore
>AMF TNL Association Setup Item		1..<maxno ofTNLAassociations>			-	
>>AMF TNL Association Address	M		CP Transport Layer Information 9.3.2.6	Previously received AMF Transport Layer information for the TNL association.	-	
AMF TNL Association Failed to Setup List	O		TNL Association List 9.3.2.7		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofTNLAassociations	Maximum no. of TNL Associations between the NG-RAN node and the AMF. Value is 32.

9.2.6.9 AMF CONFIGURATION UPDATE FAILURE

This message is sent by the NG-RAN node to indicate AMF configuration update failure.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Cause	M		9.3.1.2		YES	ignore
Time to Wait	O		9.3.1.56		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.6.10 AMF STATUS INDICATION

This message is sent by the AMF to support AMF management functions.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
Unavailable GUAMI List		1		Indicates the GUAMIs configured to be unavailable at the AMF	YES	reject
>Unavailable GUAMI Item		1..<maxno ofServedGUAMIs>			-	
>>GUAMI	M		9.3.3.3		-	
>>Timer Approach for GUAMI Removal	O		ENUMERATED (apply timer, ...)		-	
>>Backup AMF Name	O		AMF Name 9.3.3.21		-	

Range bound	Explanation
maxnoofServedGUAMIs	Maximum no. of GUAMIs served by an AMF. Value is 256.

9.2.6.11 NG RESET

This message is sent by both the NG-RAN node and the AMF to request that the NG interface, or parts of the NG interface, be reset.

Direction: NG-RAN node → AMF and AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Cause	M		9.3.1.2		YES	ignore
CHOICE <i>Reset Type</i>	M				YES	reject
>NG interface						
>>Reset All	M		ENUMERATED (Reset all, ...)		-	
>Part of NG interface						
>>UE-associated Logical NG-connection List	M		9.3.3.25		-	

9.2.6.12 NG RESET ACKNOWLEDGE

This message is sent by both the NG-RAN node and the AMF as a response to an NG RESET message.

Direction: NG-RAN node → AMF and AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
UE-associated Logical NG-connection List	O		9.3.3.25		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.6.13 ERROR INDICATION

This message is sent by both the NG-RAN node and the AMF to indicate that some error has been detected in the node.

Direction: NG-RAN node → AMF and AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	O		9.3.3.1		YES	ignore
RAN UE NGAP ID	O		9.3.3.2		YES	ignore
Cause	O		9.3.1.2		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.6.14 OVERLOAD START

This message is sent by the AMF and is used to indicate to the NG-RAN node that the AMF is overloaded.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF Overload Response	O		Overload Response 9.3.1.104		YES	reject
AMF Traffic Load Reduction Indication	O		Traffic Load Reduction Indication 9.3.1.106		YES	ignore
Overload Start NSSAI List		<i>0..1</i>			YES	ignore
>Overload Start NSSAI Item		<i>1..<maxno ofSliceltems></i>			-	
>>Slice Overload List	M		9.3.1.107		-	
>>Slice Overload Response	O		Overload Response 9.3.1.104		-	
>>Slice Traffic Load Reduction Indication	O		Traffic Load Reduction Indication 9.3.1.106		-	

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

9.2.6.15 OVERLOAD STOP

This message is sent by the AMF and is used to indicate that the AMF is no longer overloaded.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject

9.2.7 Configuration Transfer Messages

9.2.7.1 UPLINK RAN CONFIGURATION TRANSFER

This message is sent by the NG-RAN node in order to transfer RAN configuration information.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
SON Configuration Transfer	O		9.3.3.6		YES	ignore

9.2.7.2 DOWNLINK RAN CONFIGURATION TRANSFER

This message is sent by the AMF in order to transfer RAN configuration information.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
SON Configuration Transfer	O		9.3.3.6		YES	ignore

9.2.8 Warning Message Transmission Messages

9.2.8.1 WRITE-REPLACE WARNING REQUEST

This message is sent by the AMF to request the start or overwrite of the broadcast of a warning message.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Message Identifier	M		9.3.1.35		YES	reject
Serial Number	M		9.3.1.36		YES	reject
Warning Area List	O		9.3.1.37		YES	ignore
Repetition Period	M		9.3.1.49		YES	reject
Number of Broadcasts Requested	M		9.3.1.38		YES	reject
Warning Type	O		9.3.1.39		YES	ignore
Warning Security Information	O		9.3.1.40		YES	ignore
Data Coding Scheme	O		9.3.1.41		YES	ignore
Warning Message Contents	O		9.3.1.42		YES	ignore
Concurrent Warning Message Indicator	O		9.3.1.46		YES	reject
Warning Area Coordinates	O		9.3.1.112		YES	ignore

9.2.8.2 WRITE-REPLACE WARNING RESPONSE

This message is sent by the NG-RAN node to acknowledge the AMF on the start or overwrite request of a warning message.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Message Identifier	M		9.3.1.35		YES	reject
Serial Number	M		9.3.1.36		YES	reject
Broadcast Completed Area List	O		9.3.1.43		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.8.3 PWS CANCEL REQUEST

This message is forwarded by the AMF to the NG-RAN node to cancel an already ongoing broadcast of a warning message.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Message Identifier	M		9.3.1.35		YES	reject
Serial Number	M		9.3.1.36		YES	reject
Warning Area List	O		9.3.1.37		YES	ignore
Cancel-All Warning Messages Indicator	O		9.3.1.47		YES	reject

9.2.8.4 PWS CANCEL RESPONSE

This message is sent by the NG-RAN node to indicate the list of warning areas where cancellation of the broadcast of the identified message was successful and unsuccessful.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Message Identifier	M		9.3.1.35		YES	reject
Serial Number	M		9.3.1.36		YES	reject
Broadcast Cancelled Area List	O		9.3.1.44		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.8.5 PWS RESTART INDICATION

This message is sent by the NG-RAN node to inform the AMF that PWS information for some or all cells of the NG-RAN node are available for reloading from the CBC if needed.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
CHOICE <i>Cell List for Restart</i>	M				YES	reject
>E-UTRA						
>>E-UTRA Cell List for Restart		1..<maxno ofCellsinngeNB>			-	
>>>E-UTRA CGI	M		9.3.1.9		-	
>NR						
>>NR Cell List for Restart		1..<maxno ofCellsingNB>			-	
>>>NR CGI	M		9.3.1.7		-	
Global RAN Node ID	M		9.3.1.5		YES	reject
TAI List for Restart		1..<maxno ofTAIforRestart>			YES	reject
>TAI	M		9.3.3.11		-	
Emergency Area ID List for Restart		0..<maxno ofEAIforRestart>			YES	reject
>Emergency Area ID	M		9.3.1.48		-	

Range bound	Explanation
maxnoofCellsinngeNB	Maximum no. of cells that can be served by an ng-eNB. Value is 256.
maxnoofCellsingNB	Maximum no. of cells that can be served by a gNB. Value is 16384.
maxnoofTAIforRestart	Maximum no. of TAIs subject for reloading warning message broadcast. Value is 2048.
maxnoofEAIforRestart	Maximum no. of Emergency Area IDs subject for reloading warning message broadcast. Value is 256.

9.2.8.6 PWS FAILURE INDICATION

This message is sent by the NG-RAN node to inform the AMF that ongoing PWS operation for one or more cells of the NG-RAN node has failed.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
CHOICE <i>PWS Failed Cell List</i>	M				YES	reject
>E-UTRA						
>>PWS Failed E-UTRA Cell List		1..<maxno ofCellsinngeNB>			-	
>>>E-UTRA CGI	M		9.3.1.9		-	
>NR						
>>PWS Failed NR Cell List		1..<maxno ofCellsingNB>			-	
>>>NR CGI	M		9.3.1.7		-	
Global RAN Node ID	M		9.3.1.5		YES	reject

Range bound	Explanation
maxnoofCellsinngeNB	Maximum no. of cells that can be served by an ng-eNB. Value is 256.
maxnoofCellsingNB	Maximum no. of cells that can be served by a gNB. Value is 16384.

9.2.9 NRPPa Transport Messages

9.2.9.1 DOWNLINK UE ASSOCIATED NRPPA TRANSPORT

This message is sent by the AMF and is used for carrying NRPPa message over the NG interface.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
Routing ID	M		9.3.3.13		YES	reject
NRPPa-PDU	M		9.3.3.14		YES	reject

9.2.9.2 UPLINK UE ASSOCIATED NRPPA TRANSPORT

This message is sent by the NG-RAN node and is used for carrying NRPPa message over the NG interface.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
Routing ID	M		9.3.3.13		YES	reject
NRPPa-PDU	M		9.3.3.14		YES	reject

9.2.9.3 DOWNLINK NON UE ASSOCIATED NRPPA TRANSPORT

This message is sent by the AMF and is used for carrying NRPPa message over the NG interface.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
Routing ID	M		9.3.3.13		YES	reject
NRPPa-PDU	M		9.3.3.14		YES	reject

9.2.9.4 UPLINK NON UE ASSOCIATED NRPPA TRANSPORT

This message is sent by the NG-RAN node and is used for carrying NRPPa message over the NG interface.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
Routing ID	M		9.3.3.13		YES	reject
NRPPa-PDU	M		9.3.3.14		YES	reject

9.2.10 Trace Messages

9.2.10.1 TRACE START

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

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
Trace Activation	M		9.3.1.14		YES	ignore

9.2.10.2 TRACE FAILURE INDICATION

This message is sent by the NG-RAN node to indicate that a Trace Start procedure or a Deactivate Trace procedure has failed for a UE.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
NG-RAN Trace ID	M		OCTET STRING (SIZE(8))	As per NG-RAN Trace ID in <i>Trace Activation</i> IE	YES	ignore
Cause	M		9.3.1.2		YES	ignore

9.2.10.3 DEACTIVATE TRACE

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

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
NG-RAN Trace ID	M		OCTET STRING (SIZE(8))	As per NG-RAN Trace ID in <i>Trace Activation</i> IE	YES	ignore

9.2.10.4 CELL TRAFFIC TRACE

This message is sent by the NG-RAN node to transfer trace specific information.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
NG-RAN Trace ID	M		OCTET STRING (SIZE(8))	This IE is composed of the following: Trace Reference defined in TS 32.422 [11] (leftmost 6 octets, with PLMN information encoded as in 9.3.3.5), and Trace Recording Session Reference defined in TS 32.422 [11] (last 2 octets).	YES	ignore
NG-RAN CGI	M		9.3.1.73		YES	ignore
Trace Collection Entity IP Address	M		Transport Layer Address 9.3.2.4	Defined in TS 32.422 [11]	YES	ignore

9.2.11 Location Reporting Messages

9.2.11.1 LOCATION REPORTING CONTROL

This message is used by the AMF to request the NG-RAN node to report the location of the UE.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
Location Reporting Request Type	M		9.3.1.65		YES	ignore

9.2.11.2 LOCATION REPORTING FAILURE INDICATION

This message is sent by the NG-RAN node and is used to indicate the failure of location reporting.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
Cause	M		9.3.1.2		YES	ignore

9.2.11.3 LOCATION REPORT

This message is used to provide the UE's location.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
User Location Information	M		9.3.1.16		YES	ignore
UE Presence in Area of Interest List	O		9.3.1.67		YES	ignore
Location Reporting Request Type	M		9.3.1.65	Contains the Location Reporting Request Type to which the Location Report refers.	YES	ignore

9.2.12 UE TNLA Binding Messages

9.2.12.1 UE TNLA BINDING RELEASE REQUEST

This message is sent by the AMF to request the NG-RAN node to release the TNLA binding for the respective UE.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject

9.2.13 UE Radio Capability Management Messages

9.2.13.1 UE RADIO CAPABILITY INFO INDICATION

This message is sent by the NG-RAN node to provide UE radio capability related information to the AMF.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
UE Radio Capability	M		9.3.1.74		YES	ignore
UE Radio Capability for Paging	O		9.3.1.68		YES	ignore

9.2.13.2 UE RADIO CAPABILITY CHECK REQUEST

This message is sent by the AMF to request the NG-RAN node to check the compatibility between the UE radio capabilities and network configuration on IMS voice.

Direction: AMF → NG-RAN node

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	reject
RAN UE NGAP ID	M		9.3.3.2		YES	reject
UE Radio Capability	O		9.3.1.74		YES	ignore

9.2.13.3 UE RADIO CAPABILITY CHECK RESPONSE

This message is sent by the NG-RAN node to report IMS voice compatibility between the UE radio capabilities and network configuration.

Direction: NG-RAN node → AMF

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
AMF UE NGAP ID	M		9.3.3.1		YES	ignore
RAN UE NGAP ID	M		9.3.3.2		YES	ignore
IMS Voice Support Indicator	M		9.3.1.89		YES	reject
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.3 Information Element Definitions

9.3.1 Radio Network Layer Related IEs

9.3.1.1 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, ...)	

9.3.1.2 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 (Unspecified, TXnRELOCOoverall expiry, Successful handover, Release due to NG-RAN generated reason, Release due to 5GC generated reason, Handover cancelled, Partial handover, Handover failure in target 5GC/NG-RAN node or target system, Handover target not allowed, TNGRELOCOoverall expiry, TNGRELOCPprep expiry, Cell not available, Unknown target ID, No radio resources available in target cell, Unknown local UE NGAP ID, Inconsistent remote UE NGAP ID, Handover desirable for radio reasons, Time critical handover, Resource optimisation handover, Reduce load in serving cell, User inactivity, Radio connection with UE lost, Radio resources not available, Invalid QoS combination, Failure in the radio interface procedure, Interaction with other procedure, Unknown PDU Session ID, Unknown QoS Flow ID, Multiple PDU Session ID Instances, Multiple QoS Flow ID Instances, Encryption and/or integrity protection algorithms not supported, NG intra-system handover triggered, NG inter-system handover triggered, Xn handover triggered, Not supported 5QI value, UE context transfer, IMS voice EPS fallback or RAT fallback triggered, UP integrity protection not possible, UP confidentiality protection not possible, Slice not supported, UE in RRC_INACTIVE state not reachable, Redirection, Resources not available for the slice(s), UE maximum integrity protected data rate reason, Release due to CN-detected mobility, ...)</p>	
>Transport Layer				

>>Transport Layer Cause	M		ENUMERATED (Transport resource unavailable, Unspecified, ...)	
<i>>NAS</i>				
>>NAS Cause	M		ENUMERATED (Normal release, Authentication failure, Deregister, Unspecified, ...)	
<i>>Protocol</i>				
>>Protocol Cause	M		ENUMERATED (Transfer syntax error, Abstract syntax error (reject), Abstract syntax error (ignore and notify), Message not compatible with receiver state, Semantic error, Abstract syntax error (falsely constructed message), Unspecified, ...)	
<i>>Miscellaneous</i>				
>>Miscellaneous Cause	M		ENUMERATED (Control processing overload, Not enough user plane processing resources, Hardware failure, O&M intervention, Unknown PLMN, Unspecified, ...)	

The meaning of the different cause values is described in the following tables. 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
Unspecified	Sent for radio network layer cause when none of the specified cause values applies.
TXnRELOCOverall expiry	The timer guarding the handover that takes place over Xn has abnormally expired.
Successful handover	Successful handover.
Release due to NG-RAN generated reason	Release is initiated due to NG-RAN generated reason.
Release due to 5GC generated reason	Release is initiated due to 5GC generated reason.
Handover cancelled	The reason for the action is cancellation of Handover.
Partial handover	Provides a reason for the handover cancellation. The HANDOVER COMMAND message from AMF contained <i>PDU Session Resource to Release List</i> IE or <i>QoS flow to Release List</i> 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.
Handover failure in target 5GC/ NG-RAN node or target system	The handover failed due to a failure in target 5GC/NG-RAN node or target system.
Handover target not allowed	Handover to the indicated target cell is not allowed for the UE in question.
TNGRELOCoverall expiry	The reason for the action is expiry of timer TNGRELOCoverall.
TNGRELOCprep expiry	Handover Preparation procedure is cancelled when timer TNGRELOCprep expires.
Cell not available	The concerned cell is not available.
Unknown target ID	Handover rejected because the target ID is not known to the AMF.
No radio resources available in target cell	Load on target cell is too high.
Unknown local UE NGAP ID	The action failed because the receiving node does not recognise the local UE NGAP ID.
Inconsistent remote UE NGAP ID	The action failed because the receiving node considers that the received remote UE NGAP ID is inconsistent.
Handover desirable for radio reasons	The reason for requesting handover is radio related.
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.
Resource optimisation handover	The reason for requesting handover is to improve the load distribution with the neighbour cells.
Reduce load in serving cell	Load on serving cell needs to be reduced. When applied to handover preparation, it indicates the handover is triggered due to load balancing.
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.
Radio connection with UE lost	The action is requested due to losing the radio connection to the UE.
Radio resources not available	No requested radio resources are available.
Invalid QoS combination	The action was failed because of invalid QoS combination.
Failure in the radio interface procedure	Radio interface procedure has failed.
Interaction with other procedure	The action is due to an ongoing interaction with another procedure.
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 PDU Session ID instances	The action failed because multiple instance of the same PDU Session had been provided to 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.
Encryption and/or integrity protection algorithms not supported	The NG-RAN node is unable to support any of the encryption and/or integrity protection algorithms supported by the UE.
NG intra-system handover triggered	The action is due to a NG intra-system handover that has been triggered.
NG inter-system handover triggered	The action is due to a NG inter-system handover that has been triggered.
Xn handover triggered	The action is due to an Xn handover that has been triggered.
Not supported 5QI value	The QoS flow setup failed because the requested 5QI is not supported.
UE context transfer	The action is due to a UE resumes from the NG-RAN node different from the one which sent the UE into RRC_INACTIVE state.
IMS voice EPS fallback or RAT fallback triggered	The setup of QoS flow is failed due to EPS fallback or RAT fallback for IMS voice using handover or redirection.
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.
Slice not supported	Slice not supported.

UE in RRC_INACTIVE state not reachable	The action is requested due to RAN paging failure.
Redirection	The release is requested due to inter-system redirection or intra-system redirection.
Resources not available for the slice(s)	The requested resources are not available for the slice(s).
UE maximum integrity protected data rate reason	The request is not accepted in order to comply with the maximum data rate for integrity protection supported by the UE.
Release due to CN-detected mobility	The context release is requested by the AMF because the UE is already served by another CN node (same or different system), or another NG interface of the same CN node.

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

NAS cause	Meaning
Normal release	The release is normal.
Authentication failure	The action is due to authentication failure.
Deregister	The action is due to deregister.
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	Control processing overload.
Not enough user plane processing resources	Not enough resources are available related to user plane processing.
Hardware failure	Action related to hardware failure.
O&M intervention	The action is due to O&M intervention.
Unknown PLMN	The AMF does not identify any PLMN provided by the NG-RAN node.
Unspecified failure	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, NAS or Protocol.

9.3.1.3 Criticality Diagnostics

The *Criticality Diagnostics* IE is sent by the NG-RAN node or the AMF 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.

For further details on how to use the *Criticality Diagnostics* IE, see clause 10.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Procedure Code	O		INTEGER (0..255)	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)	Used only if the Criticality Diagnostics is part of Error Indication procedure.
Procedure Criticality	O		ENUMERATED (reject, ignore, notify)	Used for reporting the Criticality of the Triggering message (Procedure).
Information Element Criticality Diagnostics		<i>0..<maxnoofErrors></i>		
>IE Criticality	M		ENUMERATED (reject, ignore, notify)	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
maxnoofErrors	Maximum no. of IE errors allowed to be reported with a single message. Value is 256.

9.3.1.4 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

9.3.1.5 Global RAN Node ID

This IE is used to globally identify an NG-RAN node (see TS 38.300 [8]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
<i>CHOICE NG-RAN node</i>	M			
> <i>gNB</i>				
>>Global gNB ID	M		9.3.1.6	
> <i>ng-eNB</i>				
>>Global ng-eNB ID	M		9.3.1.8	
> <i>N3IWF</i>				
>> Global N3IWF ID	M		9.3.1.57	

9.3.1.6 Global gNB ID

This IE is used to globally identify a gNB (see TS 38.300 [8]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.3.3.5	
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.

9.3.1.7 NR CGI

This IE is used to globally identify an NR cell (see TS 38.300 [8]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.3.3.5	
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 9.3.1.6).

9.3.1.8 Global ng-eNB ID

This IE is used to globally identify an ng-eNB (see TS 38.300 [8]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.3.3.5	
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.

9.3.1.9 E-UTRA CGI

This IE is used to globally identify an E-UTRA cell (see TS 36.300 [17]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.3.3.5	
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 9.3.1.8).

9.3.1.10 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 9.3.1.4	Maximum Bit Rate in DL. Details in TS 23.501 [9].
Maximum Flow Bit Rate Uplink	M		Bit Rate 9.3.1.4	Maximum Bit Rate in UL. Details in TS 23.501 [9].
Guaranteed Flow Bit Rate Downlink	M		Bit Rate 9.3.1.4	Guaranteed Bit Rate (provided there is data to deliver) in DL. Details in TS 23.501 [9].
Guaranteed Flow Bit Rate Uplink	M		Bit Rate 9.3.1.4	Guaranteed Bit Rate (provided there is data to deliver). Details in TS 23.501 [9].
Notification Control	O		ENUMERATED (notification requested, ...)	Details in TS 23.501 [9].
Maximum Packet Loss Rate Downlink	O		Packet Loss Rate 9.3.1.79	Indicates the maximum rate for lost packets that can be tolerated in the downlink direction. Details in TS 23.501 [9].
Maximum Packet Loss Rate Uplink	O		Packet Loss Rate 9.3.1.79	Indicates the maximum rate for lost packets that can be tolerated in the uplink direction. Details in TS 23.501 [9].

9.3.1.11 Void

9.3.1.12 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		9.3.1.28	
>Dynamic 5QI				
>>Dynamic 5QI Descriptor	M		9.3.1.18	
Allocation and Retention Priority	M		9.3.1.19	
GBR QoS Flow Information	O		9.3.1.10	This IE shall be present for GBR QoS Flows only.
Reflective QoS Attribute	O		ENUMERATED (subject to, ...)	Details in TS 23.501 [9]. This IE may be present in case of non-GBR QoS flows and shall be ignored otherwise.
Additional QoS Flow Information	O		ENUMERATED (more likely, ...)	This IE 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 QoS flows and shall be ignored otherwise.

9.3.1.13 QoS Flow List

This IE contains a list of QoS flows with a cause value. It is used for example to indicate failed QoS flow(s) or QoS flow(s) to be released.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
QoS Flow Item		<i>1..<maxnoofQoSFlows></i>		
>QoS Flow Identifier	M		9.3.1.51	
>Cause	M		9.3.1.2	

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

9.3.1.14 Trace Activation

This IE defines parameters related to a trace session 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 [11] (leftmost 6 octets, with PLMN information encoded as in 9.3.3.1), and Trace Recording Session Reference defined in TS 32.422 [11] (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 [11].
Trace Collection Entity IP Address	M		Transport Layer Address 9.3.2.4	Defined in TS 32.422 [11]

9.3.1.15 Core Network Assistance Information

This IE provides assistance information for e.g. RRC_INACTIVE configuration.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Identity Index Value	M		9.3.3.23	
UE Specific DRX	O		Paging DRX 9.3.1.90	
Periodic Registration Update Timer	M		9.3.3.24	
MICO Mode Indication	O		9.3.1.23	
TAI List for RRC Inactive		<i>1</i>		
>TAI List for RRC Inactive Item		<i>1..<maxnoofTAIforInactive></i>		
>>TAI	M		9.3.3.11	
Expected UE Behaviour	O		9.3.1.93	

Range bound	Explanation
maxnoofTAIforInactive	Maximum no. of TAIs for RRC Inactive. Value is 16.

9.3.1.16 User Location Information

This IE is used to provide location information of the UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>User Location Information</i>	M			
> <i>E-UTRA user location information</i>				
>> <i>E-UTRA CGI</i>	M		9.3.1.9	
>> <i>TAI</i>	M		9.3.3.11	
>> <i>Age of Location</i>	O		Time Stamp 9.3.1.75	If received shall be handled as specified in TS 23.502 [10].
> <i>NR user location information</i>				
>> <i>NR CGI</i>	M		9.3.1.7	
>> <i>TAI</i>	M		9.3.3.11	
>> <i>Age of Location</i>	O		Time Stamp 9.3.1.75	If received shall be handled as specified in TS 23.502 [10].
> <i>N3IWF user location information</i>				
>> <i>IP Address</i>	M		Transport Layer Address 9.3.2.4	UE's local IP address used to reach the N3IWF
>> <i>Port Number</i>	O		OCTET STRING (SIZE(2))	UDP or TCP source port number if NAT is detected.

9.3.1.17 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		1..<maxnoofSliceltems>		
> <i>S-NSSAI</i>	M		9.3.1.24	

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

9.3.1.18 Dynamic 5QI Descriptor

This IE indicates the QoS Characteristics for a Non-standardised or not pre-configured 5QI for downlink and uplink.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Priority Level	M		9.3.1.84	Priority Level is specified in TS 23.501 [9].
Packet Delay Budget	M		9.3.1.80	Packet Delay Budget is specified in TS 23.501 [9].
Packet Error Rate	M		9.3.1.81	Packet Error Rate is specified in TS 23.501 [9].
5QI	O		INTEGER (0..255, ...)	Indicates the dynamically assigned 5QI as specified in TS 23.501 [9].
Delay Critical	C-ifGBRflow		ENUMERATED (delay critical, non-delay critical, ...)	Indicates whether the GBR QoS flow is delay critical as specified in TS 23.501 [9].
Averaging Window	C-ifGBRflow		9.3.1.82	Averaging Window is specified in TS 23.501 [9].
Maximum Data Burst Volume	O		9.3.1.83	Maximum Data Burst Volume is specified in TS 23.501 [9]. This IE shall be included if the <i>Delay Critical</i> IE is set to "delay critical" and shall be ignored otherwise.

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.

9.3.1.19 Allocation and Retention Priority

This IE specifies the relative importance of a QoS flow compared to other QoS flows for allocation and retention of NG-RAN resources.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Priority Level	M		INTEGER (1..15)	Desc.: This IE defines the relative importance of a resource request (see TS 23.501 [9]). Usage: Values are ordered in decreasing order of priority, i.e., with 1 as the highest priority and 15 as the lowest priority.
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 flows 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 NG-RAN node.
Pre-emption Vulnerability	M		ENUMERATED (not pre-emptable, pre-emptable, ...)	Desc.: This IE indicates the vulnerability of the QoS flow to pre-emption 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. The 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 NG-RAN node.

9.3.1.20 Source to Target Transparent Container

This IE is used to transparently pass radio related information from the handover source to the handover target through the core network; it is produced by the source RAN node and is transmitted to the target RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Source to Target Transparent Container	M		OCTET STRING	This IE includes a transparent container from the source RAN node to the target RAN node. The octets of the OCTET STRING are encoded according to the specifications of the target system. Note: In the current version of the specification, this IE may carry either the <i>Source NG-RAN Node to Target NG-RAN Node Transparent Container</i> IE or the <i>Source eNB to Target eNB Transparent Container</i> IE as defined in TS 36.413 [16].

9.3.1.21 Target to Source Transparent Container

This IE is used to transparently pass radio related information from the handover target to the handover source through the core network; it is produced by the target RAN node and is transmitted to the source RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Target to Source Transparent Container	M		OCTET STRING	This IE includes a transparent container from the target RAN node to the source RAN node. The octets of the OCTET STRING are encoded according to the specifications of the target system. Note: In the current version of the specification, this IE may carry either the <i>Target NG-RAN Node to Source NG-RAN Node Transparent Container</i> IE or the <i>Target eNB to Source eNB Transparent Container</i> IE as defined in TS 36.413 [16].

9.3.1.22 Handover Type

This IE indicates which kind of handover was triggered in the source side.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Handover Type	M		ENUMERATED (Intra5GS, 5GStoEPS, EPSto5GS, ...)	Intra5GS: NG-RAN node to NG-RAN node 5GStoEPS: NG-RAN node to eNB EPSto5GS: eNB to NG-RAN node

9.3.1.23 MICO Mode Indication

This IE indicates that the UE is configured with MICO mode by the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
MICO Mode Indication	M		ENUMERATED (true, ...)	

9.3.1.24 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))	

9.3.1.25 Target ID

This IE identifies the target for the handover.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>Target ID</i>	M			
> <i>NG-RAN</i>				
>>Global RAN Node ID	M		9.3.1.5	
>>Selected TAI	M		TAI 9.3.3.11	
> <i>E-UTRAN</i>				
>>Global eNB ID	M		Global ng-eNB ID 9.3.1.8	
>>Selected EPS TAI	M		EPS TAI 9.3.3.17	

9.3.1.26 Emergency Fallback Indicator

The IE indicates emergency service fallback.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Emergency Fallback Request Indicator	M		ENUMERATED (emergency fallback requested, ...)	
Emergency Service Target CN	O		ENUMERATED (5GC, EPC, ...)	

9.3.1.27 Security Indication

This IE contains the user plane integrity protection indication and confidentiality protection indication which indicates the requirements on UP integrity protection and ciphering for corresponding PDU sessions, respectively. Additionally, this IE contains the maximum integrity protected data rate per UE for integrity protection for DRBs.

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.
Maximum Integrity Protected Data Rate	C- ifIntegrityP rotectionR equiredor Preferred		9.3.1.103	

Condition	Explanation
ifIntegrityProtectionRequiredorPreferred	This IE shall be present if the <i>Integrity Protection Indication</i> IE within the <i>Security Indication</i> IE is present and set to "required" or "preferred".

9.3.1.28 Non Dynamic 5QI Descriptor

This IE indicates the 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, ...)	Indicates the standardized or pre-configured 5QI as specified in TS 23.501 [9].
Priority Level	O		9.3.1.84	Priority Level is specified in TS 23.501 [9]. When included, it overrides standardized or pre-configured value.
Averaging Window	O		9.3.1.82	This IE applies to GBR QoS flows only. Averaging Window is specified in TS 23.501 [9]. When included, it overrides standardized or pre-configured value.
Maximum Data Burst Volume	O		9.3.1.83	Maximum Data Burst Volume is specified in TS 23.501 [9]. When included, it overrides standardized or pre-configured value. If the 5QI refers to a non delay critical QoS flow the IE shall be ignored.

9.3.1.29 Source NG-RAN Node to Target NG-RAN Node Transparent Container

This IE is produced by the source NG-RAN node and is transmitted to the target NG-RAN node. For inter-system handovers to 5G, the IE is transmitted from the external handover source to the target NG-RAN node.

This IE is transparent to the 5GC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RRC Container	M		OCTET STRING	Includes the RRC <i>HandoverPreparationInformation</i> message as defined in TS 38.331 [18] if the target is a gNB. Includes the RRC <i>HandoverPreparationInformation</i> message as defined in TS 36.331 [21] if the target is an ng-eNB.
PDU Session Resource Information List		<i>0..1</i>		For intra-system handovers in NG-RAN.
>PDU Session Resource Information Item		<i>1..<maxnoofPDU Sessions></i>		
>>PDU Session ID	M		9.3.1.50	
>>QoS Flow Information List		<i>1</i>		
>>>QoS Flow Information Item		<i>1..<maxnoofQoS Flows></i>		
>>>>QoS Flow Identifier	M		9.3.1.51	
>>>>DL Forwarding	O		9.3.1.33	
>>DRBs to QoS Flows Mapping List	O		9.3.1.34	
E-RAB Information List		<i>0..1</i>		For inter-system handovers to 5G.
>E-RAB Information Item		<i>1..<maxnoofE-RABs></i>		
>>E-RAB ID	M		9.3.2.3	
>>DL Forwarding	O		9.3.1.33	
Target Cell ID	M		NG-RAN CGI 9.3.1.73	
Index to RAT/Frequency Selection Priority	O		9.3.1.61	
UE History Information	M		9.3.1.95	

Range bound	Explanation
maxnoofPDU Sessions	Maximum no. of PDU sessions allowed towards one UE. Value is 256.
maxnoofQoS Flows	Maximum no. of QoS flows allowed within one PDU session. Value is 64.
maxnoofE-RABs	Maximum no. of E-RABs allowed towards one UE. Value is 256.

9.3.1.30 Target NG-RAN Node to Source NG-RAN Node Transparent Container

This IE is produced by the target NG-RAN node and is transmitted to the source NG-RAN node. For inter-system handovers to 5G, the IE is transmitted from the target NG-RAN node to the external relocation source.

This IE is transparent to the 5GC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RRC Container	M		OCTET STRING	Includes the RRC <i>HandoverCommand</i> message as defined in TS 38.331 [18] if the target is a gNB. Includes the RRC <i>HandoverCommand</i> message as defined in TS 36.331 [21] if the target is an ng-eNB.

9.3.1.31 Allowed NSSAI

This IE contains the allowed NSSAI.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Allowed S-NSSAI List		1		
>Allowed S-NSSAI Item		1..<maxnoofAllowedS-NSSAIs>		
>>S-NSSAI	M		9.3.1.24	

Range bound	Explanation
maxnoofAllowedS-NSSAIs	Maximum no. of allowed S-NSSAI. Value is 8.

9.3.1.32 Relative AMF Capacity

This IE indicates the relative processing capacity of an AMF with respect to the other AMFs in the AMF Set in order to load-balance AMFs within an AMF Set defined in TS 23.501 [9].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Relative AMF Capacity	M		INTEGER (0..255)	

9.3.1.33 DL Forwarding

This IE indicates that the QoS flow or E-RAB is proposed for forwarding of downlink packets.

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

9.3.1.34 DRBs to QoS Flows 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
DRBs to QoS Flows Mapping Item		1..<maxnoofDRBs>		
>DRB ID	M		9.3.1.53	
>Associated QoS Flow List	M		9.3.1.99	Contains information of the QoS flows mapped to the DRB

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

9.3.1.35 Message Identifier

This IE identifies the warning message. It is set by the AMF and transferred to the UE by the NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Message Identifier	M		BIT STRING (SIZE(16))	This IE is set by the 5GC, transferred to the UE by the NG-RAN node. The NG-RAN node shall treat it as an identifier of the message.

9.3.1.36 Serial Number

This IE identifies a particular message from the source and type indicated by the Message Identifier and is altered every time the message with a given Message Identifier is changed.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Serial Number	M		BIT STRING (SIZE(16))	

9.3.1.37 Warning Area List

This IE indicates the areas where the warning message needs to be broadcast or cancelled.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>Warning Area</i>	M			
> <i>E-UTRA Cell IDs</i>				
>>EUTRA CGI List for Warning		1..<maxnoofCellIDforWarning>		
>>>E-UTRA CGI	M		9.3.1.9	
> <i>NR Cell IDs</i>				
>>NR CGI List for Warning		1..<maxnoofCellIDforWarning>		
>>>NR CGI	M		9.3.1.7	
> <i>TAIs for Warning</i>				
>>TAI List for Warning		1..<maxnoofTAIforWarning>		
>>>TAI	M		9.3.3.11	
> <i>Emergency Area IDs</i>				
>>Emergency Area ID List		1..<maxnoofEmergencyAreaID>		
>>>Emergency Area ID	M		9.3.1.48	

Range bound	Explanation
maxnoofCellIDforWarning	Maximum no. of Cell ID subject for warning message broadcast. Value is 65535.
maxnoofTAIforWarning	Maximum no. of TAI subject for warning message broadcast. Value is 65535.
maxnoofEmergencyAreaID	Maximum no. of Emergency Area ID subject for warning message broadcast. Value is 65535.

9.3.1.38 Number of Broadcasts Requested

This IE indicates the number of times a message is to be broadcast.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Number of Broadcasts Requested	M		INTEGER (0..65535)	

9.3.1.39 Warning Type

This IE indicates types of the disaster. This IE also indicates that a Primary Notification is included. This IE can be used by the UE to differentiate the type of alert according to the type of disaster.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Warning Type	M		OCTET STRING (SIZE(2))	

9.3.1.40 Warning Security Information

This IE provides the security information needed for securing the Primary Notification.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Warning Security Information	M		OCTET STRING (SIZE(50))	

9.3.1.41 Data Coding Scheme

This IE identifies the alphabet or coding employed for the message characters and message handling at the UE (it is passed transparently from the 5GC to the UE).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Data Coding Scheme	M		BIT STRING (SIZE(8))	

9.3.1.42 Warning Message Contents

This IE contains user information, e.g., the message with warning contents, and will be broadcast over the radio interface.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Warning Message Contents	M		OCTET STRING (SIZE(1..9600))	

9.3.1.43 Broadcast Completed Area List

This IE indicates the areas where either resources are available to perform the broadcast or where broadcast is performed successfully.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>Broadcast Completed Area</i>	M			
> <i>Cell ID Broadcast E-UTRA</i>				
>> Completed Cell List		1..<maxnoofCellIDforWarning>		
>>>E-UTRA CGI	M		9.3.1.9	
> <i>TAI Broadcast E-UTRA</i>				
>> TAI Broadcast		1..<maxnoofTAIforWarning>		
>>>TAI	M		9.3.3.11	
>>> Completed Cell in TAI List		1..<maxnoofCellinTAI>		
>>>>E-UTRA CGI	M		9.3.1.9	
> <i>Emergency Area ID Broadcast E-UTRA</i>				
>> Emergency Area ID Broadcast		1..<maxnoofEmergencyAreaID>		
>>>Emergency Area ID	M		9.3.1.48	
>>> Completed Cell in Emergency Area ID List		1..<maxnoofCellinEAI>		
>>>>E-UTRA CGI	M		9.3.1.9	
> <i>Cell ID Broadcast NR</i>				
>> Completed Cell List		1..<maxnoofCellIDforWarning>		
>>>NR-CGI	M		9.3.1.7	
> <i>TAI Broadcast NR</i>				
>> TAI Broadcast		1..<maxnoofTAIforWarning>		
>>>TAI	M		9.3.3.11	
>>> Completed Cell in TAI List		1..<maxnoofCellinTAI>		
>>>>NR-CGI	M		9.3.1.7	
> <i>Emergency Area ID Broadcast NR</i>				
>> Emergency Area ID Broadcast		1..<maxnoofEmergencyAreaID>		
>>>Emergency Area ID	M		9.3.1.48	
>>> Completed Cell in Emergency Area ID List		1..<maxnoofCellinEAI>		
>>>>NR-CGI	M		9.3.1.7	

Range bound	Explanation
maxnoofCellIDforWarning	Maximum no. of Cell ID subject for warning message broadcast. Value is 65535.
maxnoofTAIforWarning	Maximum no. of TAI subject for warning message broadcast. Value is 65535.
maxnoofEmergencyAreaID	Maximum no. of Emergency Area ID subject for warning message broadcast. Value is 65535.
maxnoofCellinTAI	Maximum no. of Cell ID within a TAI. Value is 65535.
maxnoofCellinEAI	Maximum no. of Cell ID within an Emergency Area. Value is 65535.

9.3.1.44 Broadcast Cancelled Area List

This IE indicates the areas where broadcast was stopped successfully.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>Broadcast Cancelled Area</i>	M			
>Cell ID Cancelled E-UTRA				
>>Cancelled Cell List		1..<maxnoofCellIDforWarning>		
>>>E-UTRA CGI	M		9.3.1.9	
>>>Number of Broadcasts	M		9.3.1.45	
>TAI Cancelled E-UTRA				
>>TAI Cancelled		1..<maxnoofTAIforWarning >		
>>>TAI	M		9.3.3.11	
>>>Cancelled Cell in TAI List		1..<maxnoofCellinTAI>		
>>>>E-UTRA CGI	M		9.3.1.9	
>>>>Number of Broadcasts	M		9.3.1.45	
>Emergency Area ID Cancelled E-UTRA				
>>Emergency Area ID Cancelled		1..<maxnoofEmergencyAreaID>		
>>>Emergency Area ID	M		9.3.1.48	
>>>>Cancelled Cell in Emergency Area ID List		1..<maxnoofCellinEAI>		
>>>>>E-UTRA CGI	M		9.3.1.9	
>>>>>Number of Broadcasts	M		9.3.1.45	
>Cell ID Cancelled NR				
>>Cancelled Cell List		1..<maxnoofCellIDforWarning>		
>>>NR-CGI	M		9.3.1.7	
>>>Number of Broadcasts	M		9.3.1.45	
>TAI Cancelled NR				
>>TAI Cancelled		1..<maxnoofTAIforWarning >		
>>>TAI	M		9.3.3.11	
>>>>Cancelled Cell in TAI List		1..<maxnoofCellinTAI>		
>>>>>NR-CGI	M		9.3.1.7	
>>>>>Number of Broadcasts	M		9.3.1.45	
>Emergency Area ID Cancelled NR				
>>Emergency Area ID Cancelled		1..<maxnoofEmergencyAreaID>		
>>>Emergency Area ID	M		9.3.1.48	
>>>>Cancelled Cell in Emergency Area ID List		1..<maxnoofCellinEAI>		
>>>>>NR-CGI	M		9.3.1.7	
>>>>>Number of Broadcasts	M		9.3.1.45	

Range bound	Explanation
maxnoofCellIDforWarning	Maximum no. of Cell ID subject for warning message broadcast. Value is 65535.
maxnoofTAIforWarning	Maximum no. of TAI subject for warning message broadcast. Value is 65535.
maxnoofEmergencyAreaID	Maximum no. of Emergency Area ID subject for warning message broadcast. Value is 65535.
maxnoofCellinTAI	Maximum no. of Cell ID within a TAI. Value is 65535.
maxnoofCellinEAI	Maximum no. of Cell ID within an Emergency Area. Value is 65535.

9.3.1.45 Number of Broadcasts

This IE indicates the number of times that a particular message has been broadcast in a given warning area.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Number of Broadcasts	M		INTEGER (0..65535)	This IE is set to '0' if valid results are not known or not available. It is set to 65535 if the counter results have overflowed.

9.3.1.46 Concurrent Warning Message Indicator

This IE indicates to the NG-RAN node that the received warning message is a new message to be scheduled for concurrent broadcast with any other ongoing broadcast of warning messages.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Concurrent Warning Message Indicator	M		ENUMERATED (true, ...)	This IE is used to identify a PWS type warning system which allows the broadcast of multiple concurrent warning messages over the radio.

9.3.1.47 Cancel-All Warning Messages Indicator

This IE indicates to the NG-RAN node to stop all already ongoing broadcast of warning messages in the NG-RAN node or in an area.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cancel-All Warning Messages Indicator	M		ENUMERATED (true, ...)	

9.3.1.48 Emergency Area ID

This IE is used to indicate the area which has the emergency impact.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Emergency Area ID	M		OCTET STRING (SIZE(3))	Emergency Area ID may consist of several cells. Emergency Area ID is defined by the operator.

9.3.1.49 Repetition Period

This IE indicates the periodicity of the warning message to be broadcast.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Repetition Period	M		INTEGER (0..2 ¹⁷ -1)	The unit of value 1 to 2 ¹⁷ -1 is [second].

9.3.1.50 PDU Session ID

This IE identifies a PDU Session for a UE. The definition and use of the PDU Session ID is specified in TS 23.501 [9].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session ID	M		INTEGER (0..255)	

9.3.1.51 QoS Flow Identifier

This IE identifies a QoS flow within a PDU Session. The definition and use of the QoS Flow Identifier is specified in TS 23.501 [9].

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

9.3.1.52 PDU Session Type

This IE indicates the PDU Session Type as specified in TS 23.501 [9].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session Type	M		ENUMERATED (Ipv4, Ipv6, Ipv4v6, ethernet, unstructured, ...)	

9.3.1.53 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, ...)	

9.3.1.54 Masked IMEISV

This IE 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 [23] with the last 4 digits of the SNR masked by setting the corresponding bits to 1. The first to fourth bits correspond to the first digit of the IMEISV, the fifth to eighth bits correspond to the second digit of the IMEISV, and so on.

9.3.1.55 New Security Context Indicator

This IE indicates that the AMF has activated a new 5G NAS security context as described in TS 33.501 [13].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
New Security Context Indicator	M		ENUMERATED (true, ...)	The NSCI as defined in TS 33.501 [13].

9.3.1.56 Time to Wait

This IE defines the minimum allowed waiting time.

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

9.3.1.57 Global N3IWF ID

This IE is used to globally identify an N3IWF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.3.3.5	
CHOICE <i>N3IWF ID</i>	M			
> <i>N3IWF ID</i>				
>>N3IWF ID	M		BIT STRING (SIZE(16))	

9.3.1.58 UE Aggregate Maximum Bit Rate

This IE 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 node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Aggregate Maximum Bit Rate		1		Applicable for non-GBR QoS flows.
>UE Aggregate Maximum Bit Rate Downlink	M		Bit Rate 9.3.1.4	This IE indicates the UE Aggregate Maximum Bit Rate as specified in TS 23.501 [9] in the downlink direction.
>UE Aggregate Maximum Bit Rate Uplink	M		Bit Rate 9.3.1.4	This IE indicates the UE Aggregate Maximum Bit Rate as specified in TS 23.501 [9] in the uplink direction.

9.3.1.59 Security Result

This IE indicates whether the security policy indicated as "preferred" in the *Security Indication* IE is performed or not.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Integrity Protection Result	M		ENUMERATED (performed, not performed, ...)	Indicates whether UP integrity protection is performed or not for the concerned PDU session.
Confidentiality Protection Result	M		ENUMERATED (performed, not performed, ...)	Indicates whether UP ciphering is performed or not for the concerned PDU session.

9.3.1.60 User Plane Security Information

This IE indicates user plane security information related to security policy.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Security Result	M		9.3.1.59	
Security Indication	M		9.3.1.27	

9.3.1.61 Index to RAT/Frequency Selection Priority

This IE is used to define local configuration for RRM strategies such as camp priorities in Idle mode and control of inter-RAT/inter-frequency handover in Active mode (see TS 23.501 [9]).

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

9.3.1.62 Data Forwarding Accepted

This IE indicates that the NG-RAN node accepts the proposed DL data forwarding for the QoS flow which is subject to data forwarding.

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

9.3.1.63 Data Forwarding Not Possible

This IE indicates that the 5GC decided that the corresponding PDU session will not be subject to data forwarding.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Data Forwarding Not Possible	M		ENUMERATED (data forwarding not possible, ...)	

9.3.1.64 Direct Forwarding Path Availability

This IE indicates whether a direct forwarding path is available.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Direct Forwarding Path Availability	M		ENUMERATED (direct path available, ...)	

9.3.1.65 Location Reporting Request Type

This IE indicates the type of location request to be handled by the NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Event Type	M		ENUMERATED (direct, change of serving cell, UE presence in the area of interest, stop change of serving cell, stop UE presence in the area of interest, cancel location reporting for the UE, ...)	
Report Area	M		ENUMERATED (cell, ...)	
Area of Interest List		0..1		
>Area of Interest Item		1..<maxno ofAol>		
>>Area of Interest	M		9.3.1.66	
>>Location Reporting Reference ID	M		9.3.1.76	
Location Reporting Reference ID to be Cancelled	C- ifEventTyp eisStopUE PresinAol		Location Reporting Reference ID 9.3.1.76	

Range bound	Explanation
maxnoofAol	Maximum no. of areas of interest. Value is 64.

Condition	Explanation
ifEventTypisStopUEPresinAol	This IE shall be present if the <i>Event Type</i> IE is set to "stop UE presence in the area of interest".

9.3.1.66 Area of Interest

This IE indicates the area of interest.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Area of Interest TAI List		0..1		
>Area of Interest TAI Item		1..<maxnoofTAlinAol>		
>>TAI	M		9.3.3.11	
Area of Interest Cell List		0..1		
>Area of Interest Cell Item		1..<maxnoofCellinAol>		
>>NG-RAN CGI	M		9.3.3.73	
Area of Interest RAN Node List		0..1		
>Area of Interest RAN Node Item		1..<maxnoofRANNodeinAol>		
>>Global RAN Node ID	M		9.3.1.5	

Range bound	Explanation
maxnoofTAlinAol	Maximum no. of tracking areas in an area of interest. Value is 16.
maxnoofCellinAol	Maximum no. of cells in an area of interest. Value is 256.
maxnoofRANNodeinAol	Maximum no. of NG-RAN nodes in an area of interest. Value is 64.

9.3.1.67 UE Presence in Area of Interest List

This IE indicates the UE presence in the area of interest.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Presence in Area of Interest Item		$1..<maxnoofAoI>$		
>Location Reporting Reference ID	M		9.3.1.76	
>UE Presence	M		ENUMERATED (in, out, unknown, ...)	

Range bound	Explanation
maxnoofAoI	Maximum no. of areas of interest. Value is 64.

9.3.1.68 UE Radio Capability for Paging

This IE contains paging specific UE Radio Capability information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Radio Capability for Paging of NR	O		OCTET STRING	Includes the RRC <i>UERadioPagingInformation</i> message as defined in TS 38.331 [18].
UE Radio Capability for Paging of E-UTRA	O		OCTET STRING	Includes the RRC <i>UERadioPagingInformation</i> message as defined in TS 36.331 [21].

9.3.1.69 Assistance Data for Paging

This IE provides assistance information for paging optimisation.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Assistance Data for Recommended Cells	O		9.3.1.70	
Paging Attempt Information	O		9.3.1.72	

9.3.1.70 Assistance Data for Recommended Cells

This IE provides assistance information for paging in recommended cells.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Recommended Cells for Paging	M		9.3.1.71	

9.3.1.71 Recommended Cells for Paging

This IE contains the recommended cells for paging.

This IE is transparent to the 5GC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Recommended Cell List		1		
>Recommended Cell Item		1..<maxnoofRecommendedCells>		Includes visited and non-visited cells, where visited cells are listed in the order the UE visited them with the most recent cell being the first in the list. Non-visited cells are included immediately after the visited cell they are associated with.
>>NG-RAN CGI	M		9.3.1.73	
>>Time Stayed in Cell	O		INTEGER (0..4095)	This is included for visited cells and indicates the time a UE stayed in a cell in seconds. If the UE stays in a cell more than 4095 seconds, this IE is set to 4095.

Range bound	Explanation
maxnoofRecommendedCells	Maximum no. of recommended Cells. Value is 16.

9.3.1.72 Paging Attempt Information

This IE includes information related to the paging count over NG.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Paging Attempt Count	M		INTEGER (1..16, ...)	Shall be set as specified in TS 38.300 [8].
Intended Number of Paging Attempts	M		INTEGER (1..16, ...)	Intended number of paging attempts (see TS 38.300 [8]).
Next Paging Area Scope	O		ENUMERATED (same, changed, ...)	Indicates whether the paging area scope will change or not at next paging attempt. Usage specified in TS 38.300 [8].

9.3.1.73 NG-RAN CGI

This IE is used to globally identify a cell in NG-RAN.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE NG-RAN CGI	M			
>NR				
>>NR CGI	M		9.3.1.7	
>E-UTRA				
>>E-UTRA CGI	M		9.3.1.9	

9.3.1.74 UE Radio Capability

This IE contains UE Radio Capability information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Radio Capability	M		OCTET STRING	Includes the RRC <i>UERadioAccessCapabilityInformation</i> message as defined in TS 38.331 [18].

9.3.1.75 Time Stamp

This IE contains UTC time information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Time Stamp	M		OCTET STRING (SIZE(4))	Encoded in the same format as the first four octets of the 64-bit timestamp format as defined in section 6 of IETF RFC 5905 [25]. It indicates the UTC time when the location information was generated.

9.3.1.76 Location Reporting Reference ID

This IE contains the Location Reporting Reference ID.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Location Reporting Reference ID	M		INTEGER (1..64, ...)	

9.3.1.77 Data Forwarding Response DRB List

This IE indicates data forwarding related information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Data Forwarding Response DRB Item		<i>1..<maxnoofDRBs></i>		
>DRB ID	M		9.3.1.53	
>DL Forwarding UP TNL Information	O		UP Transport Layer Information 9.3.2.2	
>UL Forwarding UP TNL Information	O		UP Transport Layer Information 9.3.2.2	

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

9.3.1.78 Paging Priority

This element indicates the paging priority for paging a UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Paging Priority	M		ENUMERATED (PrioLevel1, PrioLevel2, PrioLevel3, PrioLevel4, PrioLevel5, PrioLevel6, PrioLevel7, PrioLevel8, ...)	Lower value codepoint indicates higher priority.

9.3.1.79 Packet Loss Rate

This IE indicates the Packet Loss Rate for a QoS flow.

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.

9.3.1.80 Packet Delay Budget

This IE indicates the Packet Delay Budget for a QoS flow.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Packet Delay Budget	M		INTEGER (0..1023, ...)	Upper bound value for the delay that a packet may experience expressed in unit of 0.5ms.

9.3.1.81 Packet Error Rate

This IE indicates the Packet Error Rate for a QoS flow.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Scalar	M		INTEGER (0..9, ...)	The packet error rate is expressed as <i>Scalar</i> x 10-k where k is the <i>Exponent</i> .
Exponent	M		INTEGER (0..9, ...)	

9.3.1.82 Averaging Window

This IE indicates the Averaging Window for a QoS flow.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Averaging Window	M		INTEGER (0..4095, ...)	Unit: ms. The default value of the IE is 2000ms.

9.3.1.83 Maximum Data Burst Volume

This IE indicates the Maximum Data Burst Volume for a QoS flow.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Maximum Data Burst Volume	M		INTEGER (0..4095, ...)	Unit: byte.

9.3.1.84 Priority Level

This IE indicates the Priority Level for a QoS flow.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Priority Level	M		INTEGER (1..127, ...)	Values ordered in decreasing order of priority, i.e. with 1 as the highest priority and 127 as the lowest priority.

9.3.1.85 Mobility Restriction List

This IE defines roaming or access restrictions for subsequent mobility action 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 mobility restriction information. NG-RAN behaviour upon receiving this IE is specified in TS 23.501 [9].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Serving PLMN	M		PLMN Identity 9.3.3.5	
Equivalent PLMNs		0..<maxnoofE PLMNs>		Allowed PLMNs in addition to Serving PLMN. This list corresponds to the list of "equivalent PLMNs" as defined in TS 24.501 [26]. 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		9.3.3.5	
RAT Restrictions		0..<maxnoofE PLMNsPlusOn e>		This IE contains RAT restriction related information as specified in TS 23.501 [9].
>PLMN Identity	M		9.3.3.5	
>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 receiving node shall ignore bits 2-7.
Forbidden Area Information		0..<maxnoofE PLMNsPlusOn e>		This IE contains Forbidden Area information as specified in TS 23.501 [9].
>PLMN Identity	M		9.3.3.5	
> Forbidden TACs		1..<maxnoofFo rbTACs>		
>>TAC	M		9.3.3.10	The TAC of the forbidden TAI.
Service Area Information		0..<maxnoofE PLMNsPlusOn e>		This IE contains Service Area Restriction information as specified in TS 23.501 [9].
>PLMN Identity	M		9.3.3.5	
> Allowed TACs		0..<maxnoofAll owedAreas>		
>>TAC	M		9.3.3.10	The TAC of the allowed TAI.
> Not Allowed TACs		0..<maxnoofAll owedAreas>		
>>TAC	M		9.3.3.10	The TAC of the not-allowed TAI.

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

9.3.1.86 UE Security Capabilities

This 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 (SIZE(16, ...))	Each position in the bitmap represents an encryption algorithm: "all bits equal to 0" – UE supports no other 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 [13].
NR Integrity Protection Algorithms	M		BIT STRING (SIZE(16, ...))	Each position in the bitmap represents an integrity protection algorithm: "all bits equal to 0" – UE supports no other 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 [13].
E-UTRA Encryption Algorithms	M		BIT STRING (SIZE(16, ...))	Each position in the bitmap represents an encryption algorithm: "all bits equal to 0" – UE supports no other 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 [27].
E-UTRA Integrity Protection Algorithms	M		BIT STRING (SIZE(16, ...))	Each position in the bitmap represents an encryption 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 [27].

9.3.1.87 Security Key

This IE is used to apply security in the NG-RAN for different scenarios as defined in TS 33.501 [13].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Security Key	M		BIT STRING (SIZE(256))	Key material for NG-RAN node or Next Hop Key as defined in TS 33.501 [13]

9.3.1.88 Security Context

This IE provides security related parameters to the NG-RAN node which are used to derive security keys for user plane traffic and RRC signalling messages and for security parameter generation for subsequent mobility, see TS 33.501 [13].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Next Hop Chaining Count	M		INTEGER (0..7)	Next Hop Chaining Counter (NCC) defined in TS 33.501 [13].
Next-Hop NH	M		Security Key 9.3.1.87	The NH together with the NCC is used to derive the security configuration as defined in TS 33.501 [13].

9.3.1.89 IMS Voice Support Indicator

This IE is set by the NG-RAN node to indicate whether the UE radio capabilities are compatible with the network configuration for IMS voice.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
IMS Voice Support Indicator	M		ENUMERATED (Supported, Not Supported, ...)	

9.3.1.90 Paging DRX

This IE indicates the Paging DRX as defined in TS 38.304 [12] and TS 36.304 [29].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Paging DRX	M		ENUMERATED (32, 64, 128, 256, ...)	

9.3.1.91 RRC Inactive Transition Report Request

This IE is used to request the NG-RAN node to report or stop reporting to the 5GC when the UE enters or leaves RRC_INACTIVE state.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RRC Inactive Transition Report Request	M		ENUMERATED (Subsequent state transition report, Single RRC connected state report, Cancel report, ...)	

9.3.1.92 RRC State

This IE indicates the RRC state of the UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RRC State	M		ENUMERATED (Inactive, Connected, ...)	"Inactive" indicates the UE enters RRC_INACTIVE from RRC_CONNECTED; "Connected" indicates the UE enters RRC_CONNECTED from RRC_INACTIVE.

9.3.1.93 Expected UE Behaviour

This IE indicates the behaviour of a UE with predictable activity and/or mobility behaviour, to assist the NG-RAN node in determining the optimum RRC connection time and to help with the RRC_INACTIVE state transition and RNA configuration (e.g. size and shape of the RNA).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Expected UE Activity Behaviour	O		9.3.1.94	
Expected HO Interval	O		ENUMERATED (sec15, sec30, sec60, sec90, sec120, sec180, long-time, ...)	Indicates the expected time interval between inter NG-RAN node handovers. If "long-time" is included, the interval between inter NG-RAN node handovers is expected to be longer than 180 seconds.
Expected UE Mobility	O		ENUMERATED (stationary, mobile, ...)	Indicates whether the UE is expected to be stationary or mobile.
Expected UE Moving Trajectory		0..1		Indicates the UE's expected geographical movement.
>Expected UE Moving Trajectory Item		1..<maxnoofCellsUEMovingTrajectory>		Includes list of visited and non-visited cells, where visited cells are listed in the order the UE visited them with the most recent cell being the first in the list. Non-visited cells are included immediately after the visited cell they are associated with.
>>NG-RAN CGI	M		9.3.1.73	
>>Time Stayed in Cell	O		INTEGER (0..4095)	Included for visited cells and indicates the time a UE stayed in a cell in seconds. If the UE stays in a cell more than 4095 seconds, this IE is set to 4095.

Range bound	Explanation
maxnoofCellsUEMovingTrajectory	Maximum no. of cells of UE moving trajectory. Value is 16.

9.3.1.94 Expected UE Activity Behaviour

This IE indicates information about the expected "UE activity behaviour" as defined in TS 23.501 [9].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Expected Activity Period	O		INTEGER (1..30 40 50 60 80 100 120 150 180 181, ...)	If set to "181" the expected activity time is longer than 180 seconds. The remaining values indicate the expected activity time in [seconds].
Expected Idle Period	O		INTEGER (1..30 40 50 60 80 100 120 150 180 181, ...)	If set to "181" the expected idle time is longer than 180 seconds. The remaining values indicate the expected idle time in [seconds].
Source of UE Activity Behaviour Information	O		ENUMERATED (subscription information, statistics, ...)	If "subscription information" is indicated, the information contained in the <i>Expected Activity Period</i> IE and the <i>Expected Idle Period</i> IE, if present, is derived from subscription information. If "statistics" is indicated, the information contained in the <i>Expected Activity Period</i> IE and the <i>Expected Idle Period</i> IE, if present, is derived from statistical information.

9.3.1.95 UE History Information

This IE contains information about cells that a UE has been served by in active state prior to the target cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Last Visited Cell Item		<i>1..<maxnoofCellsinUEHistoryInfo></i>		Most recent information is added to the top of this list.
>Last Visited Cell Information	M		9.3.1.96	

Range bound	Explanation
maxnoofCellsinUEHistoryInfo	Maximum no. of cells in the UE history information. Value is 16.

9.3.1.96 Last Visited Cell Information

This IE may contain cell specific information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>Last Visited Cell Information</i>	M			
>NG-RAN Cell				
>>Last Visited NG-RAN Cell Information	M		9.3.1.97	
>E-UTRAN Cell				
>>Last Visited E-UTRAN Cell Information	M		OCTET STRING	Defined in TS 36.413 [16].
>UTRAN Cell				
>>Last Visited UTRAN Cell Information	M		OCTET STRING	Defined in TS 25.413 [28].
>GERAN Cell				
>>Last Visited GERAN Cell Information	M		OCTET STRING	Defined in TS 36.413 [16].

9.3.1.97 Last Visited NG-RAN Cell Information

This IE contains information about a cell. In case of NR cell, this IE contains information about a set of NR cells with the same NR ARFCN for reference point A, and the *Global Cell ID* IE identifies one of the NR cells in the set. The information is to be used for RRM purposes.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Global Cell ID	M		NG-RAN CGI 9.3.1.73	
Cell Type	M		9.3.1.98	
Time UE Stayed in Cell	M		INTEGER (0..4095)	The duration of time the UE stayed in the cell, or set of NR cells with the same NR ARFCN for reference point A, in seconds. If the duration is more than 4095s, this IE is set to 4095.
Time UE Stayed in Cell Enhanced Granularity	O		INTEGER (0..40950)	The duration of time the UE stayed in the cell, or set of NR cells with the same NR ARFCN for reference point A, in 1/10 seconds. If the duration is more than 4095s, this IE is set to 40950.
HO Cause Value	O		Cause 9.3.1.2	The cause for the handover.

9.3.1.98 Cell Type

This IE provides the cell coverage area.

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

9.3.1.99 Associated QoS Flow List

This IE indicates the list of QoS flows associated with e.g. a DRB or UP TNL endpoint.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Associated QoS Flow Item		<i>1..<maxnoofQoSFlows></i>		
>QoS Flow Identifier	M		9.3.1.51	
>QoS Flow Mapping Indication	O		ENUMERATED (ul, dl, ...)	

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

9.3.1.100 Information on Recommended Cells and RAN Nodes for Paging

This IE provides information on recommended cells and NG-RAN nodes for paging.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Recommended Cells for Paging	M		9.3.1.71	
Recommended RAN Nodes for Paging	M		9.3.1.101	

9.3.1.101 Recommended RAN Nodes for Paging

This IE contains recommended NG-RAN nodes for paging.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Recommended RAN Node List		1		
>Recommended RAN Node Item		1..<maxnoofRecommendedRANNodes>		Includes visited and non-visited NG-RAN nodes, where visited NG-RAN nodes are listed in the order the UE visited them with the most recent NG-RAN node being the first in the list. Non-visited NG-RAN nodes are included after the visited NG-RAN node they are associated with.
>>CHOICE AMF Paging Target				The AMF paging target is either an NG-RAN node identity or a TAI as specified in TS 38.300 [8].
>>>RAN Node				
>>>>Global RAN Node ID	M		9.3.1.5	
>>>TAI				
>>>>TAI	M		9.3.3.11	

Range bound	Explanation
maxnoofRedommendedRANNodes	Maximum no. of recommended NG-RAN nodes. Value is 16.

9.3.1.102 PDU Session Aggregate Maximum Bit Rate

This IE is applicable for all non-GBR QoS flows per PDU session which is defined for the downlink and the uplink direction and is provided by the SMF to the NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session Aggregate Maximum Bit Rate		1		Applicable for non-GBR QoS flows.
>PDU Session Aggregate Maximum Bit Rate Downlink	M		Bit Rate 9.3.1.4	Indicates the PDU session Aggregate Maximum Bit Rate as specified in TS 23.501 [9] in the downlink direction.
>PDU Session Aggregate Maximum Bit Rate Uplink	M		Bit Rate 9.3.1.4	Indicates the PDU session Aggregate Maximum Bit Rate as specified in TS 23.501 [9] in the uplink direction.

9.3.1.103 Maximum Integrity Protected Data Rate

This IE indicates the maximum aggregate data rate for integrity protected DRBs for a UE as defined in TS 38.300 [8].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Maximum Integrity Protected Data Rate	M		ENUMERATED (64kbps, max UE rate, ...)	Defines the upper bound of the aggregate data rate of user plane integrity protected data. This limit applies to both UL and DL independently.

9.3.1.104 Overload Response

This IE indicates the required behaviour of the NG-RAN node in an overload situation.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>Overload Response</i>	M			
> <i>Overload Action</i>				
>>Overload Action	M		9.3.1.105	

9.3.1.105 Overload Action

This IE indicates which signalling traffic is subject to rejection by the NG-RAN node in an AMF overload situation as defined in TS 23.501 [9].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Overload Action	M		ENUMERATED (Reject RRC connection establishments for non-emergency MO DT, Reject RRC connection establishments for Signalling, Permit Emergency Sessions and mobile terminated services only, Permit High Priority Sessions and mobile terminated services only, ...)	

9.3.1.106 Traffic Load Reduction Indication

This IE indicates the percentage of the type of traffic relative to the instantaneous incoming rate at the NG-RAN node, as indicated in the *Overload Action* IE, to be rejected.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Traffic Load Reduction Indication	M		INTEGER (1..99)	

9.3.1.107 Slice Overload List

This IE indicates the list of overloaded slices.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Slice Overload Item		<i>1..<maxnoofSliceltems></i>		
>S-NSSAI	M		9.3.1.24	

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

9.3.1.108 RAN Status Transfer Transparent Container

This IE is produced by the source NG-RAN node and is transmitted to the target NG-RAN node. It is used for intra 5GC NG handover.

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRBs Subject to Status Transfer List		1		
>DRBs Subject to Status Transfer Item		1..<maxnoof DRBs>		
>>DRB ID	M		9.3.1.53	
>>CHOICE <i>UL DRB Status</i>	M			
>>> 12 bits				
>>>>UL COUNT Value	M		COUNT Value for PDCP SN Length 12 9.3.1.109	PDCP-SN and HFN of the first missing UL PDCP SDU in case of 12 bit long PDCP-SN.
>>>>Receive Status of UL PDCP SDUs	O		BIT STRING (SIZE(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 N^{th} bit indicates the status of the UL PDCP SDU in position (N + First Missing SDU Number) modulo (1 + the maximum value of the PDCP-SN). 0: PDCP SDU has not been received. 1: PDCP SDU has been received correctly.
>>> 18 bits				
>>>>UL COUNT Value	M		COUNT Value for PDCP SN Length 18 9.3.1.110	PDCP-SN and HFN of the first missing UL PDCP SDU in case of 18 bit long PDCP-SN.
>>>>Receive Status of UL PDCP SDUs	O		BIT STRING (SIZE(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 N^{th} bit indicates the status of the UL PDCP SDU in position (N + First Missing SDU Number) modulo (1 + the maximum value of the PDCP-SN). 0: PDCP SDU has not been received. 1: PDCP SDU has been received correctly.
>>CHOICE <i>DL DRB Status</i>	M			
>>> 12 bits				
>>>>DL COUNT Value	M		COUNT Value for PDCP SN Length 12 9.3.1.109	PDCP-SN and HFN that the target NG-RAN node should assign for the next DL PDCP SDU not having an SN yet in case of 12 bit long PDCP-SN.
>>> 18 bits				
>>>>DL COUNT Value	M		COUNT Value for PDCP SN Length 18 9.3.1.110	PDCP-SN and HFN that the target NG-RAN node should assign for the next DL PDCP 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.

9.3.1.109 COUNT Value for PDCP SN Length 12

This IE contains a PDCP sequence number and a hyper frame number in case of 12 bit long PDCP-SN.

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)	

9.3.1.110 COUNT Value for PDCP SN Length 18

This IE contains a PDCP sequence number and a hyper frame number in case of 18 bit long PDCP-SN.

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)	

9.3.1.111 RRC Establishment Cause

This IE indicates the reason for RRC Connection Establishment as received from the UE in the *EstablishmentCause* defined in TS 38.331 [18] and TS 36.331 [21].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RRC Establishment Cause	M		ENUMERATED (emergency, highPriorityAccess, mt-Access, mo-Signalling, mo-Data, mo-VoiceCall, mo-VideoCall, mo-SMS, mps-PriorityAccess, mcs-PriorityAccess, ...)	

9.3.1.112 Warning Area Coordinates

This IE contains the affected alert area coordinates of a warning message, and will be broadcast over the radio interface.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Warning Area Coordinates	M		OCTET STRING (SIZE(1..1024))	

9.3.1.113 Network Instance

This IE provides the network instance to be used by the NG-RAN node when selecting a particular transport network resource as described in TS 23.501 [9].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Network Instance	M		INTEGER (1..256, ...)	

9.3.2 Transport Network Layer Related IEs

9.3.2.1 UP TNL Information

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>UP TNL Information</i>	M			
> <i>Single TNL Info</i>				
>>UP Transport Layer Information	M		9.3.2.2	
> <i>Multiple TNL Info</i>				
>>TNL Information List		1		
>>>TNL Information Item		1..<maxnoofMultiConnectivities>		
>>>>QoS Flow per TNL Information	M		9.3.2.8	

Range bound	Explanation
maxnoofMultiConnectivities	Maximum no. of connectivity allowed for a UE. Value is 4. The current version of the specification supports up to 2 connectivity.

9.3.2.2 UP Transport Layer Information

This IE is used to provide the NG user plane transport layer information associated with a PDU session for an NG-RAN node – AMF pair. 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>				
>>Endpoint IP Address	M		Transport Layer Address 9.3.2.4	
>>GTP-TEID	M		9.3.2.5	

9.3.2.3 E-RAB ID

This IE is the identifier of the LTE E-RAB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
E-RAB ID	M		INTEGER (0..15, ...)	

9.3.2.4 Transport Layer Address

This IE is an IP address.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Transport Layer Address	M		BIT STRING (SIZE(1..160, ...))	The Radio Network Layer is not supposed to interpret the address information. It should pass it to the Transport Layer for interpretation. For details, see TS 38.414 [14].

9.3.2.5 GTP-TEID

This IE is the GTP Tunnel Endpoint Identifier to be used for the user plane transport between the NG-RAN node and the UPF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
GTP-TEID	M		OCTET STRING (SIZE(4))	For details and range, see TS 29.281 [15].

9.3.2.6 CP Transport Layer Information

This IE is used to provide the NG control plane transport layer information associated with an NG-RAN node – AMF pair.

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 9.3.2.4	

9.3.2.7 TNL Association List

This IE contains a list of TNL associations. It is used for example to indicate failed TNL association(s).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TNL Association Item		1..<maxnoofTNLAssociations>		
>TNL Association Address	M		CP Transport Layer Information 9.3.2.6	
>Cause	M		9.3.1.2	

Range bound	Explanation
maxnoofTNLAssociations	Maximum no. of TNL Associations between the NG-RAN node and the AMF. Value is 32.

9.3.2.8 QoS Flow per TNL Information

This IE indicates the NG-U transport layer information and associated list of QoS flows.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UP Transport Layer Information	M		9.3.2.2	
Associated QoS Flow List	M		9.3.1.99	

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

9.3.2.9 TNL Association Usage

This IE indicates the usage of the TNL association.

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

9.3.2.10 TNL Address Weight Factor

This IE indicates the weight factor of the TNL address.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TNL Address Weight Factor	M		INTEGER (0..255)	Value 0 indicates the TNL address is not permitted for the initial NGAP message. If the value for each TNL address is the same, it indicates the deployments that rely solely on 5GC-based load balancing.

9.3.3 NAS Related IEs

9.3.3.1 AMF UE NGAP ID

This IE uniquely identifies the UE association over the NG interface within the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
AMF UE NGAP ID	M		INTEGER (0..2 ⁴⁰ -1)	

9.3.3.2 RAN UE NGAP ID

This IE uniquely identifies the UE association over the NG interface within the NG-RAN node.

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

9.3.3.3 GUAMI

This IE indicates the AMF identity.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.3.3.5	
AMF Region ID	M		BIT STRING (SIZE(8))	
AMF Set ID	M		9.3.3.12	
AMF Pointer	M		9.3.3.19	

9.3.3.4 NAS-PDU

This IE contains a 5GC – UE or UE – 5GC message that is transferred without interpretation in the NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NAS-PDU	M		OCTET STRING	

9.3.3.5 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:</p> <ul style="list-style-type: none"> - bits 4 to 1 of octet n encoding digit 2n-1 - bits 8 to 5 of octet n encoding digit 2n <p>PLMN Identity consists of 3 digits from MCC followed by either:</p> <ul style="list-style-type: none"> - 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).

9.3.3.6 SON Configuration Transfer

This IE contains the configuration information, used by e.g., SON functionality, and additionally includes the NG-RAN node identifier of the destination of this configuration information and the NG-RAN node identifier of the source of this information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Target RAN Node ID	M			
>Global RAN Node ID	M		9.3.1.5	
>Selected TAI	M		TAI 9.3.3.11	
Source RAN Node ID	M			
>Global RAN Node ID	M		9.3.1.5	
>Selected TAI	M		TAI 9.3.3.11	
SON Information	M		9.3.3.7	
Xn TNL Configuration Info	C- ifSONInfor mationRe quest		9.3.3.9	Source NG-RAN node Xn TNL Configuration Info.

Condition	Explanation
ifSONInformationRequest	This IE shall be present if the <i>SON Information</i> IE contains the <i>SON Information Request</i> IE set to "Xn TNL Configuration Info"

9.3.3.7 SON Information

This IE identifies the nature of the configuration information transferred, i.e., a request, a reply or a report.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>SON Information</i>	M			
> <i>SON Information Request</i>				
>> <i>SON Information Request</i>	M		ENUMERATED (Xn TNL Configuration Info, ...)	
> <i>SON Information Reply</i>				
>> <i>SON Information Reply</i>	M		9.3.3.8	

9.3.3.8 SON Information Reply

This IE contains the configuration information to be replied to the NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Xn TNL Configuration Info	O		9.3.3.9	

9.3.3.9 Xn TNL Configuration Info

This IE is used for signalling Xn TNL Configuration information for automatic Xn SCTP association establishment.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Xn Transport Layer Addresses		<i>1..<maxnoofXn TLAs></i>		
>Transport Layer Address	M		9.3.2.4	Transport Layer Addresses for Xn SCTP endpoint.
Xn Extended Transport Layer Addresses		<i>0..<maxnoofXn ExtTLAs></i>		
>IP-Sec Transport Layer Address	O		Transport Layer Address 9.3.2.4	Transport Layer Addresses for IP-Sec endpoint.
>Xn GTP Transport Layer Addresses		<i>0..<maxnoofXn GTP-TLAs></i>		
>>GTP Transport Layer Address	M		Transport Layer Address 9.3.2.4	GTP Transport Layer Addresses for GTP end-points (used for data forwarding over Xn).

Range bound	Explanation
maxnoofXnTLAs	Maximum no. of Xn Transport Layer Addresses for an SCTP end-point. Value is 2.
maxnoofXnExtTLAs	Maximum no. of Xn Extended Transport Layer Addresses in the message. Value is 16.
maxnoofXnGTP-TLAs	Maximum no. of Xn GTP Transport Layer Addresses for a GTP end-point in the message. Value is 16.

9.3.3.10 TAC

This IE is used to uniquely identify a Tracking Area Code.

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

9.3.3.11 TAI

This IE is used to uniquely identify a Tracking Area.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.3.3.5	
TAC	M		9.3.3.10	

9.3.3.12 AMF Set ID

This IE is used to uniquely identify an AMF Set within the AMF Region.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
AMF Set ID	M		BIT STRING (SIZE(10))	

9.3.3.13 Routing ID

This IE is used to identify an LMF within the 5GC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Routing ID	M		OCTET STRING	

9.3.3.14 NRPPa-PDU

This IE contains an NG-RAN node – LMF or LMF – NG-RAN node message that is transferred without interpretation in the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NRPPa-PDU	M		OCTET STRING	

9.3.3.15 RAN Paging Priority

This IE contains the service priority as defined in TS 23.501 [9].

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

9.3.3.16 EPS TAC

This IE is used to uniquely identify an EPS Tracking Area Code.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
EPS TAC	M		OCTET STRING (SIZE(2))	

9.3.3.17 EPS TAI

This IE is used to uniquely identify an EPS Tracking Area.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.3.3.5	
EPS TAC	M		9.3.3.16	

9.3.3.18 UE Paging Identity

This IE represents the Identity with which the UE is paged.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>UE Paging Identity</i>	M			
>5G-S-TMSI				
>>5G-S-TMSI	M		9.3.3.20	

9.3.3.19 AMF Pointer

This IE is used to identify one or more AMF(s) within the AMF Set.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
AMF Pointer	M		BIT STRING (SIZE(6))	

9.3.3.20 5G-S-TMSI

This IE is used for security reasons, to hide the identity of a subscriber.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
AMF Set ID	M		9.3.3.12	
AMF Pointer	M		9.3.3.19	
5G-TMSI	M		OCTET STRING (SIZE(4))	5G-TMSI is unique within the AMF that allocated it.

9.3.3.21 AMF Name

This IE is used to uniquely identify the AMF (see TS 38.300 [8]). It may also be used as a human readable name of the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
AMF Name	M		PrintableString (SIZE(1..150, ...))	

9.3.3.22 Paging Origin

This IE indicates whether Paging is originated due to the PDU sessions from the non-3GPP access.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Paging Origin	M		ENUMERATED (non-3GPP, ...)	

9.3.3.23 UE Identity Index Value

This IE is used by the NG-RAN node to calculate the Paging Frame as specified in TS 38.304 [12] and TS 36.304 [29].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>UE Identity Index Value</i>				
> <i>Index Length 10</i>				
>> <i>Index Length 10</i>	M		BIT STRING (SIZE(10))	Coded as specified in TS 38.304 [12] and TS 36.304 [29].

9.3.3.24 Periodic Registration Update Timer

This IE is used to assist NG-RAN to generate corresponding timer for periodic RNA update for RRC_INACTIVE UEs.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Periodic Registration Update Timer	M		BIT STRING (SIZE(8))	<p>Bits 5 to 1 represent the binary coded timer value.</p> <p>Bits 6 to 8 define the timer value unit for the Periodic Registration Update Timer as follows:</p> <p>Bits</p> <p>8 7 6</p> <p>0 0 0 value is incremented in multiples of 10 minutes 0 0 1 value is incremented in multiples of 1 hour 0 1 0 value is incremented in multiples of 10 hours 0 1 1 value is incremented in multiples of 2 seconds 1 0 0 value is incremented in multiples of 30 seconds 1 0 1 value is incremented in multiples of 1 minute 1 1 1 value indicates that the timer is deactivated.</p> <p>Other values shall be interpreted as multiples of 1 hour in this version of the protocol.</p>

9.3.3.25 UE-associated Logical NG-connection List

This IE contains a list of UE-associated logical NG-connections.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE-associated Logical NG-connection Item		<i>1..<maxnoofN GConnections ToReset></i>		
>AMF UE NGAP ID	O		9.3.3.1	
>RAN UE NGAP ID	O		9.3.3.2	

Range bound	Explanation
maxnoofNGConnectionsToReset	Maximum no. of UE-associated logical NG-connections allowed to reset in one message. Value is 65536.

9.3.3.26 NAS Security Parameters from NG-RAN

This IE provides security related parameters for inter-system handover from NG-RAN to E-UTRAN via the eNB to the UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NAS Security Parameters from NG-RAN	M		OCTET STRING	Coded as the value part of the <i>N1 mode to S1 mode NAS transparent container</i> IE defined in TS 24.501 [26].

9.3.4 SMF Related IEs

9.3.4.1 PDU Session Resource Setup Request Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDU Session Aggregate Maximum Bit Rate	O		9.3.1.102	This IE shall be present when at least one non-GBR QoS flow is being setup.	YES	reject
UL NG-U UP TNL Information	M		UP Transport Layer Information 9.3.2.2	UPF endpoint of the NG-U transport bearer, for delivery of UL PDUs.	YES	reject
Additional UL NG-U UP TNL Information	O		UP Transport Layer Information 9.3.2.2	UPF endpoint of the additional NG-U transport bearer, for delivery of UL PDUs.	YES	reject
Data Forwarding Not Possible	O		9.3.1.63	This IE may be present in case of HANDOVER REQUEST message and shall be ignored otherwise.	YES	reject
PDU Session Type	M		9.3.1.52		YES	reject
Security Indication	O		9.3.1.27		YES	reject
Network Instance	O		9.3.1.113		YES	reject
QoS Flow Setup Request List		1			YES	reject
>QoS Flow Setup Request Item		1..<maxno of QoS Flows>			-	
>>QoS Flow Identifier	M		9.3.1.51		-	
>>QoS Flow Level QoS Parameters	M		9.3.1.12		-	
>>E-RAB ID	O		9.3.2.3		-	

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

9.3.4.2 PDU Session Resource Setup Response Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
QoS Flow per TNL Information	M		9.3.2.8	
Additional QoS Flow per TNL Information	O		QoS Flow per TNL Information 9.3.2.8	
Security Result	O		9.3.1.59	
QoS Flow Failed to Setup List	O		QoS Flow List 9.3.1.13	

9.3.4.3 PDU Session Resource Modify Request Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDU Session Aggregate Maximum Bit Rate	O		9.3.1.102		YES	reject
UL NG-U UP TNL Modify List		0..1			YES	reject
>UL NG-U UP TNL Modify Item		1..<maxno ofMultiConnectivities >			-	
>>UL NG-U UP TNL Information	M		UP Transport Layer Information 9.3.2.2	UPF endpoint of the NG-U transport bearer, for delivery of UL PDUs.	-	
>>DL NG-U UP TNL Information	M		UP Transport Layer Information 9.3.2.2	Identifies the NG-U transport bearer at the NG-RAN node.	-	
Network Instance	O		9.3.1.113		YES	reject
QoS Flow Add or Modify Request List		0..1			YES	reject
>QoS Flow Add or Modify Request Item		1..<maxno ofQoSFlows>			-	
>>QoS Flow Identifier	M		9.3.1.51		-	
>>QoS Flow Level QoS Parameters	O		9.3.1.12		-	
>>E-RAB ID	O		9.3.2.3		-	
QoS Flow to Release List	O		QoS Flow List 9.3.1.13		YES	reject
Additional UL NG-U UP TNL Information	O		UP Transport Layer Information 9.3.2.2	UPF endpoint of the additional NG-U transport bearer proposed for delivery of UL PDUs for split PDU session.	YES	reject

Range bound	Explanation
maxnoofQoSFlows	Maximum no. of QoS flows allowed within one PDU session. Value is 64.
maxnoofMultiConnectivities	Maximum no. of connectivity allowed for a UE. Value is 4. The current version of the specification supports up to 2 connectivity.

9.3.4.4 PDU Session Resource Modify Response Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL NG-U UP TNL Information	O		UP Transport Layer Information 9.3.2.2	NG-RAN node endpoint of the NG-U transport bearer, for delivery of DL PDUs.
UL NG-U UP TNL Information	O		UP Transport Layer Information 9.3.2.2	Identifies the NG-U transport bearer at the 5GC node.
QoS Flow Add or Modify Response List		<i>0..1</i>		
>QoS Flow Add or Modify Response Item		<i>1..<maxnoofQoSFlows></i>		
>>QoS Flow Identifier	M		9.3.1.51	
Additional QoS Flow per TNL Information	O		QoS Flow per TNL Information 9.3.2.8	NG-RAN node endpoint of the additional NG-U transport bearer, for delivery of DL PDUs for split PDU session.
QoS Flow Failed to Add or Modify List	O		QoS Flow List 9.3.1.13	

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

9.3.4.5 PDU Session Resource Notify Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
QoS Flow Notify List		<i>0..1</i>		
>QoS Flow Notify Item		<i>1..<maxnoofQoSFlows></i>		
>>QoS Flow Identifier	M		9.3.1.51	
>>Notification Cause	M		ENUMERATED (fulfilled, not fulfilled, ...)	
QoS Flow Released List	O		QoS Flow List 9.3.1.13	

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

9.3.4.6 PDU Session Resource Modify Indication Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL UP TNL Information	O		UP TNL Information 9.3.2.1	One or multiple NG-RAN Transport Layer Information

9.3.4.7 PDU Session Resource Modify Confirm Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
QoS Flow Modify Confirm List		1		
>QoS Flow Modify Confirm Item		1..<maxnoofQoSFlows>		
>>QoS Flow Identifier	M		9.3.1.51	
TNL Mapping List		0..1		
>TNL Mapping Item		1..<maxnoofMultiConnectivities>		
>>DL NG-U UP TNL Information	M		UP Transport Layer Information 9.3.2.2	NG-RAN endpoint of the NG-U transport bearer indicated in the <i>PDU Session Resource Modify Indication Transfer IE</i> .
>>UL NG-U UP TNL Information	M		UP Transport Layer Information 9.3.2.2	UPF endpoint of the NG-U transport bearer identified by the above <i>DL NG-U UP TNL Information IE</i> .
QoS Flow Failed to Modify List	O		QoS Flow List 9.3.1.13	

Range bound	Explanation
maxnoofQoSFlows	Maximum no. of QoS flows allowed within one PDU session. Value is 64.
maxnoofMultiConnectivities	Maximum no. of connectivity allowed for a UE. Value is 4. The current version of the specification supports up to 2 connectivity.

9.3.4.8 Path Switch Request Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL NG-U UP TNL Information	M		UP Transport Layer Information 9.3.2.2	NG-RAN node endpoint of the NG-U transport bearer, for delivery of DL PDUs.
DL NG-U TNL Information Reused	O		ENUMERATED (true, ...)	Indicates that DL NG-U TNL Information has been reused.
User Plane Security Information	O		9.3.1.60	
QoS Flow Accepted List		1		
>QoS Flow Accepted Item		1..<maxnoofQoSFlows>		
>>QoS Flow Identifier	M		9.3.1.51	

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

9.3.4.9 Path Switch Request Acknowledge Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UL NG-U UP TNL Information	O		UP Transport Layer Information 9.3.2.2	UPF endpoint of the NG-U transport bearer, for delivery of UL PDUs.
Security Indication	O		9.3.1.27	

9.3.4.10 Handover Command Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL Forwarding UP TNL Information	O		UP Transport Layer Information 9.3.2.2	To deliver forwarded DL PDUs.
QoS Flow to be Forwarded List		0..1		
>QoS Flow to be Forwarded Item		1..<maxnoofQoSFlows>		
>>QoS Flow Identifier	M		9.3.1.51	
Data Forwarding Response DRB List	O		9.3.1.77	

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

9.3.4.11 Handover Request Acknowledge Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL NG-U UP TNL Information	M		UP Transport Layer Information 9.3.2.2	NG-RAN node endpoint of the NG-U transport bearer, for delivery of DL PDUs.
DL Forwarding UP TNL Information	O		UP Transport Layer Information 9.3.2.2	To deliver forwarded DL PDUs.
Security Result	O		9.3.1.59	
QoS Flow Setup Response List		1		
>QoS Flow Setup Response Item		1..<maxnoofQoSFlows>		
>>QoS Flow Identifier	M		9.3.1.51	
>>Data Forwarding Accepted	O		9.3.1.62	
QoS Flow Failed to Setup List	O		QoS Flow List 9.3.1.13	
Data Forwarding Response DRB List	O		9.3.1.77	

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

9.3.4.12 PDU Session Resource Release Command Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cause	M		9.3.1.2	

9.3.4.13 PDU Session Resource Notify Released Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cause	M		9.3.1.2	

9.3.4.14 Handover Required Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Direct Forwarding Path Availability	O		9.3.1.64	

9.3.4.15 Path Switch Request Setup Failed Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cause	M		9.3.1.2	

9.3.4.16 PDU Session Resource Setup Unsuccessful Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cause	M		9.3.1.2	
Criticality Diagnostics	O		9.3.1.3	

9.3.4.17 PDU Session Resource Modify Unsuccessful Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cause	M		9.3.1.2	
Criticality Diagnostics	O		9.3.1.3	

9.3.4.18 Handover Preparation Unsuccessful Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cause	M		9.3.1.2	

9.3.4.19 Handover Resource Allocation Unsuccessful Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cause	M		9.3.1.2	
Criticality Diagnostics	O		9.3.1.3	

9.3.4.20 Path Switch Request Unsuccessful Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cause	M		9.3.1.2	

9.3.4.21 PDU Session Resource Release Response Transfer

This IE is transparent to the AMF.

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

9.3.4.22 PDU Session Resource Modify Indication Unsuccessful Transfer

This IE is transparent to the AMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cause	M		9.3.1.2	

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

9.4.1 General

NGAP ASN.1 definition conforms to ITU-T Rec. X.691 [4], ITU-T Rec. X.680 [5] and ITU-T Rec. X.681 [6].

The ASN.1 definition specifies the structure and content of NGAP messages. NGAP 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 NGAP 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 where 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 will have different IE IDs.

If an NGAP 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 subclause 10.3.6.

9.4.2 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 interoperability;
- 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.

9.4.3 Elementary Procedure Definitions

```
-- ASN1START
-- *****
--
-- Elementary Procedure definitions
--
-- *****

NGAP-PDU-Descriptions {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-Access (22) modules (3) ngap (1) version1 (1) ngap-PDU-Descriptions (0)}

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS

    Criticality,
    ProcedureCode
FROM NGAP-CommonDataTypes

    AMFConfigurationUpdate,
    AMFConfigurationUpdateAcknowledge,
    AMFConfigurationUpdateFailure,
    AMFStatusIndication,
    CellTrafficTrace,
    DeactivateTrace,
    DownlinkNASTransport,
    DownlinkNonUEAssociatedNRPPaTransport,
    DownlinkRANConfigurationTransfer,
    DownlinkRANStatusTransfer,
    DownlinkUEAssociatedNRPPaTransport,
    ErrorIndication,
    HandoverCancel,
    HandoverCancelAcknowledge,
    HandoverCommand,
    HandoverFailure,
    HandoverNotify,
    HandoverPreparationFailure,
    HandoverRequest,
    HandoverRequestAcknowledge,
    HandoverRequired,
    InitialContextSetupFailure,
    InitialContextSetupRequest,
    InitialContextSetupResponse,
```

InitialUEMessage,
LocationReport,
LocationReportingControl,
LocationReportingFailureIndication,
NASNonDeliveryIndication,
NGReset,
NGResetAcknowledge,
NGSetupFailure,
NGSetupRequest,
NGSetupResponse,
OverloadStart,
OverloadStop,
Paging,
PathSwitchRequest,
PathSwitchRequestAcknowledge,
PathSwitchRequestFailure,
PDUSessionResourceModifyConfirm,
PDUSessionResourceModifyIndication,
PDUSessionResourceModifyRequest,
PDUSessionResourceModifyResponse,
PDUSessionResourceNotify,
PDUSessionResourceReleaseCommand,
PDUSessionResourceReleaseResponse,
PDUSessionResourceSetupRequest,
PDUSessionResourceSetupResponse,
PrivateMessage,
PWSCancelRequest,
PWSCancelResponse,
PWSFailureIndication,
PWSRestartIndication,
RANConfigurationUpdate,
RANConfigurationUpdateAcknowledge,
RANConfigurationUpdateFailure,
RerouteNASRequest,
RRCInactiveTransitionReport,
TraceFailureIndication,
TraceStart,
UEContextModificationFailure,
UEContextModificationRequest,
UEContextModificationResponse,
UEContextReleaseCommand,
UEContextReleaseComplete,
UEContextReleaseRequest,
UERadioCapabilityCheckRequest,
UERadioCapabilityCheckResponse,
UERadioCapabilityInfoIndication,
UETNLABindingReleaseRequest,
UplinkNASTransport,
UplinkNonUEAssociatedNRPPaTransport,
UplinkRANConfigurationTransfer,
UplinkRANStatusTransfer,
UplinkUEAssociatedNRPPaTransport,
WriteReplaceWarningRequest,
WriteReplaceWarningResponse

FROM NGAP-PDU-Contents

id-AMFConfigurationUpdate,
id-AMFStatusIndication,
id-CellTrafficTrace,
id-DeactivateTrace,
id-DownlinkNASTransport,
id-DownlinkNonUEAssociatedNRPPaTransport,
id-DownlinkRANConfigurationTransfer,
id-DownlinkRANStatusTransfer,
id-DownlinkUEAssociatedNRPPaTransport,
id-ErrorIndication,
id-HandoverCancel,
id-HandoverNotification,
id-HandoverPreparation,
id-HandoverResourceAllocation,
id-InitialContextSetup,
id-InitialUEMessage,
id-LocationReport,
id-LocationReportingControl,
id-LocationReportingFailureIndication,
id-NASNonDeliveryIndication,
id-NGReset,
id-NGSetup,
id-OverloadStart,
id-OverloadStop,
id-Paging,
id-PathSwitchRequest,
id-PDUSessionResourceModify,
id-PDUSessionResourceModifyIndication,
id-PDUSessionResourceNotify,
id-PDUSessionResourceRelease,
id-PDUSessionResourceSetup,
id-PrivateMessage,
id-PWSCancel,
id-PWSFailureIndication,
id-PWSRestartIndication,
id-RANConfigurationUpdate,
id-RerouteNASRequest,
id-RRCInactiveTransitionReport,
id-TraceFailureIndication,
id-TraceStart,
id-UEContextModification,
id-UEContextRelease,
id-UEContextReleaseRequest,
id-UERadioCapabilityCheck,
id-UERadioCapabilityInfoIndication,
id-UETNLABindingRelease,
id-UplinkNASTransport,
id-UplinkNonUEAssociatedNRPPaTransport,
id-UplinkRANConfigurationTransfer,
id-UplinkRANStatusTransfer,
id-UplinkUEAssociatedNRPPaTransport,
id-WriteReplaceWarning

```

FROM NGAP-Constants;

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

NGAP-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
--
-- *****

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

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

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

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

```



```

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

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

NGAP-ELEMENTARY-PROCEDURES-CLASS-1 NGAP-ELEMENTARY-PROCEDURE ::= {
    aMFConfigurationUpdate
    handoverCancel
    handoverPreparation
    handoverResourceAllocation
    initialContextSetup
    nGReset
    nGSetup
    pathSwitchRequest
    pDUSessionResourceModify
    pDUSessionResourceModifyIndication
    pDUSessionResourceRelease
    pDUSessionResourceSetup
    pWSCancel
    rANConfigurationUpdate
    uEContextModification
    uEContextRelease
    uERadioCapabilityCheck
    writeReplaceWarning
}

NGAP-ELEMENTARY-PROCEDURES-CLASS-2 NGAP-ELEMENTARY-PROCEDURE ::= {
    aMFStatusIndication
    cellTrafficTrace
    deactivateTrace
    downlinkNASTransport
    downlinkNonUEAssociatedNRPPaTransport
    downlinkRANConfigurationTransfer
    downlinkRANStatusTransfer
    downlinkUEAssociatedNRPPaTransport
    errorIndication
    handoverNotification
    initialUEMessage
    locationReport
    locationReportingControl
    locationReportingFailureIndication
    nASNonDeliveryIndication
    overloadStart
    overloadStop
    paging
    pDUSessionResourceNotify
}

```

```

privateMessage
pWSFailureIndication
pWSRestartIndication
rerouteNASRequest
rRCInactiveTransitionReport
traceFailureIndication
traceStart
uEContextReleaseRequest
uERadioCapabilityInfoIndication
uETNLABindingRelease
uplinkNASTransport
uplinkNonUEAssociatedNRPPaTransport
uplinkRANConfigurationTransfer
uplinkRANStatusTransfer
uplinkUEAssociatedNRPPaTransport
}

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

AMFConfigurationUpdate NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      AMFConfigurationUpdate
    SUCCESSFUL OUTCOME      AMFConfigurationUpdateAcknowledge
    UNSUCCESSFUL OUTCOME    AMFConfigurationUpdateFailure
    PROCEDURE CODE          id-AMFConfigurationUpdate
    CRITICALITY              reject
}

AMFStatusIndication NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      AMFStatusIndication
    PROCEDURE CODE          id-AMFStatusIndication
    CRITICALITY              ignore
}

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

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

downlinkNASTransport NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      DownlinkNASTransport
    PROCEDURE CODE          id-DownlinkNASTransport
    CRITICALITY              ignore
}

```

```
downlinkNonUEAssociatedNRPPaTransport NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      DownlinkNonUEAssociatedNRPPaTransport
  PROCEDURE CODE          id-DownlinkNonUEAssociatedNRPPaTransport
  CRITICALITY              ignore
}

downlinkRANConfigurationTransfer NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      DownlinkRANConfigurationTransfer
  PROCEDURE CODE          id-DownlinkRANConfigurationTransfer
  CRITICALITY              ignore
}

downlinkRANStatusTransfer NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      DownlinkRANStatusTransfer
  PROCEDURE CODE          id-DownlinkRANStatusTransfer
  CRITICALITY              ignore
}

downlinkUEAssociatedNRPPaTransport NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      DownlinkUEAssociatedNRPPaTransport
  PROCEDURE CODE          id-DownlinkUEAssociatedNRPPaTransport
  CRITICALITY              ignore
}

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

handoverCancel NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      HandoverCancel
  SUCCESSFUL OUTCOME      HandoverCancelAcknowledge
  PROCEDURE CODE          id-HandoverCancel
  CRITICALITY              reject
}

handoverNotification NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      HandoverNotify
  PROCEDURE CODE          id-HandoverNotification
  CRITICALITY              ignore
}

handoverPreparation NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      HandoverRequired
  SUCCESSFUL OUTCOME      HandoverCommand
  UNSUCCESSFUL OUTCOME    HandoverPreparationFailure
  PROCEDURE CODE          id-HandoverPreparation
  CRITICALITY              reject
}

handoverResourceAllocation NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      HandoverRequest
```

```
    SUCCESSFUL OUTCOME      HandoverRequestAcknowledge
    UNSUCCESSFUL OUTCOME    HandoverFailure
    PROCEDURE CODE          id-HandoverResourceAllocation
    CRITICALITY              reject
}

initialContextSetup NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      InitialContextSetupRequest
    SUCCESSFUL OUTCOME      InitialContextSetupResponse
    UNSUCCESSFUL OUTCOME    InitialContextSetupFailure
    PROCEDURE CODE          id-InitialContextSetup
    CRITICALITY              reject
}

initialUEMessage NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      InitialUEMessage
    PROCEDURE CODE          id-InitialUEMessage
    CRITICALITY              ignore
}

locationReport NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      LocationReport
    PROCEDURE CODE          id-LocationReport
    CRITICALITY              ignore
}

locationReportingControl NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      LocationReportingControl
    PROCEDURE CODE          id-LocationReportingControl
    CRITICALITY              ignore
}

locationReportingFailureIndication NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      LocationReportingFailureIndication
    PROCEDURE CODE          id-LocationReportingFailureIndication
    CRITICALITY              ignore
}

NASNonDeliveryIndication NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      NASNonDeliveryIndication
    PROCEDURE CODE          id-NASNonDeliveryIndication
    CRITICALITY              ignore
}

NGReset NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      NGReset
    SUCCESSFUL OUTCOME      NGResetAcknowledge
    PROCEDURE CODE          id-NGReset
    CRITICALITY              reject
}

NGSetup NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      NGSetupRequest
    SUCCESSFUL OUTCOME      NGSetupResponse
}
```

```
    UNSUCCESSFUL OUTCOME    NGSetupFailure
    PROCEDURE CODE          id-NGSetup
    CRITICALITY              reject
}

overloadStart NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      OverloadStart
    PROCEDURE CODE          id-OverloadStart
    CRITICALITY              ignore
}

overloadStop NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      OverloadStop
    PROCEDURE CODE          id-OverloadStop
    CRITICALITY              reject
}

paging NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      Paging
    PROCEDURE CODE          id-Paging
    CRITICALITY              ignore
}

pathSwitchRequest NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PathSwitchRequest
    SUCCESSFUL OUTCOME      PathSwitchRequestAcknowledge
    UNSUCCESSFUL OUTCOME    PathSwitchRequestFailure
    PROCEDURE CODE          id-PathSwitchRequest
    CRITICALITY              reject
}

pDUSessionResourceModify NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PDUResourceModifyRequest
    SUCCESSFUL OUTCOME      PDUResourceModifyResponse
    PROCEDURE CODE          id-PDUResourceModify
    CRITICALITY              reject
}

pDUSessionResourceModifyIndication NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PDUResourceModifyIndication
    SUCCESSFUL OUTCOME      PDUResourceModifyConfirm
    PROCEDURE CODE          id-PDUResourceModifyIndication
    CRITICALITY              reject
}

pDUSessionResourceNotify NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PDUResourceNotify
    PROCEDURE CODE          id-PDUResourceNotify
    CRITICALITY              ignore
}

pDUSessionResourceRelease NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PDUResourceReleaseCommand
    SUCCESSFUL OUTCOME      PDUResourceReleaseResponse
}
```

```
    PROCEDURE CODE          id-PDUSessionResourceRelease
    CRITICALITY             reject
}

pDUSessionResourceSetup NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PDUSessionResourceSetupRequest
    SUCCESSFUL OUTCOME      PDUSessionResourceSetupResponse
    PROCEDURE CODE          id-PDUSessionResourceSetup
    CRITICALITY             reject
}

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

pWSCancel NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PWSCancelRequest
    SUCCESSFUL OUTCOME      PWSCancelResponse
    PROCEDURE CODE          id-PWSCancel
    CRITICALITY             reject
}

pWSFailureIndication NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PWSFailureIndication
    PROCEDURE CODE          id-PWSFailureIndication
    CRITICALITY             ignore
}

pWSRestartIndication NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PWSRestartIndication
    PROCEDURE CODE          id-PWSRestartIndication
    CRITICALITY             ignore
}

rANConfigurationUpdate NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      RANConfigurationUpdate
    SUCCESSFUL OUTCOME      RANConfigurationUpdateAcknowledge
    UNSUCCESSFUL OUTCOME    RANConfigurationUpdateFailure
    PROCEDURE CODE          id-RANConfigurationUpdate
    CRITICALITY             reject
}

rerouteNASRequest NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      RerouteNASRequest
    PROCEDURE CODE          id-RerouteNASRequest
    CRITICALITY             reject
}

rRCInactiveTransitionReport NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      RRCInactiveTransitionReport
    PROCEDURE CODE          id-RRCInactiveTransitionReport
    CRITICALITY             ignore
}
```

```
}

traceFailureIndication NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      TraceFailureIndication
    PROCEDURE CODE          id-TraceFailureIndication
    CRITICALITY              ignore
}

traceStart NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      TraceStart
    PROCEDURE CODE          id-TraceStart
    CRITICALITY              ignore
}

ueContextModification NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UEContextModificationRequest
    SUCCESSFUL OUTCOME      UEContextModificationResponse
    UNSUCCESSFUL OUTCOME    UEContextModificationFailure
    PROCEDURE CODE          id-UEContextModification
    CRITICALITY              reject
}

ueContextRelease NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UEContextReleaseCommand
    SUCCESSFUL OUTCOME      UEContextReleaseComplete
    PROCEDURE CODE          id-UEContextRelease
    CRITICALITY              reject
}

ueContextReleaseRequest NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UEContextReleaseRequest
    PROCEDURE CODE          id-UEContextReleaseRequest
    CRITICALITY              ignore
}

ueRadioCapabilityCheck NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UERadioCapabilityCheckRequest
    SUCCESSFUL OUTCOME      UERadioCapabilityCheckResponse
    PROCEDURE CODE          id-UERadioCapabilityCheck
    CRITICALITY              reject
}

ueRadioCapabilityInfoIndication NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UERadioCapabilityInfoIndication
    PROCEDURE CODE          id-UERadioCapabilityInfoIndication
    CRITICALITY              ignore
}

ueTNLABindingRelease NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UETNLABindingReleaseRequest
    PROCEDURE CODE          id-UETNLABindingRelease
    CRITICALITY              ignore
}
```

```

uplinkNASTransport NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      UplinkNASTransport
  PROCEDURE CODE          id-UplinkNASTransport
  CRITICALITY             ignore
}

uplinkNonUEAssociatedNRPPaTransport NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      UplinkNonUEAssociatedNRPPaTransport
  PROCEDURE CODE          id-UplinkNonUEAssociatedNRPPaTransport
  CRITICALITY             ignore
}

uplinkRANConfigurationTransfer NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      UplinkRANConfigurationTransfer
  PROCEDURE CODE          id-UplinkRANConfigurationTransfer
  CRITICALITY             ignore
}

uplinkRANStatusTransfer NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      UplinkRANStatusTransfer
  PROCEDURE CODE          id-UplinkRANStatusTransfer
  CRITICALITY             ignore
}

uplinkUEAssociatedNRPPaTransport NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      UplinkUEAssociatedNRPPaTransport
  PROCEDURE CODE          id-UplinkUEAssociatedNRPPaTransport
  CRITICALITY             ignore
}

writeReplaceWarning NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      WriteReplaceWarningRequest
  SUCCESSFUL OUTCOME      WriteReplaceWarningResponse
  PROCEDURE CODE          id-WriteReplaceWarning
  CRITICALITY             reject
}

END
-- ASN1STOP

```

9.4.4 PDU Definitions

```

-- ASN1START
-- *****
--
-- PDU definitions for NGAP.
--
-- *****

NGAP-PDU-Contents {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-Access (22) modules (3) ngap (1) version1 (1) ngap-PDU-Contents (1) }

```



```
DEFINITIONS AUTOMATIC TAGS ::=
```

```
BEGIN
```

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

```
IMPORTS
```

```
    AllowedNSSAI,  
    AMFName,  
    AMFSetID,  
    AMF-TNLAssociationSetupList,  
    AMF-TNLAssociationToAddList,  
    AMF-TNLAssociationToRemoveList,  
    AMF-TNLAssociationToUpdateList,  
    AMF-UE-NGAP-ID,  
    AssistanceDataForPaging,  
    BroadcastCancelledAreaList,  
    BroadcastCompletedAreaList,  
    CancelAllWarningMessages,  
    Cause,  
    CellIDListForRestart,  
    ConcurrentWarningMessageInd,  
    CoreNetworkAssistanceInformation,  
    CPTransportLayerInformation,  
    CriticalityDiagnostics,  
    DataCodingScheme,  
    DirectForwardingPathAvailability,  
    EmergencyAreaIDListForRestart,  
    EmergencyFallbackIndicator,  
    EUTRA-CGI,  
    FiveG-S-TMSI,  
    GlobalRANNodeID,  
    GUAMI,  
    HandoverType,  
    IMSVoiceSupportIndicator,  
    IndexToRFSP,  
    InfoOnRecommendedCellsAndRANNodesForPaging,  
    LocationReportingRequestType,  
    MaskedIMEISV,  
    MessageIdentifier,  
    MobilityRestrictionList,  
    NAS-PDU,  
    NASSecurityParametersFromNGRAN,  
    NewSecurityContextInd,  
    NGRAN-CGI,  
    NGRANTraceID,  
    NR-CGI,  
    NRPPa-PDU,  
    NumberOfBroadcastsRequested,
```

OverloadResponse,
OverloadStartNSSAList,
PagingDRX,
PagingOrigin,
PagingPriority,
PDUSessionAggregateMaximumBitRate,
PDUSessionResourceAdmittedList,
PDUSessionResourceFailedToModifyListModCfm,
PDUSessionResourceFailedToModifyListModRes,
PDUSessionResourceFailedToSetupListCxtFail,
PDUSessionResourceFailedToSetupListCxtRes,
PDUSessionResourceFailedToSetupListHOAck,
PDUSessionResourceFailedToSetupListPSReq,
PDUSessionResourceFailedToSetupListSURES,
PDUSessionResourceHandoverList,
PDUSessionResourceListCxtRelCpl,
PDUSessionResourceListCxtRelReq,
PDUSessionResourceListHORqd,
PDUSessionResourceModifyListModCfm,
PDUSessionResourceModifyListModInd,
PDUSessionResourceModifyListModReq,
PDUSessionResourceModifyListModRes,
PDUSessionResourceNotifyList,
PDUSessionResourceReleasedListNot,
PDUSessionResourceReleasedListPSAck,
PDUSessionResourceReleasedListPSFail,
PDUSessionResourceReleasedListRelRes,
PDUSessionResourceSetupListCxtReq,
PDUSessionResourceSetupListCxtRes,
PDUSessionResourceSetupListHOREq,
PDUSessionResourceSetupListSUREq,
PDUSessionResourceSetupListSURES,
PDUSessionResourceSwitchedList,
PDUSessionResourceToBeSwitchedDLList,
PDUSessionResourceToReleaseListHOCmd,
PDUSessionResourceToReleaseListRelCmd,
PLMNSupportList,
PWSFailedCellIDList,
RANNodeName,
RANPagingPriority,
RANStatusTransfer-TransparentContainer,
RAN-UE-NGAP-ID,
RelativeAMFCapacity,
RepetitionPeriod,
ResetType,
RoutingID,
RRCEstablishmentCause,
RRCInactiveTransitionReportRequest,
RRCState,
SecurityContext,
SecurityKey,
SerialNumber,
ServedGUAMIList,
SliceSupportList,

S-NSSAI,
SONConfigurationTransfer,
SourceToTarget-TransparentContainer,
SupportedTAList,
TAIListForPaging,
TAIListForRestart,
TargetID,
TargetToSource-TransparentContainer,
TimeToWait,
TNLAssociationList,
TraceActivation,
TrafficLoadReductionIndication,
TransportLayerAddress,
UEAggregateMaximumBitRate,
UE-associatedLogicalNG-connectionList,
UEContextRequest,
UE-NGAP-IDs,
UEPagingIdentity,
UEPresenceInAreaOfInterestList,
UERadioCapability,
UERadioCapabilityForPaging,
UESecurityCapabilities,
UnavailableGUAMList,
UserLocationInformation,
WarningAreaCoordinates,
WarningAreaList,
WarningMessageContents,
WarningSecurityInfo,
WarningType
FROM NGAP-IEs

PrivateIE-Container {},
ProtocolExtensionContainer {},
ProtocolIE-Container {},
ProtocolIE-ContainerList {},
ProtocolIE-ContainerPair {},
ProtocolIE-SingleContainer {},
NGAP-PRIVATE-IES,
NGAP-PROTOCOL-EXTENSION,
NGAP-PROTOCOL-IES,
NGAP-PROTOCOL-IES-PAIR
FROM NGAP-Containers

id-AllowedNSSAI,
id-AMFName,
id-AMFOverloadResponse,
id-AMFSetID,
id-AMF-TNLAssociationFailedToSetupList,
id-AMF-TNLAssociationSetupList,
id-AMF-TNLAssociationToAddList,
id-AMF-TNLAssociationToRemoveList,
id-AMF-TNLAssociationToUpdateList,
id-AMFTrafficLoadReductionIndication,
id-AMF-UE-NGAP-ID,

id-AssistanceDataForPaging,
id-BroadcastCancelledAreaList,
id-BroadcastCompletedAreaList,
id-CancelAllWarningMessages,
id-Cause,
id-CellIDListForRestart,
id-ConcurrentWarningMessageInd,
id-CoreNetworkAssistanceInformation,
id-CriticalityDiagnostics,
id-DataCodingScheme,
id-DefaultPagingDRX,
id-DirectForwardingPathAvailability,
id-EmergencyAreaIDListForRestart,
id-EmergencyFallbackIndicator,
id-EUTRA-CGI,
id-FiveG-S-TMSI,
id-GlobalRANNodeID,
id-GUAMI,
id-HandoverType,
id-IMSVoiceSupportIndicator,
id-IndexToRFSP,
id-InfoOnRecommendedCellsAndRANNodesForPaging,
id-LocationReportingRequestType,
id-MaskedIMEISV,
id-MessageIdentifier,
id-MobilityRestrictionList,
id-NAS-PDU,
id-NASC,
id-NASSecurityParametersFromNGRAN,
id-NewAMF-UE-NGAP-ID,
id-NewSecurityContextInd,
id-NGAP-Message,
id-NGRAN-CGI,
id-NGRANTraceID,
id-NR-CGI,
id-NRPPa-PDU,
id-NumberOfBroadcastsRequested,
id-OldAMF,
id-OverloadStartNSSAList,
id-PagingDRX,
id-PagingOrigin,
id-PagingPriority,
id-PDUSessionResourceAdmittedList,
id-PDUSessionResourceFailedToModifyListModCfm,
id-PDUSessionResourceFailedToModifyListModRes,
id-PDUSessionResourceFailedToSetupListCxtFail,
id-PDUSessionResourceFailedToSetupListCxtRes,
id-PDUSessionResourceFailedToSetupListHOack,
id-PDUSessionResourceFailedToSetupListPSReq,
id-PDUSessionResourceFailedToSetupListSURES,
id-PDUSessionResourceHandoverList,
id-PDUSessionResourceListCxtRelCpl,
id-PDUSessionResourceListCxtRelReq,
id-PDUSessionResourceListHORqd,

id-PDUSessionResourceModifyListModCfm,
id-PDUSessionResourceModifyListModInd,
id-PDUSessionResourceModifyListModReq,
id-PDUSessionResourceModifyListModRes,
id-PDUSessionResourceNotifyList,
id-PDUSessionResourceReleasedListNot,
id-PDUSessionResourceReleasedListPSAck,
id-PDUSessionResourceReleasedListPSFail,
id-PDUSessionResourceReleasedListRelRes,
id-PDUSessionResourceSetupListCxtReq,
id-PDUSessionResourceSetupListCxtRes,
id-PDUSessionResourceSetupListHOREq,
id-PDUSessionResourceSetupListSUREq,
id-PDUSessionResourceSetupListSURES,
id-PDUSessionResourceSwitchedList,
id-PDUSessionResourceToBeSwitchedDLLList,
id-PDUSessionResourceToReleaseListHOCmd,
id-PDUSessionResourceToReleaseListRelCmd,
id-PLMNSupportList,
id-PWSFailedCellIDList,
id-RANNodeName,
id-RANPagingPriority,
id-RANStatusTransfer-TransparentContainer,
id-RAN-UE-NGAP-ID,
id-RelativeAMFCapacity,
id-RepetitionPeriod,
id-ResetType,
id-RoutingID,
id-RRCEstablishmentCause,
id-RRCInactiveTransitionReportRequest,
id-RRCState,
id-SecurityContext,
id-SecurityKey,
id-SerialNumber,
id-ServedGUAMIList,
id-SliceSupportList,
id-SONConfigurationTransferDL,
id-SONConfigurationTransferUL,
id-SourceAMF-UE-NGAP-ID,
id-SourceToTarget-TransparentContainer,
id-SupportedTAList,
id-TAIListForPaging,
id-TAIListForRestart,
id-TargetID,
id-TargetToSource-TransparentContainer,
id-TimeToWait,
id-TraceActivation,
id-TraceCollectionEntityIPAddress,
id-UEAggregateMaximumBitRate,
id-UE-associatedLogicalNG-connectionList,
id-UEContextRequest,
id-UE-NGAP-IDs,
id-UEPagingIdentity,
id-UEPresenceInAreaOfInterestList,

```

    id-UERadioCapability,
    id-UERadioCapabilityForPaging,
    id-UESecurityCapabilities,
    id-UnavailableGUAMIList,
    id-UserLocationInformation,
    id-WarningAreaCoordinates,
    id-WarningAreaList,
    id-WarningMessageContents,
    id-WarningSecurityInfo,
    id-WarningType
FROM NGAP-Constants;

-- *****
--
-- PDU SESSION MANAGEMENT ELEMENTARY PROCEDURES
--
-- *****
--
-- *****
--
-- PDU Session Resource Setup Elementary Procedure
--
-- *****
--
-- *****
--
-- PDU SESSION RESOURCE SETUP REQUEST
--
-- *****

PDU Session Resource Setup Request ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PDU Session Resource Setup Request IEs} },
    ...
}

PDU Session Resource Setup Request IEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject TYPE AMF-UE-NGAP-ID          PRESENCE mandatory } |
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject TYPE RAN-UE-NGAP-ID          PRESENCE mandatory } |
    { ID id-RANPagingPriority        CRITICALITY ignore TYPE RANPagingPriority        PRESENCE optional   } |
    { ID id-NAS-PDU                  CRITICALITY reject TYPE NAS-PDU                  PRESENCE optional   } |
    { ID id-PDU Session Resource Setup List SUReq CRITICALITY reject TYPE PDU Session Resource Setup List SUReq PRESENCE mandatory } |
    ...
}

-- *****
--
-- PDU SESSION RESOURCE SETUP RESPONSE
--
-- *****

PDU Session Resource Setup Response ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PDU Session Resource Setup Response IEs} },
    ...
}

```

```

PDUSessionResourceSetupResponseIEs NGAP-PROTOCOL-IES ::= {
  { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
  { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
  { ID id-PDUSessionResourceSetupListSUs    CRITICALITY ignore TYPE PDUSessionResourceSetupListSUs    PRESENCE optional  }|
  { ID id-PDUSessionResourceFailedToSetupListSUs  CRITICALITY ignore TYPE PDUSessionResourceFailedToSetupListSUs  PRESENCE optional  }|
  { ID id-CriticalityDiagnostics          CRITICALITY ignore TYPE CriticalityDiagnostics          PRESENCE optional  },
  ...
}

-- *****
--
-- PDU Session Resource Release Elementary Procedure
--
-- *****

-- *****
--
-- PDU SESSION RESOURCE RELEASE COMMAND
--
-- *****

PDUSessionResourceReleaseCommand ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container      { {PDUSessionResourceReleaseCommandIEs} },
  ...
}

PDUSessionResourceReleaseCommandIEs NGAP-PROTOCOL-IES ::= {
  { ID id-AMF-UE-NGAP-ID          CRITICALITY reject TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
  { ID id-RAN-UE-NGAP-ID          CRITICALITY reject TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
  { ID id-RANPagingPriority        CRITICALITY ignore TYPE RANPagingPriority        PRESENCE optional  }|
  { ID id-NAS-PDU                  CRITICALITY ignore TYPE NAS-PDU                  PRESENCE optional  }|
  { ID id-PDUSessionResourceToReleaseListRelCmd  CRITICALITY reject TYPE PDUSessionResourceToReleaseListRelCmd  PRESENCE mandatory },
  ...
}

-- *****
--
-- PDU SESSION RESOURCE RELEASE RESPONSE
--
-- *****

PDUSessionResourceReleaseResponse ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container      { {PDUSessionResourceReleaseResponseIEs} },
  ...
}

PDUSessionResourceReleaseResponseIEs NGAP-PROTOCOL-IES ::= {
  { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
  { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
  { ID id-PDUSessionResourceReleasedListRelRes  CRITICALITY ignore TYPE PDUSessionResourceReleasedListRelRes  PRESENCE mandatory }|
  { ID id-UserLocationInformation          CRITICALITY ignore TYPE UserLocationInformation          PRESENCE optional  }|
  { ID id-CriticalityDiagnostics          CRITICALITY ignore TYPE CriticalityDiagnostics          PRESENCE optional  },
}

```

```

}
...
}
-- *****
--
-- PDU Session Resource Modify Elementary Procedure
--
-- *****

-- *****
--
-- PDU SESSION RESOURCE MODIFY REQUEST
--
-- *****

PDUSessionResourceModifyRequest ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PDUSessionResourceModifyRequestIEs} },
    ...
}

PDUSessionResourceModifyRequestIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory } |
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory } |
    { ID id-RANPagingPriority        CRITICALITY ignore  TYPE RANPagingPriority        PRESENCE optional   } |
    { ID id-PDUSessionResourceModifyListModReq  CRITICALITY reject  TYPE PDUSessionResourceModifyListModReq  PRESENCE mandatory } |
    ...
}

-- *****
--
-- PDU SESSION RESOURCE MODIFY RESPONSE
--
-- *****

PDUSessionResourceModifyResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PDUSessionResourceModifyResponseIEs} },
    ...
}

PDUSessionResourceModifyResponseIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory } |
    { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory } |
    { ID id-PDUSessionResourceModifyListModRes  CRITICALITY ignore  TYPE PDUSessionResourceModifyListModRes  PRESENCE optional   } |
    { ID id-PDUSessionResourceFailedToModifyListModRes  CRITICALITY ignore  TYPE PDUSessionResourceFailedToModifyListModRes  PRESENCE optional   } |
    { ID id-UserLocationInformation  CRITICALITY ignore  TYPE UserLocationInformation  PRESENCE optional   } |
    { ID id-CriticalityDiagnostics    CRITICALITY ignore  TYPE CriticalityDiagnostics    PRESENCE optional   } |
    ...
}

```



```

-- *****
--
-- PDU Session Resource Notify Elementary Procedure
--
-- *****

-- *****
--
-- PDU SESSION RESOURCE NOTIFY
--
-- *****

PDUSessionResourceNotify ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PDUSessionResourceNotifyIEs} },
    ...
}

PDUSessionResourceNotifyIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-PDUSessionResourceNotifyList  CRITICALITY reject TYPE PDUSessionResourceNotifyList  PRESENCE optional }|
    { ID id-PDUSessionResourceReleasedListNot  CRITICALITY ignore TYPE PDUSessionResourceReleasedListNot  PRESENCE optional }|
    { ID id-UserLocationInformation  CRITICALITY ignore TYPE UserLocationInformation  PRESENCE optional },
    ...
}

-- *****
--
-- PDU Session Resource Modify Indication Elementary Procedure
--
-- *****

-- *****
--
-- PDU SESSION RESOURCE MODIFY INDICATION
--
-- *****

PDUSessionResourceModifyIndication ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PDUSessionResourceModifyIndicationIEs} },
    ...
}

PDUSessionResourceModifyIndicationIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-PDUSessionResourceModifyListModInd  CRITICALITY reject TYPE PDUSessionResourceModifyListModInd  PRESENCE mandatory },
    ...
}

-- *****

```

```

--
-- PDU SESSION RESOURCE MODIFY CONFIRM
--
-- *****

PDUSessionResourceModifyConfirm ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PDUSessionResourceModifyConfirmIEs} },
    ...
}

PDUSessionResourceModifyConfirmIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-PDUSessionResourceModifyListModCfm CRITICALITY ignore TYPE PDUSessionResourceModifyListModCfm PRESENCE mandatory }|
    { ID id-PDUSessionResourceFailedToModifyListModCfm CRITICALITY ignore TYPE PDUSessionResourceFailedToModifyListModCfm PRESENCE optional }|
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

-- *****
--
-- UE CONTEXT MANAGEMENT ELEMENTARY PROCEDURES
--
-- *****

-- *****
--
-- Initial Context Setup Elementary Procedure
--
-- *****

-- *****
--
-- INITIAL CONTEXT SETUP REQUEST
--
-- *****

InitialContextSetupRequest ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {InitialContextSetupRequestIEs} },
    ...
}

InitialContextSetupRequestIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-OldAMF                  CRITICALITY reject TYPE AMFName                PRESENCE optional }|
    { ID id-UEAggregateMaximumBitRate CRITICALITY reject TYPE UEAggregateMaximumBitRate PRESENCE conditional }|
    { ID id-CoreNetworkAssistanceInformation CRITICALITY ignore TYPE CoreNetworkAssistanceInformation PRESENCE optional }|
    { ID id-GUAMI                   CRITICALITY reject TYPE GUAMI                  PRESENCE mandatory }|
    { ID id-PDUSessionResourceSetupListCxtReq CRITICALITY reject TYPE PDUSessionResourceSetupListCxtReq PRESENCE optional }|
    { ID id-AllowedNSSAI             CRITICALITY reject TYPE AllowedNSSAI           PRESENCE mandatory }|
    { ID id-UESecurityCapabilities   CRITICALITY reject TYPE UESecurityCapabilities   PRESENCE mandatory }|
    { ID id-SecurityKey              CRITICALITY reject TYPE SecurityKey             PRESENCE mandatory }|
    { ID id-TraceActivation          CRITICALITY ignore TYPE TraceActivation         PRESENCE optional }|
}

```

```

    { ID id-MobilityRestrictionList          CRITICALITY ignore TYPE MobilityRestrictionList          PRESENCE optional }|
    { ID id-UERadioCapability                CRITICALITY ignore TYPE UERadioCapability                PRESENCE optional }|
    { ID id-IndexToRFSP                     CRITICALITY ignore TYPE IndexToRFSP                     PRESENCE optional }|
    { ID id-MaskedIMEISV                    CRITICALITY ignore TYPE MaskedIMEISV                    PRESENCE optional }|
    { ID id-NAS-PDU                         CRITICALITY ignore TYPE NAS-PDU                         PRESENCE optional }|
    { ID id-EmergencyFallbackIndicator       CRITICALITY reject  TYPE EmergencyFallbackIndicator       PRESENCE optional }|
    { ID id-RRCInactiveTransitionReportRequest CRITICALITY ignore TYPE RRCInactiveTransitionReportRequest PRESENCE optional }|
    { ID id-UERadioCapabilityForPaging      CRITICALITY ignore TYPE UERadioCapabilityForPaging      PRESENCE optional },
    ...
}

-- *****
--
-- INITIAL CONTEXT SETUP RESPONSE
--
-- *****

InitialContextSetupResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    { {InitialContextSetupResponseIEs} },
    ...
}

InitialContextSetupResponseIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore TYPE AMF-UE-NGAP-ID          PRESENCE mandatory
    }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore TYPE RAN-UE-NGAP-ID          PRESENCE mandatory
    }|
    { ID id-PDUSessionResourceSetupListCxtRes CRITICALITY ignore TYPE PDUSessionResourceSetupListCxtRes PRESENCE optional
    }|
    { ID id-PDUSessionResourceFailedToSetupListCxtRes CRITICALITY ignore TYPE PDUSessionResourceFailedToSetupListCxtRes PRESENCE optional
    }|
    { ID id-CriticalityDiagnostics   CRITICALITY ignore TYPE CriticalityDiagnostics   PRESENCE optional
    },
    ...
}

-- *****
--
-- INITIAL CONTEXT SETUP FAILURE
--
-- *****

InitialContextSetupFailure ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    { {InitialContextSetupFailureIEs} },
    ...
}

InitialContextSetupFailureIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore TYPE AMF-UE-NGAP-ID          PRESENCE mandatory
    }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore TYPE RAN-UE-NGAP-ID          PRESENCE mandatory
    }|
}

```

```

    { ID id-PDUSessionResourceFailedToSetupListCxtFail CRITICALITY ignore TYPE PDUSessionResourceFailedToSetupListCxtFail PRESENCE optional
    }|
    { ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory
    }|
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional
    },
    ...
}

-- *****
--
-- UE Context Release Request Elementary Procedure
--
-- *****
--
-- UE CONTEXT RELEASE REQUEST
--
-- *****

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

UEContextReleaseRequest-IEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID CRITICALITY reject TYPE AMF-UE-NGAP-ID PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID CRITICALITY reject TYPE RAN-UE-NGAP-ID PRESENCE mandatory }|
    { ID id-PDUSessionResourceListCxtRelReq CRITICALITY reject TYPE PDUSessionResourceListCxtRelReq PRESENCE optional }|
    { ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory },
    ...
}

-- *****
--
-- UE Context Release Elementary Procedure
--
-- *****
--
-- UE CONTEXT RELEASE COMMAND
--
-- *****

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

UEContextReleaseCommand-IEs NGAP-PROTOCOL-IES ::= {
    { ID id-UE-NGAP-IDs CRITICALITY reject TYPE UE-NGAP-IDs PRESENCE mandatory }|
    { ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory },

```

```

}
...
-- *****
--
-- UE CONTEXT RELEASE COMPLETE
--
-- *****

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

UEContextReleaseComplete-IEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-UserLocationInformation CRITICALITY ignore TYPE UserLocationInformation PRESENCE optional   }|
    { ID id-InfoOnRecommendedCellsAndRANNodesForPaging CRITICALITY ignore TYPE InfoOnRecommendedCellsAndRANNodesForPaging PRESENCE optional }|
    { ID id-PDUSessionResourceListCxtRelCpl CRITICALITY reject TYPE PDUSessionResourceListCxtRelCpl PRESENCE optional }|
    { ID id-CriticalityDiagnostics   CRITICALITY ignore TYPE CriticalityDiagnostics   PRESENCE optional }|
    ...
}

-- *****
--
-- UE Context Modification Elementary Procedure
--
-- *****

-- *****
--
-- UE CONTEXT MODIFICATION REQUEST
--
-- *****

UEContextModificationRequest ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {UEContextModificationRequestIEs} },
    ...
}

UEContextModificationRequestIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RANPagingPriority        CRITICALITY ignore TYPE RANPagingPriority        PRESENCE optional   }|
    { ID id-SecurityKey              CRITICALITY reject TYPE SecurityKey              PRESENCE optional   }|
    { ID id-IndexToRFSP              CRITICALITY ignore TYPE IndexToRFSP              PRESENCE optional   }|
    { ID id-UEAggregateMaximumBitRate CRITICALITY ignore TYPE UEAggregateMaximumBitRate PRESENCE optional   }|
    { ID id-UESecurityCapabilities    CRITICALITY reject TYPE UESecurityCapabilities    PRESENCE optional   }|
    { ID id-CoreNetworkAssistanceInformation CRITICALITY ignore TYPE CoreNetworkAssistanceInformation PRESENCE optional }|
    { ID id-EmergencyFallbackIndicator CRITICALITY reject TYPE EmergencyFallbackIndicator PRESENCE optional }|
    { ID id-NewAMF-UE-NGAP-ID        CRITICALITY ignore TYPE AMF-UE-NGAP-ID          PRESENCE optional   }|
    { ID id-RRCInactiveTransitionReportRequest CRITICALITY ignore TYPE RRCInactiveTransitionReportRequest PRESENCE optional }|
    ...
}

```

```

}
-- *****
--
-- UE CONTEXT MODIFICATION RESPONSE
--
-- *****

UEContextModificationResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {UEContextModificationResponseIEs} },
    ...
}

UEContextModificationResponseIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RRCState                CRITICALITY ignore  TYPE RRCState                PRESENCE optional   }|
    { ID id-UserLocationInformation CRITICALITY ignore  TYPE UserLocationInformation PRESENCE optional   }|
    { ID id-CriticalityDiagnostics   CRITICALITY ignore  TYPE CriticalityDiagnostics  PRESENCE optional   },
    ...
}

-- *****
--
-- UE CONTEXT MODIFICATION FAILURE
--
-- *****

UEContextModificationFailure ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {UEContextModificationFailureIEs} },
    ...
}

UEContextModificationFailureIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-Cause                    CRITICALITY ignore  TYPE Cause                    PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics   CRITICALITY ignore  TYPE CriticalityDiagnostics  PRESENCE optional   },
    ...
}

-- *****
--
-- RRC INACTIVE TRANSITION REPORT
--
-- *****

RRCInactiveTransitionReport ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {RRCInactiveTransitionReportIEs} },
    ...
}

RRCInactiveTransitionReportIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|

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    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RRCState                CRITICALITY ignore TYPE RRCState                PRESENCE mandatory }|
    { ID id-UserLocationInformation  CRITICALITY ignore TYPE UserLocationInformation PRESENCE mandatory },
    ...
}

-- *****
--
-- UE MOBILITY MANAGEMENT ELEMENTARY PROCEDURES
--
-- *****
--
-- Handover Preparation Elementary Procedure
--
-- *****
--
-- HANDOVER REQUIRED
--
-- *****

HandoverRequired ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {HandoverRequiredIEs} },
    ...
}

HandoverRequiredIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-HandoverType            CRITICALITY reject TYPE HandoverType            PRESENCE mandatory }|
    { ID id-Cause                   CRITICALITY ignore TYPE Cause                   PRESENCE mandatory }|
    { ID id-TargetID                CRITICALITY reject TYPE TargetID                PRESENCE mandatory }|
    { ID id-DirectForwardingPathAvailability CRITICALITY ignore TYPE DirectForwardingPathAvailability PRESENCE optional }|
    { ID id-PDUSessionResourceListHORqd CRITICALITY reject TYPE PDUSessionResourceListHORqd PRESENCE mandatory }|
    { ID id-SourceToTarget-TransparentContainer CRITICALITY reject TYPE SourceToTarget-TransparentContainer PRESENCE mandatory },
    ...
}

-- *****
--
-- HANDOVER COMMAND
--
-- *****

HandoverCommand ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {HandoverCommandIEs} },
    ...
}

HandoverCommandIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|

```

```

    { ID id-RAN-UE-NGAP-ID                CRITICALITY reject TYPE RAN-UE-NGAP-ID                PRESENCE mandatory }|
    { ID id-HandoverType                   CRITICALITY reject TYPE HandoverType                   PRESENCE mandatory }|
    { ID id-NASSecurityParametersFromNGRAN CRITICALITY reject TYPE NASSecurityParametersFromNGRAN PRESENCE conditional }|
    -- This IE shall be present if HandoverType IE is set to value "5GStoEPPS" --
    { ID id-PDUSessionResourceHandoverList CRITICALITY ignore TYPE PDUSessionResourceHandoverList PRESENCE mandatory }|
    { ID id-PDUSessionResourceToReleaseListHOCmd CRITICALITY ignore TYPE PDUSessionResourceToReleaseListHOCmd PRESENCE optional }|
    { ID id-TargetToSource-TransparentContainer CRITICALITY reject TYPE TargetToSource-TransparentContainer PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics         CRITICALITY ignore TYPE CriticalityDiagnostics         PRESENCE optional }|
    ...
}

-- *****
--
-- HANDOVER PREPARATION FAILURE
--
-- *****

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

HandoverPreparationFailureIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID                CRITICALITY ignore TYPE AMF-UE-NGAP-ID                PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID                CRITICALITY ignore TYPE RAN-UE-NGAP-ID                PRESENCE mandatory }|
    { ID id-Cause                          CRITICALITY ignore TYPE Cause                          PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics         CRITICALITY ignore TYPE CriticalityDiagnostics         PRESENCE optional }|
    ...
}

-- *****
--
-- Handover Resource Allocation Elementary Procedure
--
-- *****
--
-- HANDOVER REQUEST
--
-- *****

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

HandoverRequestIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID                CRITICALITY reject TYPE AMF-UE-NGAP-ID                PRESENCE mandatory }|
    { ID id-HandoverType                   CRITICALITY reject TYPE HandoverType                   PRESENCE mandatory }|
    { ID id-Cause                          CRITICALITY ignore TYPE Cause                          PRESENCE mandatory }|
    { ID id-UEAggregateMaximumBitRate     CRITICALITY reject TYPE UEAggregateMaximumBitRate     PRESENCE mandatory }|
    { ID id-CoreNetworkAssistanceInformation CRITICALITY ignore TYPE CoreNetworkAssistanceInformation PRESENCE optional }|
}

```



```

{ ID id-UESecurityCapabilities          CRITICALITY reject TYPE UESecurityCapabilities PRESENCE mandatory }|
{ ID id-SecurityContext                 CRITICALITY reject TYPE SecurityContext PRESENCE mandatory }|
{ ID id-NewSecurityContextInd           CRITICALITY reject TYPE NewSecurityContextInd PRESENCE optional }|
{ ID id-NASC                             CRITICALITY reject TYPE NAS-PDU PRESENCE optional }|
{ ID id-PDUSessionResourceSetupListHReq CRITICALITY reject TYPE PDUSessionResourceSetupListHReq PRESENCE mandatory }|
{ ID id-AllowedNSSAI                   CRITICALITY reject TYPE AllowedNSSAI PRESENCE mandatory }|
{ ID id-TraceActivation                 CRITICALITY ignore TYPE TraceActivation PRESENCE optional }|
{ ID id-MaskedIMEISV                   CRITICALITY ignore TYPE MaskedIMEISV PRESENCE optional }|
{ ID id-SourceToTarget-TransparentContainer CRITICALITY reject TYPE SourceToTarget-TransparentContainer PRESENCE mandatory }|
{ ID id-MobilityRestrictionList         CRITICALITY ignore TYPE MobilityRestrictionList PRESENCE optional }|
{ ID id-LocationReportingRequestType    CRITICALITY ignore TYPE LocationReportingRequestType PRESENCE optional }|
{ ID id-RRCInactiveTransitionReportRequest CRITICALITY ignore TYPE RRCInactiveTransitionReportRequest PRESENCE optional }|
{ ID id-GUAMI                           CRITICALITY reject TYPE GUAMI PRESENCE mandatory }|
...
}

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

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

HandoverRequestAcknowledgeIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-PDUSessionResourceAdmittedList CRITICALITY ignore TYPE PDUSessionResourceAdmittedList PRESENCE mandatory }|
    { ID id-PDUSessionResourceFailedToSetupListHOAck CRITICALITY ignore TYPE PDUSessionResourceFailedToSetupListHOAck PRESENCE optional }|
    { ID id-TargetToSource-TransparentContainer CRITICALITY reject TYPE TargetToSource-TransparentContainer PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional }|
    ...
}

-- *****
--
-- HANDOVER FAILURE
--
-- *****

HandoverFailure ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { { HandoverFailureIEs } },
    ...
}

HandoverFailureIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-Cause                    CRITICALITY ignore TYPE Cause                    PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional }|
    ...
}

```

```

}
-- *****
--
-- Handover Notification Elementary Procedure
--
-- *****

-- *****
--
-- HANDOVER NOTIFY
--
-- *****

HandoverNotify ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { { HandoverNotifyIEs } },
    ...
}

HandoverNotifyIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-UserLocationInformation CRITICALITY ignore  TYPE UserLocationInformation PRESENCE optional   },
    ...
}

-- *****
--
-- Path Switch Request Elementary Procedure
--
-- *****

-- *****
--
-- PATH SWITCH REQUEST
--
-- *****

PathSwitchRequest ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { { PathSwitchRequestIEs } },
    ...
}

PathSwitchRequestIEs NGAP-PROTOCOL-IES ::= {
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-SourceAMF-UE-NGAP-ID    CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-UserLocationInformation CRITICALITY ignore  TYPE UserLocationInformation PRESENCE mandatory }|
    { ID id-UESecurityCapabilities   CRITICALITY ignore  TYPE UESecurityCapabilities   PRESENCE mandatory }|
    { ID id-PDUSessionResourceToBeSwitchedDLList CRITICALITY reject  TYPE PDUSessionResourceToBeSwitchedDLList PRESENCE mandatory }|
    { ID id-PDUSessionResourceFailedToSetupListPSReq CRITICALITY ignore  TYPE PDUSessionResourceFailedToSetupListPSReq PRESENCE optional   },
    ...
}

```

```

-- *****
--
-- PATH SWITCH REQUEST ACKNOWLEDGE
--
-- *****

PathSwitchRequestAcknowledge ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { { PathSwitchRequestAcknowledgeIEs } },
    ...
}

PathSwitchRequestAcknowledgeIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-UESecurityCapabilities  CRITICALITY reject TYPE UESecurityCapabilities  PRESENCE optional }|
    { ID id-SecurityContext         CRITICALITY reject TYPE SecurityContext         PRESENCE mandatory }|
    { ID id-NewSecurityContextInd    CRITICALITY ignore TYPE NewSecurityContextInd    PRESENCE optional }|
    { ID id-PDUSessionResourceSwitchedList CRITICALITY ignore TYPE PDUSessionResourceSwitchedList PRESENCE mandatory }|
    { ID id-PDUSessionResourceReleasedListPSAck CRITICALITY ignore TYPE PDUSessionResourceReleasedListPSAck PRESENCE optional }|
    { ID id-AllowedNSSAI            CRITICALITY reject TYPE AllowedNSSAI            PRESENCE mandatory }|
    { ID id-CoreNetworkAssistanceInformation CRITICALITY ignore TYPE CoreNetworkAssistanceInformation PRESENCE optional }|
    { ID id-RRCInactiveTransitionReportRequest CRITICALITY ignore TYPE RRCInactiveTransitionReportRequest PRESENCE optional }|
    { ID id-CriticalityDiagnostics   CRITICALITY ignore TYPE CriticalityDiagnostics   PRESENCE optional }|
    ...
}

-- *****
--
-- PATH SWITCH REQUEST FAILURE
--
-- *****

PathSwitchRequestFailure ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { { PathSwitchRequestFailureIEs } },
    ...
}

PathSwitchRequestFailureIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-PDUSessionResourceReleasedListPSFail CRITICALITY ignore TYPE PDUSessionResourceReleasedListPSFail PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics   CRITICALITY ignore TYPE CriticalityDiagnostics   PRESENCE optional }|
    ...
}

-- *****
--
-- Handover Cancellation Elementary Procedure
--
-- *****

```

```

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

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

HandoverCancelIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID      CRITICALITY reject  TYPE AMF-UE-NGAP-ID      PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID      CRITICALITY reject  TYPE RAN-UE-NGAP-ID      PRESENCE mandatory }|
    { ID id-Cause                CRITICALITY ignore  TYPE Cause                PRESENCE mandatory },
    ...
}

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

HandoverCancelAcknowledge ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { { HandoverCancelAcknowledgeIEs } },
    ...
}

HandoverCancelAcknowledgeIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID      CRITICALITY ignore  TYPE AMF-UE-NGAP-ID      PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID      CRITICALITY ignore  TYPE RAN-UE-NGAP-ID      PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics CRITICALITY ignore  TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

-- *****
--
-- Uplink RAN Status Transfer Elementary Procedure
--
-- *****
--
-- UPLINK RAN STATUS TRANSFER
--
-- *****

UplinkRANStatusTransfer ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {UplinkRANStatusTransferIEs} },
    ...
}

UplinkRANStatusTransferIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID      CRITICALITY reject  TYPE AMF-UE-NGAP-ID      PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID      CRITICALITY reject  TYPE RAN-UE-NGAP-ID      PRESENCE mandatory }|

```

```

    { ID id-RANStatusTransfer-TransparentContainer      CRITICALITY reject  TYPE RANStatusTransfer-TransparentContainer      PRESENCE mandatory  },
    ...
}

-- *****
--
-- Downlink RAN Status Transfer Elementary Procedure
--
-- *****
--
-- *****
--
-- DOWNLINK RAN STATUS TRANSFER
--
-- *****

DownlinkRANStatusTransfer ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {DownlinkRANStatusTransferIEs} },
    ...
}

DownlinkRANStatusTransferIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory  }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory  }|
    { ID id-RANStatusTransfer-TransparentContainer  CRITICALITY reject  TYPE RANStatusTransfer-TransparentContainer  PRESENCE mandatory  },
    ...
}

-- *****
--
-- PAGING ELEMENTARY PROCEDURE
--
-- *****
--
-- *****
--
-- PAGING
--
-- *****

Paging ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PagingIEs} },
    ...
}

PagingIEs NGAP-PROTOCOL-IES ::= {
    { ID id-UEPagingIdentity        CRITICALITY ignore  TYPE UEPagingIdentity        PRESENCE mandatory  }|
    { ID id-PagingDRX               CRITICALITY ignore  TYPE PagingDRX               PRESENCE optional   }|
    { ID id-TAILListForPaging       CRITICALITY ignore  TYPE TAILListForPaging       PRESENCE mandatory  }|
    { ID id-PagingPriority           CRITICALITY ignore  TYPE PagingPriority           PRESENCE optional   }|
    { ID id-UERadioCapabilityForPaging CRITICALITY ignore  TYPE UERadioCapabilityForPaging PRESENCE optional   }|
    { ID id-PagingOrigin            CRITICALITY ignore  TYPE PagingOrigin            PRESENCE optional   }|
    { ID id-AssistanceDataForPaging CRITICALITY ignore  TYPE AssistanceDataForPaging PRESENCE optional   },
    ...
}

```

```

}
-- *****
--
-- NAS TRANSPORT ELEMENTARY PROCEDURES
--
-- *****

-- *****
--
-- INITIAL UE MESSAGE
--
-- *****

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

InitialUEMessage-IEs NGAP-PROTOCOL-IES ::= {
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-NAS-PDU                 CRITICALITY reject TYPE NAS-PDU                 PRESENCE mandatory }|
    { ID id-UserLocationInformation CRITICALITY reject TYPE UserLocationInformation PRESENCE mandatory }|
    { ID id-RRCEstablishmentCause   CRITICALITY ignore TYPE RRCEstablishmentCause   PRESENCE mandatory }|
    { ID id-FiveG-S-TMSI            CRITICALITY reject TYPE FiveG-S-TMSI            PRESENCE optional  }|
    { ID id-AMFSetID                CRITICALITY ignore TYPE AMFSetID                PRESENCE optional  }|
    { ID id-UEContextRequest        CRITICALITY ignore TYPE UEContextRequest        PRESENCE optional  }|
    { ID id-AllowedNSSAI            CRITICALITY reject TYPE AllowedNSSAI            PRESENCE optional  },
    ...
}

-- *****
--
-- DOWNLINK NAS TRANSPORT
--
-- *****

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

DownlinkNASTransport-IEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-OldAMF                  CRITICALITY reject TYPE AMFName                  PRESENCE optional  }|
    { ID id-RANPagingPriority        CRITICALITY ignore TYPE RANPagingPriority        PRESENCE optional  }|
    { ID id-NAS-PDU                 CRITICALITY reject TYPE NAS-PDU                 PRESENCE mandatory }|
    { ID id-MobilityRestrictionList CRITICALITY ignore TYPE MobilityRestrictionList PRESENCE optional  }|
    { ID id-IndexToRFSP             CRITICALITY ignore TYPE IndexToRFSP             PRESENCE optional  }|
    { ID id-UEAggregateMaximumBitRate CRITICALITY ignore TYPE UEAggregateMaximumBitRate PRESENCE optional  }|
    { ID id-AllowedNSSAI            CRITICALITY reject TYPE AllowedNSSAI            PRESENCE optional  },
    ...
}

```

```

-- *****
--
-- UPLINK NAS TRANSPORT
--
-- *****

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

UplinkNASTransport-IEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-NAS-PDU                  CRITICALITY reject  TYPE NAS-PDU                  PRESENCE mandatory }|
    { ID id-UserLocationInformation  CRITICALITY ignore  TYPE UserLocationInformation  PRESENCE mandatory },
    ...
}

-- *****
--
-- NAS NON DELIVERY INDICATION
--
-- *****

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

NASNonDeliveryIndication-IEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-NAS-PDU                  CRITICALITY ignore  TYPE NAS-PDU                  PRESENCE mandatory }|
    { ID id-Cause                    CRITICALITY ignore  TYPE Cause                    PRESENCE mandatory },
    ...
}

-- *****
--
-- REROUTE NAS REQUEST
--
-- *****

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

RerouteNASRequest-IEs NGAP-PROTOCOL-IES ::= {
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore  TYPE AMF-UE-NGAP-ID          PRESENCE optional }|
    { ID id-NGAP-Message            CRITICALITY reject  TYPE OCTET STRING            PRESENCE mandatory }|
}

```

```

    { ID id-AMFSetID                CRITICALITY reject  TYPE AMFSetID                PRESENCE mandatory }|
    { ID id-AllowedNSSAI            CRITICALITY reject  TYPE AllowedNSSAI            PRESENCE optional  },
    ...
}

-- *****
--
-- INTERFACE MANAGEMENT ELEMENTARY PROCEDURES
--
-- *****

-- *****
--
-- NG Setup Elementary Procedure
--
-- *****

-- *****
--
-- NG SETUP REQUEST
--
-- *****

NGSetupRequest ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {NGSetupRequestIEs} },
    ...
}

NGSetupRequestIEs NGAP-PROTOCOL-IES ::= {
    { ID id-GlobalRANNodeID          CRITICALITY reject  TYPE GlobalRANNodeID          PRESENCE mandatory }|
    { ID id-RANNodeName              CRITICALITY ignore  TYPE RANNodeName              PRESENCE optional   }|
    { ID id-SupportedTAList          CRITICALITY reject  TYPE SupportedTAList          PRESENCE mandatory }|
    { ID id-DefaultPagingDRX         CRITICALITY ignore  TYPE PagingDRX                PRESENCE mandatory },
    ...
}

-- *****
--
-- NG SETUP RESPONSE
--
-- *****

NGSetupResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {NGSetupResponseIEs} },
    ...
}

NGSetupResponseIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMFName                  CRITICALITY reject  TYPE AMFName                  PRESENCE mandatory }|
    { ID id-ServedGUAMIList          CRITICALITY reject  TYPE ServedGUAMIList          PRESENCE mandatory }|
    { ID id-RelativeAMFCapacity      CRITICALITY ignore  TYPE RelativeAMFCapacity      PRESENCE mandatory }|
    { ID id-PLMNSupportList          CRITICALITY reject  TYPE PLMNSupportList          PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics    CRITICALITY ignore  TYPE CriticalityDiagnostics    PRESENCE optional   },
    ...
}

```



```

}
-- *****
--
-- NG SETUP FAILURE
--
-- *****

NGSetupFailure ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {NGSetupFailureIEs} },
    ...
}

NGSetupFailureIEs NGAP-PROTOCOL-IES ::= {
    { ID id-Cause          CRITICALITY ignore TYPE Cause          PRESENCE mandatory }|
    { ID id-TimeToWait     CRITICALITY ignore TYPE TimeToWait     PRESENCE optional   }|
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional   },
    ...
}

-- *****
--
-- RAN Configuration Update Elementary Procedure
--
-- *****

-- *****
--
-- RAN CONFIGURATION UPDATE
--
-- *****

RANConfigurationUpdate ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {RANConfigurationUpdateIEs} },
    ...
}

RANConfigurationUpdateIEs NGAP-PROTOCOL-IES ::= {
    { ID id-RANNodeName     CRITICALITY ignore TYPE RANNodeName     PRESENCE optional   }|
    { ID id-SupportedTAList CRITICALITY reject TYPE SupportedTAList   PRESENCE optional   }|
    { ID id-DefaultPagingDRX CRITICALITY ignore TYPE PagingDRX       PRESENCE optional   },
    ...
}

-- *****
--
-- RAN CONFIGURATION UPDATE ACKNOWLEDGE
--
-- *****

RANConfigurationUpdateAcknowledge ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {RANConfigurationUpdateAcknowledgeIEs} },
    ...
}

```

```

RANConfigurationUpdateAcknowledgeIEs NGAP-PROTOCOL-IES ::= {
  { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics      PRESENCE optional  },
  ...
}

-- *****
--
-- RAN CONFIGURATION UPDATE FAILURE
--
-- *****

RANConfigurationUpdateFailure ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container      { {RANConfigurationUpdateFailureIEs} },
  ...
}

RANConfigurationUpdateFailureIEs NGAP-PROTOCOL-IES ::= {
  { ID id-Cause                CRITICALITY ignore  TYPE Cause                PRESENCE mandatory  }|
  { ID id-TimeToWait           CRITICALITY ignore  TYPE TimeToWait           PRESENCE optional   }|
  { ID id-CriticalityDiagnostics CRITICALITY ignore  TYPE CriticalityDiagnostics PRESENCE optional   },
  ...
}

-- *****
--
-- AMF Configuration Update Elementary Procedure
--
-- *****

-- *****
--
-- AMF CONFIGURATION UPDATE
--
-- *****

AMFConfigurationUpdate ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container      { {AMFConfigurationUpdateIEs} },
  ...
}

AMFConfigurationUpdateIEs NGAP-PROTOCOL-IES ::= {
  { ID id-AMFName                CRITICALITY reject  TYPE AMFName                PRESENCE optional   }|
  { ID id-ServedGUAMIList        CRITICALITY reject  TYPE ServedGUAMIList        PRESENCE optional   }|
  { ID id-RelativeAMFCapacity    CRITICALITY ignore  TYPE RelativeAMFCapacity    PRESENCE optional   }|
  { ID id-PLMNSupportList        CRITICALITY reject  TYPE PLMNSupportList        PRESENCE optional   }|
  { ID id-AMF-TNLAssociationToAddList CRITICALITY ignore  TYPE AMF-TNLAssociationToAddList PRESENCE optional   }|
  { ID id-AMF-TNLAssociationToRemoveList CRITICALITY ignore  TYPE AMF-TNLAssociationToRemoveList PRESENCE optional   }|
  { ID id-AMF-TNLAssociationToUpdateList CRITICALITY ignore  TYPE AMF-TNLAssociationToUpdateList PRESENCE optional   },
  ...
}

-- *****
--

```

```

-- AMF CONFIGURATION UPDATE ACKNOWLEDGE
--
-- *****
AMFConfigurationUpdateAcknowledge ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {AMFConfigurationUpdateAcknowledgeIEs} },
    ...
}

AMFConfigurationUpdateAcknowledgeIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-TNLAssociationSetupList          CRITICALITY ignore TYPE AMF-TNLAssociationSetupList          PRESENCE optional }|
    { ID id-AMF-TNLAssociationFailedToSetupList  CRITICALITY ignore TYPE TNLAssociationList          PRESENCE optional }|
    { ID id-CriticalityDiagnostics              CRITICALITY ignore TYPE CriticalityDiagnostics        PRESENCE optional },
    ...
}

-- *****
--
-- AMF CONFIGURATION UPDATE FAILURE
--
-- *****

AMFConfigurationUpdateFailure ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {AMFConfigurationUpdateFailureIEs} },
    ...
}

AMFConfigurationUpdateFailureIEs NGAP-PROTOCOL-IES ::= {
    { ID id-Cause                CRITICALITY ignore TYPE Cause                PRESENCE mandatory }|
    { ID id-TimeToWait           CRITICALITY ignore TYPE TimeToWait           PRESENCE optional }|
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

-- *****
--
-- AMF Status Indication Elementary Procedure
--
-- *****
--
-- AMF STATUS INDICATION
--
-- *****

AMFStatusIndication ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {AMFStatusIndicationIEs} },
    ...
}

AMFStatusIndicationIEs NGAP-PROTOCOL-IES ::= {
    { ID id-UnavailableGUAMIList  CRITICALITY reject TYPE UnavailableGUAMIList  PRESENCE mandatory },
    ...
}

```

```

}
-- *****
--
-- NG Reset Elementary Procedure
--
-- *****

-- *****
--
-- NG RESET
--
-- *****

NGReset ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {NGResetIEs} },
    ...
}

NGResetIEs NGAP-PROTOCOL-IES ::= {
    { ID id-Cause          CRITICALITY ignore  TYPE Cause          PRESENCE mandatory }|
    { ID id-ResetType     CRITICALITY reject  TYPE ResetType       PRESENCE mandatory },
    ...
}

-- *****
--
-- NG RESET ACKNOWLEDGE
--
-- *****

NGResetAcknowledge ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {NGResetAcknowledgeIEs} },
    ...
}

NGResetAcknowledgeIEs NGAP-PROTOCOL-IES ::= {
    { ID id-UE-associatedLogicalNG-connectionList          CRITICALITY ignore  TYPE UE-associatedLogicalNG-connectionList          PRESENCE optional
    }|
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics          PRESENCE optional
    },
    ...
}

-- *****
--
-- Error Indication Elementary Procedure
--
-- *****

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

```

```

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

ErrorIndicationIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore  TYPE AMF-UE-NGAP-ID          PRESENCE optional }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore  TYPE RAN-UE-NGAP-ID          PRESENCE optional }|
    { ID id-Cause                    CRITICALITY ignore  TYPE Cause                    PRESENCE optional }|
    { ID id-CriticalityDiagnostics    CRITICALITY ignore  TYPE CriticalityDiagnostics    PRESENCE optional },
    ...
}

-- *****
--
-- OVERLOAD START
--
-- *****

OverloadStart ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {OverloadStartIEs} },
    ...
}

OverloadStartIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMFOverloadResponse      CRITICALITY reject  TYPE OverloadResponse      PRESENCE optional }|
    { ID id-AMFTrafficLoadReductionIndication  CRITICALITY ignore  TYPE TrafficLoadReductionIndication  PRESENCE optional }|
    { ID id-OverloadStartNSSAList      CRITICALITY ignore  TYPE OverloadStartNSSAList      PRESENCE optional },
    ...
}

-- *****
--
-- OVERLOAD STOP
--
-- *****

OverloadStop ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {OverloadStopIEs} },
    ...
}

OverloadStopIEs NGAP-PROTOCOL-IES ::= {
    ...
}

-- *****
--
-- CONFIGURATION TRANSFER ELEMENTARY PROCEDURES
--
-- *****

```

```
-- *****
--
-- UPLINK RAN CONFIGURATION TRANSFER
--
-- *****

UplinkRANConfigurationTransfer ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {UplinkRANConfigurationTransferIEs} },
    ...
}

UplinkRANConfigurationTransferIEs NGAP-PROTOCOL-IES ::= {
    { ID id-SONConfigurationTransferUL      CRITICALITY ignore TYPE SONConfigurationTransfer PRESENCE optional },
    ...
}

-- *****
--
-- DOWNLINK RAN CONFIGURATION TRANSFER
--
-- *****

DownlinkRANConfigurationTransfer ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {DownlinkRANConfigurationTransferIEs} },
    ...
}

DownlinkRANConfigurationTransferIEs NGAP-PROTOCOL-IES ::= {
    { ID id-SONConfigurationTransferDL      CRITICALITY ignore TYPE SONConfigurationTransfer PRESENCE optional },
    ...
}

-- *****
--
-- WARNING MESSAGE TRANSMISSION ELEMENTARY PROCEDURES
--
-- *****

-- *****
--
-- Write-Replace Warning Elementary Procedure
--
-- *****

-- *****
--
-- WRITE-REPLACE WARNING REQUEST
--
-- *****

WriteReplaceWarningRequest ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {WriteReplaceWarningRequestIEs} },
    ...
}
```

```

WriteReplaceWarningRequestIEs NGAP-PROTOCOL-IES ::= {
  { ID id-MessageIdentifier          CRITICALITY reject  TYPE MessageIdentifier          PRESENCE mandatory }|
  { ID id-SerialNumber                CRITICALITY reject  TYPE SerialNumber            PRESENCE mandatory }|
  { ID id-WarningAreaList             CRITICALITY ignore  TYPE WarningAreaList        PRESENCE optional  }|
  { ID id-RepetitionPeriod            CRITICALITY reject  TYPE RepetitionPeriod       PRESENCE mandatory }|
  { ID id-NumberOfBroadcastsRequested CRITICALITY reject  TYPE NumberOfBroadcastsRequested PRESENCE mandatory }|
  { ID id-WarningType                 CRITICALITY ignore  TYPE WarningType            PRESENCE optional  }|
  { ID id-WarningSecurityInfo         CRITICALITY ignore  TYPE WarningSecurityInfo    PRESENCE optional  }|
  { ID id-DataCodingScheme            CRITICALITY ignore  TYPE DataCodingScheme       PRESENCE optional  }|
  { ID id-WarningMessageContents     CRITICALITY ignore  TYPE WarningMessageContents PRESENCE optional  }|
  { ID id-ConcurrentWarningMessageInd CRITICALITY reject  TYPE ConcurrentWarningMessageInd PRESENCE optional  }|
  { ID id-WarningAreaCoordinates     CRITICALITY ignore  TYPE WarningAreaCoordinates PRESENCE optional  }|
  ...
}

-- *****
--
-- WRITE-REPLACE WARNING RESPONSE
--
-- *****

WriteReplaceWarningResponse ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container          { {WriteReplaceWarningResponseIEs} },
  ...
}

WriteReplaceWarningResponseIEs NGAP-PROTOCOL-IES ::= {
  { ID id-MessageIdentifier          CRITICALITY reject  TYPE MessageIdentifier          PRESENCE mandatory }|
  { ID id-SerialNumber                CRITICALITY reject  TYPE SerialNumber            PRESENCE mandatory }|
  { ID id-BroadcastCompletedAreaList CRITICALITY ignore  TYPE BroadcastCompletedAreaList PRESENCE optional  }|
  { ID id-CriticalityDiagnostics     CRITICALITY ignore  TYPE CriticalityDiagnostics    PRESENCE optional  }|
  ...
}

-- *****
--
-- PWS Cancel Elementary Procedure
--
-- *****
--
-- PWS CANCEL REQUEST
--
-- *****

PWSCancelRequest ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container          { {PWSCancelRequestIEs} },
  ...
}

PWSCancelRequestIEs NGAP-PROTOCOL-IES ::= {
  { ID id-MessageIdentifier          CRITICALITY reject  TYPE MessageIdentifier          PRESENCE mandatory }|

```

```

    { ID id-SerialNumber          CRITICALITY reject TYPE SerialNumber          PRESENCE mandatory }|
    { ID id-WarningAreaList       CRITICALITY ignore TYPE WarningAreaList       PRESENCE optional  }|
    { ID id-CancelAllWarningMessages CRITICALITY reject TYPE CancelAllWarningMessages PRESENCE optional  },
    ...
}

-- *****
--
-- PWS CANCEL RESPONSE
--
-- *****

PWSCancelResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PWSCancelResponseIEs} },
    ...
}

PWSCancelResponseIEs NGAP-PROTOCOL-IES ::= {
    { ID id-MessageIdentifier      CRITICALITY reject TYPE MessageIdentifier      PRESENCE mandatory }|
    { ID id-SerialNumber           CRITICALITY reject TYPE SerialNumber           PRESENCE mandatory }|
    { ID id-BroadcastCancelledAreaList CRITICALITY ignore TYPE BroadcastCancelledAreaList PRESENCE optional  }|
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional  },
    ...
}

-- *****
--
-- PWS Restart Indication Elementary Procedure
--
-- *****
--
-- PWS RESTART INDICATION
--
-- *****

PWSRestartIndication ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PWSRestartIndicationIEs} },
    ...
}

PWSRestartIndicationIEs NGAP-PROTOCOL-IES ::= {
    { ID id-CellIDListForRestart    CRITICALITY reject TYPE CellIDListForRestart    PRESENCE mandatory }|
    { ID id-GlobalRANNodeID         CRITICALITY reject TYPE GlobalRANNodeID         PRESENCE mandatory }|
    { ID id-TAIListForRestart       CRITICALITY reject TYPE TAIListForRestart       PRESENCE mandatory }|
    { ID id-EmergencyAreaIDListForRestart CRITICALITY reject TYPE EmergencyAreaIDListForRestart PRESENCE optional  },
    ...
}

-- *****
--
-- PWS Failure Indication Elementary Procedure
--

```



```

-- *****
-- *****
--
-- PWS FAILURE INDICATION
--
-- *****

PWSFailureIndication ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PWSFailureIndicationIEs} },
    ...
}

PWSFailureIndicationIEs NGAP-PROTOCOL-IES ::= {
    { ID id-PWSFailedCellIDList          CRITICALITY reject  TYPE PWSFailedCellIDList    PRESENCE mandatory }|
    { ID id-GlobalRANNodeID              CRITICALITY reject  TYPE GlobalRANNodeID      PRESENCE mandatory },
    ...
}

-- *****
--
-- NRPPA TRANSPORT ELEMENTARY PROCEDURES
--
-- *****

-- *****
--
-- DOWNLINK UE ASSOCIATED NRPPA TRANSPORT
--
-- *****

DownlinkUEAssociatedNRPPaTransport ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {DownlinkUEAssociatedNRPPaTransportIEs} },
    ...
}

DownlinkUEAssociatedNRPPaTransportIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID                CRITICALITY reject  TYPE AMF-UE-NGAP-ID      PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID                CRITICALITY reject  TYPE RAN-UE-NGAP-ID      PRESENCE mandatory }|
    { ID id-RoutingID                     CRITICALITY reject  TYPE RoutingID            PRESENCE mandatory }|
    { ID id-NRPPa-PDU                     CRITICALITY reject  TYPE NRPPa-PDU           PRESENCE mandatory },
    ...
}

-- *****
--
-- UPLINK UE ASSOCIATED NRPPA TRANSPORT
--
-- *****

UplinkUEAssociatedNRPPaTransport ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {UplinkUEAssociatedNRPPaTransportIEs} },
    ...
}

```

```

UplinkUEAssociatedNRPPaTransportIES NGAP-PROTOCOL-IES ::= {
  { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
  { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
  { ID id-RoutingID               CRITICALITY reject  TYPE RoutingID              PRESENCE mandatory }|
  { ID id-NRPPa-PDU               CRITICALITY reject  TYPE NRPPa-PDU              PRESENCE mandatory },
  ...
}

-- *****
--
-- DOWNLINK NON UE ASSOCIATED NRPPA TRANSPORT
--
-- *****

DownlinkNonUEAssociatedNRPPaTransport ::= SEQUENCE {
  protocolIES      ProtocolIE-Container      { {DownlinkNonUEAssociatedNRPPaTransportIES} },
  ...
}

DownlinkNonUEAssociatedNRPPaTransportIES NGAP-PROTOCOL-IES ::= {
  { ID id-RoutingID               CRITICALITY reject  TYPE RoutingID              PRESENCE mandatory }|
  { ID id-NRPPa-PDU               CRITICALITY reject  TYPE NRPPa-PDU              PRESENCE mandatory },
  ...
}

-- *****
--
-- UPLINK NON UE ASSOCIATED NRPPA TRANSPORT
--
-- *****

UplinkNonUEAssociatedNRPPaTransport ::= SEQUENCE {
  protocolIES      ProtocolIE-Container      { {UplinkNonUEAssociatedNRPPaTransportIES} },
  ...
}

UplinkNonUEAssociatedNRPPaTransportIES NGAP-PROTOCOL-IES ::= {
  { ID id-RoutingID               CRITICALITY reject  TYPE RoutingID              PRESENCE mandatory }|
  { ID id-NRPPa-PDU               CRITICALITY reject  TYPE NRPPa-PDU              PRESENCE mandatory },
  ...
}

-- *****
--
-- TRACE ELEMENTARY PROCEDURES
--
-- *****

-- *****
--
-- TRACE START
--
-- *****

```

```

TraceStart ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {TraceStartIEs} },
    ...
}

TraceStartIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-TraceActivation          CRITICALITY ignore  TYPE TraceActivation         PRESENCE mandatory }|
    ...
}

-- *****
--
-- TRACE FAILURE INDICATION
--
-- *****

TraceFailureIndication ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {TraceFailureIndicationIEs} },
    ...
}

TraceFailureIndicationIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-NGRANTraceID            CRITICALITY ignore  TYPE NGRANTraceID           PRESENCE mandatory }|
    { ID id-Cause                    CRITICALITY ignore  TYPE Cause                   PRESENCE mandatory }|
    ...
}

-- *****
--
-- DEACTIVATE TRACE
--
-- *****

DeactivateTrace ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {DeactivateTraceIEs} },
    ...
}

DeactivateTraceIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-NGRANTraceID            CRITICALITY ignore  TYPE NGRANTraceID           PRESENCE mandatory }|
    ...
}

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

```

```

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

CellTrafficTraceIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory } |
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory } |
    { ID id-NGRANTraceID           CRITICALITY ignore TYPE NGRANTraceID          PRESENCE mandatory } |
    { ID id-NGRAN-CGI              CRITICALITY ignore TYPE NGRAN-CGI              PRESENCE mandatory } |
    { ID id-TraceCollectionEntityIPAddress CRITICALITY ignore TYPE TransportLayerAddress PRESENCE mandatory } |
    ...
}

-- *****
--
-- LOCATION REPORTING ELEMENTARY PROCEDURES
--
-- *****

-- *****
--
-- LOCATION REPORTING CONTROL
--
-- *****

LocationReportingControl ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {LocationReportingControlIEs} },
    ...
}

LocationReportingControlIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory } |
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory } |
    { ID id-LocationReportingRequestType CRITICALITY ignore TYPE LocationReportingRequestType PRESENCE mandatory } |
    ...
}

-- *****
--
-- LOCATION REPORTING FAILURE INDICATION
--
-- *****

LocationReportingFailureIndication ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {LocationReportingFailureIndicationIEs} },
    ...
}

LocationReportingFailureIndicationIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory } |
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory } |

```

```

    { ID id-Cause                CRITICALITY ignore  TYPE Cause                PRESENCE mandatory },
    ...
}

-- *****
--
-- LOCATION REPORT
--
-- *****

LocationReport ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {LocationReportIEs} },
    ...
}

LocationReportIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-UserLocationInformation CRITICALITY ignore  TYPE UserLocationInformation PRESENCE mandatory }|
    { ID id-UEPresenceInAreaOfInterestList CRITICALITY ignore  TYPE UEPresenceInAreaOfInterestList PRESENCE optional }|
    { ID id-LocationReportingRequestType CRITICALITY ignore  TYPE LocationReportingRequestType PRESENCE mandatory },
    ...
}

-- *****
--
-- UE TNLA BINDING ELEMENTARY PROCEDURES
--
-- *****

-- *****
--
-- UE TNLA BINDING RELEASE REQUEST
--
-- *****

UETNLABindingReleaseRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {UETNLABindingReleaseRequestIEs} },
    ...
}

UETNLABindingReleaseRequestIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject  TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject  TYPE RAN-UE-NGAP-ID          PRESENCE mandatory },
    ...
}

-- *****
--
-- UE RADIO CAPABILITY MANAGEMENT ELEMENTARY PROCEDURES
--
-- *****

```

```

--
-- UE RADIO CAPABILITY INFO INDICATION
--
-- *****
UERadioCapabilityInfoIndication ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {UERadioCapabilityInfoIndicationIEs} },
    ...
}

UERadioCapabilityInfoIndicationIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-UERadioCapability       CRITICALITY ignore TYPE UERadioCapability       PRESENCE mandatory }|
    { ID id-UERadioCapabilityForPaging CRITICALITY ignore TYPE UERadioCapabilityForPaging PRESENCE optional },
    ...
}

-- *****
--
-- UE Radio Capability Check Elementary Procedure
--
-- *****
--
-- *****
--
-- UE RADIO CAPABILITY CHECK REQUEST
--
-- *****

UERadioCapabilityCheckRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {UERadioCapabilityCheckRequestIEs} },
    ...
}

UERadioCapabilityCheckRequestIEs NGAP-PROTOCOL-IES ::= {
    { ID id-AMF-UE-NGAP-ID          CRITICALITY reject TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY reject TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-UERadioCapability       CRITICALITY ignore TYPE UERadioCapability       PRESENCE optional },
    ...
}

-- *****
--
-- UE RADIO CAPABILITY CHECK RESPONSE
--
-- *****

UERadioCapabilityCheckResponse ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {UERadioCapabilityCheckResponseIEs} },
    ...
}

UERadioCapabilityCheckResponseIEs NGAP-PROTOCOL-IES ::= {

```

```

    { ID id-AMF-UE-NGAP-ID          CRITICALITY ignore TYPE AMF-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-RAN-UE-NGAP-ID          CRITICALITY ignore TYPE RAN-UE-NGAP-ID          PRESENCE mandatory }|
    { ID id-IMSVoiceSupportIndicator CRITICALITY reject TYPE IMSVoiceSupportIndicator PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics  CRITICALITY ignore TYPE CriticalityDiagnostics  PRESENCE optional  },
    ...
}

-- *****
--
-- PRIVATE MESSAGE ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- PRIVATE MESSAGE
--
-- *****

PrivateMessage ::= SEQUENCE {
    privateIES      PrivateIE-Container    { { PrivateMessageIES } },
    ...
}

PrivateMessageIES NGAP-PRIVATE-IES ::= {
    ...
}

END
-- ASN1STOP

```

9.4.5 Information Element Definitions

```

-- ASN1START
-- *****
--
-- Information Element Definitions
--
-- *****

NGAP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-Access (22) modules (3) ngap (1) version1 (1) ngap-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

    id-AdditionalUL-NGU-UP-TNLInformation,
    id-Cause,

```

id-DataForwardingNotPossible,
id-DL-NGU-UP-TNLInformation,
id-NetworkInstance,
id-PDUSessionAggregateMaximumBitRate,
id-PDUSessionResourceFailedToSetupListCxtFail,
id-PDUSessionType,
id-QosFlowAddOrModifyRequestList,
id-QosFlowSetupRequestList,
id-QosFlowToReleaseList,
id-SecurityIndication,
id-UL-NGU-UP-TNLInformation,
id-UL-NGU-UP-TNLModifyList,
maxnoofAllowedAreas,
maxnoofAllowedS-NSSAIs,
maxnoofBPLMNs,
maxnoofCellIDforWarning,
maxnoofCellinAoI,
maxnoofCellinEAI,
maxnoofCellsingNB,
maxnoofCellsingNB,
maxnoofCellinTAI,
maxnoofCellsinUEHistoryInfo,
maxnoofCellsUEMovingTrajectory,
maxnoofDRBs,
maxnoofEmergencyAreaID,
maxnoofEAIforRestart,
maxnoofEPLMNs,
maxnoofEPLMNsPlusOne,
maxnoofE-RABs,
maxnoofErrors,
maxnoofForbTACs,
maxnoofMultiConnectivities,
maxnoofNGConnectionsToReset,
maxnoofPDUSessions,
maxnoofPLMNs,
maxnoofQosFlows,
maxnoofRANNodeinAoI,
maxnoofRecommendedCells,
maxnoofRecommendedRANNodes,
maxnoofAoI,
maxnoofServedGUAMIs,
maxnoofSliceItems,
maxnoofTACs,
maxnoofTAIforInactive,
maxnoofTAIforPaging,
maxnoofTAIforRestart,
maxnoofTAIforWarning,
maxnoofTAIinAoI,
maxnoofTNLAssociations,
maxnoofXnExtTLAs,
maxnoofXnGTP-TLAs,
maxnoofXnTLAs
FROM NGAP-Constants


```

    Criticality,
    ProcedureCode,
    ProtocolIE-ID,
    TriggeringMessage
FROM NGAP-CommonDataTypes

    ProtocolExtensionContainer{},
    ProtocolIE-Container{},
    NGAP-PROTOCOL-EXTENSION,
    ProtocolIE-SingleContainer{},
    NGAP-PROTOCOL-IES
FROM NGAP-Containers;

-- A

AdditionalQosFlowInformation ::= ENUMERATED {
    more-likely,
    ...
}

AllocationAndRetentionPriority ::= SEQUENCE {
    priorityLevelARP          PriorityLevelARP,
    pre-emptionCapability     Pre-emptionCapability,
    pre-emptionVulnerability  Pre-emptionVulnerability,
    iE-Extensions            ProtocolExtensionContainer { {AllocationAndRetentionPriority-ExtIEs} } OPTIONAL,
    ...
}

AllocationAndRetentionPriority-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AllowedNSSAI ::= SEQUENCE (SIZE(1..maxnoofAllowedS-NSSAIs)) OF AllowedNSSAI-Item

AllowedNSSAI-Item ::= SEQUENCE {
    s-NSSAI          S-NSSAI,
    iE-Extensions   ProtocolExtensionContainer { {AllowedNSSAI-Item-ExtIEs} } OPTIONAL,
    ...
}

AllowedNSSAI-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AllowedTACs ::= SEQUENCE (SIZE(1..maxnoofAllowedAreas)) OF TAC

AMFName ::= PrintableString (SIZE(1..150, ...))

AMFPagingTarget ::= CHOICE {
    globalRANNodeID      GlobalRANNodeID,
    TAI                  TAI,
    choice-Extensions   ProtocolIE-SingleContainer { {AMFPagingTarget-ExtIEs} }
}

```

```

AMFPagingTarget-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

AMFPointer ::= BIT STRING (SIZE(6))

AMFRegionID ::= BIT STRING (SIZE(8))

AMFSetID ::= BIT STRING (SIZE(10))

AMF-TNLAssociationSetupList ::= SEQUENCE (SIZE(1..maxnoofTNLAssociations)) OF AMF-TNLAssociationSetupItem

AMF-TNLAssociationSetupItem ::= SEQUENCE {
    aMF-TNLAssociationAddress      CPTransportLayerInformation,
    iE-Extensions                  ProtocolExtensionContainer { {AMF-TNLAssociationSetupItem-ExtIEs} } OPTIONAL,
    ...
}

AMF-TNLAssociationSetupItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AMF-TNLAssociationToAddList ::= SEQUENCE (SIZE(1..maxnoofTNLAssociations)) OF AMF-TNLAssociationToAddItem

AMF-TNLAssociationToAddItem ::= SEQUENCE {
    aMF-TNLAssociationAddress      CPTransportLayerInformation,
    tNLAssociationUsage           TNLAssociationUsage                      OPTIONAL,
    tNLAddressWeightFactor        TNLAddressWeightFactor,
    iE-Extensions                  ProtocolExtensionContainer { {AMF-TNLAssociationToAddItem-ExtIEs} } OPTIONAL,
    ...
}

AMF-TNLAssociationToAddItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AMF-TNLAssociationToRemoveList ::= SEQUENCE (SIZE(1..maxnoofTNLAssociations)) OF AMF-TNLAssociationToRemoveItem

AMF-TNLAssociationToRemoveItem ::= SEQUENCE {
    aMF-TNLAssociationAddress      CPTransportLayerInformation,
    iE-Extensions                  ProtocolExtensionContainer { {AMF-TNLAssociationToRemoveItem-ExtIEs} } OPTIONAL,
    ...
}

AMF-TNLAssociationToRemoveItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AMF-TNLAssociationToUpdateList ::= SEQUENCE (SIZE(1..maxnoofTNLAssociations)) OF AMF-TNLAssociationToUpdateItem

AMF-TNLAssociationToUpdateItem ::= SEQUENCE {
    aMF-TNLAssociationAddress      CPTransportLayerInformation,
    tNLAssociationUsage           TNLAssociationUsage                      OPTIONAL,
    tNLAddressWeightFactor        TNLAddressWeightFactor                  OPTIONAL,

```

```

    iE-Extensions      ProtocolExtensionContainer { {AMF-TNLAssociationToUpdateItem-ExtIEs} } OPTIONAL,
    ...
}

AMF-TNLAssociationToUpdateItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AMF-UE-NGAP-ID ::= INTEGER (0..1099511627775)

AreaOfInterest ::= SEQUENCE {
    areaOfInterestTAIList      AreaOfInterestTAIList      OPTIONAL,
    areaOfInterestCellList     AreaOfInterestCellList     OPTIONAL,
    areaOfInterestRANNodeList   AreaOfInterestRANNodeList   OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { {AreaOfInterest-ExtIEs} } OPTIONAL,
    ...
}

AreaOfInterest-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AreaOfInterestCellList ::= SEQUENCE (SIZE(1..maxnoofCellinAoI)) OF AreaOfInterestCellItem

AreaOfInterestCellItem ::= SEQUENCE {
    nGRAN-CGI                  NGRAN-CGI,
    iE-Extensions              ProtocolExtensionContainer { {AreaOfInterestCellItem-ExtIEs} } OPTIONAL,
    ...
}

AreaOfInterestCellItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AreaOfInterestList ::= SEQUENCE (SIZE(1..maxnoofAoI)) OF AreaOfInterestItem

AreaOfInterestItem ::= SEQUENCE {
    areaOfInterest              AreaOfInterest,
    locationReportingReferenceID LocationReportingReferenceID,
    iE-Extensions              ProtocolExtensionContainer { {AreaOfInterestItem-ExtIEs} } OPTIONAL,
    ...
}

AreaOfInterestItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AreaOfInterestRANNodeList ::= SEQUENCE (SIZE(1..maxnoofRANNodeinAoI)) OF AreaOfInterestRANNodeItem

AreaOfInterestRANNodeItem ::= SEQUENCE {
    globalRANNodeID            GlobalRANNodeID,
    iE-Extensions              ProtocolExtensionContainer { {AreaOfInterestRANNodeItem-ExtIEs} } OPTIONAL,
    ...
}

```

```

AreaOfInterestRANNodeItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AreaOfInterestTAIList ::= SEQUENCE (SIZE(1..maxnoofTAIinAoI)) OF AreaOfInterestTAIItem

AreaOfInterestTAIItem ::= SEQUENCE {
    tAI                TAI,
    iE-Extensions     ProtocolExtensionContainer { {AreaOfInterestTAIItem-ExtIEs} } OPTIONAL,
    ...
}

AreaOfInterestTAIItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AssistanceDataForPaging ::= SEQUENCE {
    assistanceDataForRecommendedCells      AssistanceDataForRecommendedCells      OPTIONAL,
    pagingAttemptInformation                PagingAttemptInformation                OPTIONAL,
    iE-Extensions                          ProtocolExtensionContainer { {AssistanceDataForPaging-ExtIEs} } OPTIONAL,
    ...
}

AssistanceDataForPaging-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AssistanceDataForRecommendedCells ::= SEQUENCE {
    recommendedCellsForPaging              RecommendedCellsForPaging,
    iE-Extensions                          ProtocolExtensionContainer { {AssistanceDataForRecommendedCells-ExtIEs} } OPTIONAL,
    ...
}

AssistanceDataForRecommendedCells-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AssociatedQosFlowList ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF AssociatedQosFlowItem

AssociatedQosFlowItem ::= SEQUENCE {
    qosFlowIdentifier                      QosFlowIdentifier,
    qosFlowMappingIndication                ENUMERATED {ul, dl, ...} OPTIONAL,
    iE-Extensions                          ProtocolExtensionContainer { {AssociatedQosFlowItem-ExtIEs} } OPTIONAL,
    ...
}

AssociatedQosFlowItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

AveragingWindow ::= INTEGER (0..4095, ...)

-- B

```

```

BitRate ::= INTEGER (0..4000000000000, ...)

BroadcastCancelledAreaList ::= CHOICE {
  cellIDCancelledEUTRA          CellIDCancelledEUTRA,
  tAICancelledEUTRA             TAICancelledEUTRA,
  emergencyAreaIDCancelledEUTRA EmergencyAreaIDCancelledEUTRA,
  cellIDCancelledNR             CellIDCancelledNR,
  tAICancelledNR                TAICancelledNR,
  emergencyAreaIDCancelledNR     EmergencyAreaIDCancelledNR,
  choice-Extensions             ProtocolIE-SingleContainer { {BroadcastCancelledAreaList-ExtIEs} }
}

BroadcastCancelledAreaList-ExtIEs NGAP-PROTOCOL-IES ::= {
  ...
}

BroadcastCompletedAreaList ::= CHOICE {
  cellIDBroadcastEUTRA          CellIDBroadcastEUTRA,
  tAIBroadcastEUTRA             TAIBroadcastEUTRA,
  emergencyAreaIDBroadcastEUTRA EmergencyAreaIDBroadcastEUTRA,
  cellIDBroadcastNR             CellIDBroadcastNR,
  tAIBroadcastNR                TAIBroadcastNR,
  emergencyAreaIDBroadcastNR     EmergencyAreaIDBroadcastNR,
  choice-Extensions             ProtocolIE-SingleContainer { {BroadcastCompletedAreaList-ExtIEs} }
}

BroadcastCompletedAreaList-ExtIEs NGAP-PROTOCOL-IES ::= {
  ...
}

BroadcastPLMNList ::= SEQUENCE (SIZE(1..maxnoofBPLMNs)) OF BroadcastPLMNItem

BroadcastPLMNItem ::= SEQUENCE {
  pLMNIdentity          PLMNIdentity,
  tAISliceSupportList   SliceSupportList,
  iE-Extensions         ProtocolExtensionContainer { {BroadcastPLMNItem-ExtIEs} } OPTIONAL,
  ...
}

BroadcastPLMNItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- C

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

CancelledCellsInEAI-EUTRA ::= SEQUENCE (SIZE(1..maxnoofCellInEAI)) OF CancelledCellsInEAI-EUTRA-Item

CancelledCellsInEAI-EUTRA-Item ::= SEQUENCE {

```

```

    eUTRA-CGI          EUTRA-CGI,
    numberOfBroadcasts  NumberOfBroadcasts,
    iE-Extensions      ProtocolExtensionContainer { {CancelledCellsInEAI-EUTRA-Item-ExtIEs} } OPTIONAL,
    ...
}

CancelledCellsInEAI-EUTRA-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CancelledCellsInEAI-NR ::= SEQUENCE (SIZE(1..maxnoofCellInEAI)) OF CancelledCellsInEAI-NR-Item

CancelledCellsInEAI-NR-Item ::= SEQUENCE {
    nR-CGI          NR-CGI,
    numberOfBroadcasts  NumberOfBroadcasts,
    iE-Extensions      ProtocolExtensionContainer { {CancelledCellsInEAI-NR-Item-ExtIEs} } OPTIONAL,
    ...
}

CancelledCellsInEAI-NR-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CancelledCellsInTAI-EUTRA ::= SEQUENCE (SIZE(1..maxnoofCellInTAI)) OF CancelledCellsInTAI-EUTRA-Item

CancelledCellsInTAI-EUTRA-Item ::= SEQUENCE {
    eUTRA-CGI          EUTRA-CGI,
    numberOfBroadcasts  NumberOfBroadcasts,
    iE-Extensions      ProtocolExtensionContainer { {CancelledCellsInTAI-EUTRA-Item-ExtIEs} } OPTIONAL,
    ...
}

CancelledCellsInTAI-EUTRA-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CancelledCellsInTAI-NR ::= SEQUENCE (SIZE(1..maxnoofCellInTAI)) OF CancelledCellsInTAI-NR-Item

CancelledCellsInTAI-NR-Item ::= SEQUENCE{
    nR-CGI          NR-CGI,
    numberOfBroadcasts  NumberOfBroadcasts,
    iE-Extensions      ProtocolExtensionContainer { {CancelledCellsInTAI-NR-Item-ExtIEs} } OPTIONAL,
    ...
}

CancelledCellsInTAI-NR-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

Cause ::= CHOICE {
    radioNetwork      CauseRadioNetwork,
    transport         CauseTransport,
    nas               CauseNas,
    protocol          CauseProtocol,
}

```

```
    misc          CauseMisc,
  choice-Extensions ProtocolIE-SingleContainer { {Cause-ExtIEs} }
}

Cause-ExtIEs NGAP-PROTOCOL-IES ::= {
  ...
}

CauseMisc ::= ENUMERATED {
  control-processing-overload,
  not-enough-user-plane-processing-resources,
  hardware-failure,
  om-intervention,
  unknown-PLMN,
  unspecified,
  ...
}

CauseNas ::= ENUMERATED {
  normal-release,
  authentication-failure,
  deregister,
  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,
  ...
}

CauseRadioNetwork ::= ENUMERATED {
  unspecified,
  txnrelocoverall-expiry,
  successful-handover,
  release-due-to-ngran-generated-reason,
  release-due-to-5gc-generated-reason,
  handover-cancelled,
  partial-handover,
  ho-failure-in-target-5GC-ngran-node-or-target-system,
  ho-target-not-allowed,
  tngrelocoverall-expiry,
  tngrelocprep-expiry,
  cell-not-available,
  unknown-targetID,
  no-radio-resources-available-in-target-cell,
  unknown-local-UE-NGAP-ID,
  inconsistent-remote-UE-NGAP-ID,
}
```

```

handover-desirable-for-radio-reason,
time-critical-handover,
resource-optimisation-handover,
reduce-load-in-serving-cell,
user-inactivity,
radio-connection-with-ue-lost,
radio-resources-not-available,
invalid-qos-combination,
failure-in-radio-interface-procedure,
interaction-with-other-procedure,
unknown-PDU-session-ID,
unkown-qos-flow-ID,
multiple-PDU-session-ID-instances,
multiple-qos-flow-ID-instances,
encryption-and-or-integrity-protection-algorithms-not-supported,
ng-intra-system-handover-triggered,
ng-inter-system-handover-triggered,
xn-handover-triggered,
not-supported-5QI-value,
ue-context-transfer,
ims-voice-eps-fallback-or-rat-fallback-triggered,
up-integrity-protection-not-possible,
up-confidentiality-protection-not-possible,
slice-not-supported,
ue-in-rrc-inactive-state-not-reachable,
redirection,
resources-not-available-for-the-slice,
ue-max-integrity-protected-data-rate-reason,
release-due-to-cn-detected-mobility,
...
}

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

CellIDBroadcastEUTRA ::= SEQUENCE (SIZE(1..maxnoofCellIDforWarning)) OF CellIDBroadcastEUTRA-Item

CellIDBroadcastEUTRA-Item ::= SEQUENCE {
    eUTRA-CGI          EUTRA-CGI,
    iE-Extensions     ProtocolExtensionContainer { {CellIDBroadcastEUTRA-Item-ExtIEs} } OPTIONAL,
    ...
}

CellIDBroadcastEUTRA-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellIDBroadcastNR ::= SEQUENCE (SIZE(1..maxnoofCellIDforWarning)) OF CellIDBroadcastNR-Item

CellIDBroadcastNR-Item ::= SEQUENCE {
    nR-CGI            NR-CGI,

```



```

    iE-Extensions      ProtocolExtensionContainer { {CellIDBroadcastNR-Item-ExtIEs} } OPTIONAL,
    ...
}

CellIDBroadcastNR-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellIDCancelledEUTRA ::= SEQUENCE (SIZE(1..maxnoofCellIDforWarning)) OF CellIDCancelledEUTRA-Item

CellIDCancelledEUTRA-Item ::= SEQUENCE {
    eUTRA-CGI          EUTRA-CGI,
    numberOfBroadcasts  NumberOfBroadcasts,
    iE-Extensions      ProtocolExtensionContainer { {CellIDCancelledEUTRA-Item-ExtIEs} } OPTIONAL,
    ...
}

CellIDCancelledEUTRA-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellIDCancelledNR ::= SEQUENCE (SIZE(1..maxnoofCellIDforWarning)) OF CellIDCancelledNR-Item

CellIDCancelledNR-Item ::= SEQUENCE {
    nR-CGI            NR-CGI,
    numberOfBroadcasts  NumberOfBroadcasts,
    iE-Extensions      ProtocolExtensionContainer { {CellIDCancelledNR-Item-ExtIEs} } OPTIONAL,
    ...
}

CellIDCancelledNR-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellIDListForRestart ::= CHOICE {
    eUTRA-CGIListforRestart  EUTRA-CGIList,
    nR-CGIListforRestart     NR-CGIList,
    choice-Extensions        ProtocolIE-SingleContainer { {CellIDListForRestart-ExtIEs} }
}

CellIDListForRestart-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

CellSize ::= ENUMERATED {verysmall, small, medium, large, ...}

CellType ::= SEQUENCE {
    cellSize          CellSize,
    iE-Extensions      ProtocolExtensionContainer { {CellType-ExtIEs} } OPTIONAL,
    ...
}

CellType-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

```

```

    ...
}

CompletedCellsInEAI-EUTRA ::= SEQUENCE (SIZE(1..maxnoofCellInEAI)) OF CompletedCellsInEAI-EUTRA-Item

CompletedCellsInEAI-EUTRA-Item ::= SEQUENCE {
    eUTRA-CGI          EUTRA-CGI,
    iE-Extensions     ProtocolExtensionContainer { {CompletedCellsInEAI-EUTRA-Item-ExtIEs} } OPTIONAL,
    ...
}

CompletedCellsInEAI-EUTRA-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CompletedCellsInEAI-NR ::= SEQUENCE (SIZE(1..maxnoofCellInEAI)) OF CompletedCellsInEAI-NR-Item

CompletedCellsInEAI-NR-Item ::= SEQUENCE {
    nR-CGI          NR-CGI,
    iE-Extensions     ProtocolExtensionContainer { {CompletedCellsInEAI-NR-Item-ExtIEs} } OPTIONAL,
    ...
}

CompletedCellsInEAI-NR-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CompletedCellsInTAI-EUTRA ::= SEQUENCE (SIZE(1..maxnoofCellInTAI)) OF CompletedCellsInTAI-EUTRA-Item

CompletedCellsInTAI-EUTRA-Item ::= SEQUENCE{
    eUTRA-CGI          EUTRA-CGI,
    iE-Extensions     ProtocolExtensionContainer { {CompletedCellsInTAI-EUTRA-Item-ExtIEs} } OPTIONAL,
    ...
}

CompletedCellsInTAI-EUTRA-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CompletedCellsInTAI-NR ::= SEQUENCE (SIZE(1..maxnoofCellInTAI)) OF CompletedCellsInTAI-NR-Item

CompletedCellsInTAI-NR-Item ::= SEQUENCE{
    nR-CGI          NR-CGI,
    iE-Extensions     ProtocolExtensionContainer { {CompletedCellsInTAI-NR-Item-ExtIEs} } OPTIONAL,
    ...
}

CompletedCellsInTAI-NR-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

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

```

```

}

ConfidentialityProtectionIndication ::= ENUMERATED {
    required,
    preferred,
    not-needed,
    ...
}

ConfidentialityProtectionResult ::= ENUMERATED {
    performed,
    not-performed,
    ...
}

CoreNetworkAssistanceInformation ::= SEQUENCE {
    ueIdentityIndexValue          UEIdentityIndexValue,
    ueSpecificDRX                 PagingDRX                                OPTIONAL,
    periodicRegistrationUpdateTimer PeriodicRegistrationUpdateTimer,
    mICOModeIndication            MICOModeIndication                OPTIONAL,
    tAIListForInactive            TAIListForInactive,
    expectedUEBehaviour           ExpectedUEBehaviour                OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { {CoreNetworkAssistanceInformation-ExtIEs} } OPTIONAL,
    ...
}

CoreNetworkAssistanceInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

COUNTValueForPDCP-SN12 ::= SEQUENCE {
    pDCP-SN12                     INTEGER (0..4095),
    hFN-PDCP-SN12                 INTEGER (0..1048575),
    iE-Extensions                 ProtocolExtensionContainer { {COUNTValueForPDCP-SN12-ExtIEs} } OPTIONAL,
    ...
}

COUNTValueForPDCP-SN12-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

COUNTValueForPDCP-SN18 ::= SEQUENCE {
    pDCP-SN18                     INTEGER (0..262143),
    hFN-PDCP-SN18                 INTEGER (0..16383),
    iE-Extensions                 ProtocolExtensionContainer { {COUNTValueForPDCP-SN18-ExtIEs} } OPTIONAL,
    ...
}

COUNTValueForPDCP-SN18-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CPTransportLayerInformation ::= CHOICE {
    endpointIPAddress             TransportLayerAddress,

```

```

    choice-Extensions      ProtocolIE-SingleContainer { {CPTransportLayerInformation-ExtIEs} }
  }

CPTransportLayerInformation-ExtIEs NGAP-PROTOCOL-IES ::= {
  ...
}

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

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

CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE(1..maxnoofErrors)) OF CriticalityDiagnostics-IE-Item

CriticalityDiagnostics-IE-Item ::= SEQUENCE {
  iECriticality          Criticality,
  iE-ID                  ProtocolIE-ID,
  typeOfError            TypeOfError,
  iE-Extensions          ProtocolExtensionContainer {{CriticalityDiagnostics-IE-Item-ExtIEs}} OPTIONAL,
  ...
}

CriticalityDiagnostics-IE-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- D

DataCodingScheme ::= BIT STRING (SIZE(8))

DataForwardingAccepted ::= ENUMERATED {
  data-forwarding-accepted,
  ...
}

DataForwardingNotPossible ::= ENUMERATED {
  data-forwarding-not-possible,
  ...
}

DataForwardingResponseDRBList ::= SEQUENCE (SIZE(1..maxnoofDRBs)) OF DataForwardingResponseDRBItem

DataForwardingResponseDRBItem ::= SEQUENCE {
  dRB-ID                 DRB-ID,
  dLForwardingUP-TNLInformation UPTransportLayerInformation OPTIONAL,
  uLForwardingUP-TNLInformation UPTransportLayerInformation OPTIONAL,
}

```

```

    iE-Extensions      ProtocolExtensionContainer {{DataForwardingResponseDRBItem-ExtIEs}}    OPTIONAL,
    ...
}

DataForwardingResponseDRBItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

DelayCritical ::= ENUMERATED {
    delay-critical,
    non-delay-critical,
    ...
}

DLForwarding ::= ENUMERATED {
    dl-forwarding-proposed,
    ...
}

DL-NGU-TNLInformationReused ::= ENUMERATED {
    true,
    ...
}

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

DRB-ID ::= INTEGER (1..32, ...)

DRBsSubjectToStatusTransferList ::= SEQUENCE (SIZE(1..maxnoofDRBs)) OF DRBsSubjectToStatusTransferItem

DRBsSubjectToStatusTransferItem ::= SEQUENCE {
    dRB-ID                DRB-ID,
    dRBStatusUL           DRBStatusUL,
    dRBStatusDL           DRBStatusDL,
    iE-Extension          ProtocolExtensionContainer {{DRBsSubjectToStatusTransferItem-ExtIEs}} OPTIONAL,
    ...
}

DRBsSubjectToStatusTransferItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

DRBStatusDL ::= CHOICE {
    dRBStatusDL12        DRBStatusDL12,
    dRBStatusDL18        DRBStatusDL18,
    choice-Extensions    ProtocolIE-SingleContainer { {DRBStatusDL-ExtIEs} }
}

DRBStatusDL-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

```

```

DRBStatusDL12 ::= SEQUENCE {
    dL-COUNTValue      COUNTValueForPDCP-SN12,
    iE-Extension       ProtocolExtensionContainer { {DRBStatusDL12-ExtIEs} }   OPTIONAL,
    ...
}

DRBStatusDL12-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

DRBStatusDL18 ::= SEQUENCE {
    dL-COUNTValue      COUNTValueForPDCP-SN18,
    iE-Extension       ProtocolExtensionContainer { {DRBStatusDL18-ExtIEs} }   OPTIONAL,
    ...
}

DRBStatusDL18-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

DRBStatusUL ::= CHOICE {
    dRBStatusUL12      DRBStatusUL12,
    dRBStatusUL18      DRBStatusUL18,
    choice-Extensions  ProtocolIE-SingleContainer { {DRBStatusUL-ExtIEs} }
}

DRBStatusUL-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

DRBStatusUL12 ::= SEQUENCE {
    uL-COUNTValue      COUNTValueForPDCP-SN12,
    receiveStatusOfUL-PDCP-SDUs BIT STRING (SIZE(1..2048))   OPTIONAL,
    iE-Extension       ProtocolExtensionContainer { {DRBStatusUL12-ExtIEs} }   OPTIONAL,
    ...
}

DRBStatusUL12-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

DRBStatusUL18 ::= SEQUENCE {
    uL-COUNTValue      COUNTValueForPDCP-SN18,
    receiveStatusOfUL-PDCP-SDUs BIT STRING (SIZE(1..131072))   OPTIONAL,
    iE-Extension       ProtocolExtensionContainer { {DRBStatusUL18-ExtIEs} }   OPTIONAL,
    ...
}

DRBStatusUL18-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

DRBsToQosFlowsMappingList ::= SEQUENCE (SIZE(1..maxnoofDRBs)) OF DRBsToQosFlowsMappingItem

```

```

DRBsToQosFlowsMappingItem ::= SEQUENCE {
    drb-ID                DRB-ID,
    associatedQosFlowList  AssociatedQosFlowList,
    iE-Extensions         ProtocolExtensionContainer { {DRBsToQosFlowsMappingItem-ExtIEs} } OPTIONAL,
    ...
}

DRBsToQosFlowsMappingItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

Dynamic5QIDescriptor ::= SEQUENCE {
    priorityLevelQos      PriorityLevelQos,
    packetDelayBudget     PacketDelayBudget,
    packetErrorRate       PacketErrorRate,
    fiveQI                FiveQI                                OPTIONAL,
    delayCritical         DelayCritical                        OPTIONAL,
    averagingWindow       AveragingWindow                    OPTIONAL,
    maximumDataBurstVolume MaximumDataBurstVolume          OPTIONAL,
    iE-Extensions         ProtocolExtensionContainer { {Dynamic5QIDescriptor-ExtIEs} } OPTIONAL,
    ...
}

Dynamic5QIDescriptor-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- E

EmergencyAreaID ::= OCTET STRING (SIZE(3))

EmergencyAreaIDBroadcastEUTRA ::= SEQUENCE (SIZE(1..maxnoofEmergencyAreaID)) OF EmergencyAreaIDBroadcastEUTRA-Item

EmergencyAreaIDBroadcastEUTRA-Item ::= SEQUENCE {
    emergencyAreaID      EmergencyAreaID,
    completedCellsInEAI-EUTRA CompletedCellsInEAI-EUTRA,
    iE-Extensions         ProtocolExtensionContainer { {EmergencyAreaIDBroadcastEUTRA-Item-ExtIEs} } OPTIONAL,
    ...
}

EmergencyAreaIDBroadcastEUTRA-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

EmergencyAreaIDBroadcastNR ::= SEQUENCE (SIZE(1..maxnoofEmergencyAreaID)) OF EmergencyAreaIDBroadcastNR-Item

EmergencyAreaIDBroadcastNR-Item ::= SEQUENCE {
    emergencyAreaID      EmergencyAreaID,
    completedCellsInEAI-NR CompletedCellsInEAI-NR,
    iE-Extensions         ProtocolExtensionContainer { {EmergencyAreaIDBroadcastNR-Item-ExtIEs} } OPTIONAL,
    ...
}

```

```

EmergencyAreaIDBroadcastNR-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

EmergencyAreaIDCancelledEUTRA ::= SEQUENCE (SIZE(1..maxnoofEmergencyAreaID)) OF EmergencyAreaIDCancelledEUTRA-Item

EmergencyAreaIDCancelledEUTRA-Item ::= SEQUENCE {
    emergencyAreaID           EmergencyAreaID,
    cancelledCellsInEAI-EUTRA CancelledCellsInEAI-EUTRA,
    iE-Extensions            ProtocolExtensionContainer { {EmergencyAreaIDCancelledEUTRA-Item-ExtIEs} } OPTIONAL,
    ...
}

EmergencyAreaIDCancelledEUTRA-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

EmergencyAreaIDCancelledNR ::= SEQUENCE (SIZE(1..maxnoofEmergencyAreaID)) OF EmergencyAreaIDCancelledNR-Item

EmergencyAreaIDCancelledNR-Item ::= SEQUENCE {
    emergencyAreaID           EmergencyAreaID,
    cancelledCellsInEAI-NR    CancelledCellsInEAI-NR,
    iE-Extensions            ProtocolExtensionContainer { {EmergencyAreaIDCancelledNR-Item-ExtIEs} } OPTIONAL,
    ...
}

EmergencyAreaIDCancelledNR-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

EmergencyAreaIDList ::= SEQUENCE (SIZE(1..maxnoofEmergencyAreaID)) OF EmergencyAreaID

EmergencyAreaIDListForRestart ::= SEQUENCE (SIZE(1..maxnoofEAIforRestart)) OF EmergencyAreaID

EmergencyFallbackIndicator ::= SEQUENCE {
    emergencyFallbackRequestIndicator           EmergencyFallbackRequestIndicator,
    emergencyServiceTargetCN                   EmergencyServiceTargetCN           OPTIONAL,
    iE-Extensions                             ProtocolExtensionContainer { {EmergencyFallbackIndicator-ExtIEs} } OPTIONAL,
    ...
}

EmergencyFallbackIndicator-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

EmergencyFallbackRequestIndicator ::= ENUMERATED {
    emergency-fallback-requested,
    ...
}

EmergencyServiceTargetCN ::= ENUMERATED {
    fiveGC,
    epc,
    ...
}

```



```

}

EquivalentPLMNs ::= SEQUENCE (SIZE(1..maxnoofEPLMNs)) OF PLMNIdentity

EPS-TAC ::= OCTET STRING (SIZE(2))

EPS-TAI ::= SEQUENCE {
    pLMNIdentity      PLMNIdentity,
    ePS-TAC           EPS-TAC,
    iE-Extensions     ProtocolExtensionContainer { {EPS-TAI-ExtIEs} } OPTIONAL,
    ...
}

EPS-TAI-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RAB-ID ::= INTEGER (0..15, ...)

E-RABInformationList ::= SEQUENCE (SIZE(1..maxnoofE-RABs)) OF E-RABInformationItem

E-RABInformationItem ::= SEQUENCE {
    e-RAB-ID          E-RAB-ID,
    dLForwarding      DLForwarding                                OPTIONAL,
    iE-Extensions     ProtocolExtensionContainer { {E-RABInformationItem-ExtIEs} } OPTIONAL,
    ...
}

E-RABInformationItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

EUTRACellIdentity ::= BIT STRING (SIZE(28))

EUTRA-CGI ::= SEQUENCE {
    pLMNIdentity      PLMNIdentity,
    eUTRACellIdentity EUTRACellIdentity,
    iE-Extensions     ProtocolExtensionContainer { {EUTRA-CGI-ExtIEs} } OPTIONAL,
    ...
}

EUTRA-CGI-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

EUTRA-CGIList ::= SEQUENCE (SIZE(1..maxnoofCellsinngeNB)) OF EUTRA-CGI

EUTRA-CGIListForWarning ::= SEQUENCE (SIZE(1..maxnoofCellIDforWarning)) OF EUTRA-CGI

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

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

EventType ::= ENUMERATED {

```

```

    direct,
    change-of-serve-cell,
    ue-presence-in-area-of-interest,
    stop-change-of-serve-cell,
    stop-ue-presence-in-area-of-interest,
    cancel-location-reporting-for-the-ue,
    ...
}

ExpectedActivityPeriod ::= INTEGER (1..30|40|50|60|80|100|120|150|180|181, ...)

ExpectedHOInterval ::= ENUMERATED {
    sec15, sec30, sec60, sec90, sec120, sec180, long-time,
    ...
}

ExpectedIdlePeriod ::= INTEGER (1..30|40|50|60|80|100|120|150|180|181, ...)

ExpectedUEActivityBehaviour ::= SEQUENCE {
    expectedActivityPeriod           ExpectedActivityPeriod           OPTIONAL,
    expectedIdlePeriod               ExpectedIdlePeriod             OPTIONAL,
    sourceOfUEActivityBehaviourInformation SourceOfUEActivityBehaviourInformation OPTIONAL,
    iE-Extensions                    ProtocolExtensionContainer { {ExpectedUEActivityBehaviour-ExtIEs} } OPTIONAL,
    ...
}

ExpectedUEActivityBehaviour-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

ExpectedUEBehaviour ::= SEQUENCE {
    expectedUEActivityBehaviour     ExpectedUEActivityBehaviour     OPTIONAL,
    expectedHOInterval              ExpectedHOInterval             OPTIONAL,
    expectedUEMobility              ExpectedUEMobility             OPTIONAL,
    expectedUEMovingTrajectory      ExpectedUEMovingTrajectory     OPTIONAL,
    iE-Extensions                    ProtocolExtensionContainer { {ExpectedUEBehaviour-ExtIEs} } OPTIONAL,
    ...
}

ExpectedUEBehaviour-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

ExpectedUEMobility ::= ENUMERATED {
    stationary,
    mobile,
    ...
}

ExpectedUEMovingTrajectory ::= SEQUENCE (SIZE(1..maxnoofCellsUEMovingTrajectory)) OF ExpectedUEMovingTrajectoryItem

ExpectedUEMovingTrajectoryItem ::= SEQUENCE {
    nGRAN-CGI                      NGRAN-CGI,
    timeStayedInCell                INTEGER (0..4095)                OPTIONAL,

```

```

    iE-Extensions      ProtocolExtensionContainer { {ExpectedUEMovingTrajectoryItem-ExtIEs} } OPTIONAL,
    ...
}

ExpectedUEMovingTrajectoryItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- F

FiveG-S-TMSI ::= SEQUENCE {
    aMFSetID           AMFSetID,
    aMFPointer         AMFPointer,
    fiveG-TMSI        FiveG-TMSI,
    iE-Extensions      ProtocolExtensionContainer { {FiveG-S-TMSI-ExtIEs} } OPTIONAL,
    ...
}

FiveG-S-TMSI-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

FiveG-TMSI ::= OCTET STRING (SIZE(4))

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

ForbiddenAreaInformation ::= SEQUENCE (SIZE(1.. maxnoofEPLMNsPlusOne)) OF ForbiddenAreaInformation-Item

ForbiddenAreaInformation-Item ::= SEQUENCE {
    pLMNIdentity       PLMNIdentity,
    forbiddenTACs      ForbiddenTACs,
    iE-Extensions      ProtocolExtensionContainer { {ForbiddenAreaInformation-Item-ExtIEs} } OPTIONAL,
    ...
}

ForbiddenAreaInformation-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

ForbiddenTACs ::= SEQUENCE (SIZE(1..maxnoofForbTACs)) OF TAC

-- G

GBR-QosInformation ::= SEQUENCE {
    maximumFlowBitRateDL      BitRate,
    maximumFlowBitRateUL      BitRate,
    guaranteedFlowBitRateDL   BitRate,
    guaranteedFlowBitRateUL   BitRate,
    notificationControl        NotificationControl OPTIONAL,
    maximumPacketLossRateDL    PacketLossRate OPTIONAL,
    maximumPacketLossRateUL    PacketLossRate OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { {GBR-QosInformation-ExtIEs} } OPTIONAL,
    ...
}

```

```
GBR-QosInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...}

GlobalGNB-ID ::= SEQUENCE {
    pLMNIdentity      PLMNIdentity,
    gNB-ID            GNB-ID,
    iE-Extensions     ProtocolExtensionContainer { {GlobalGNB-ID-ExtIEs} } OPTIONAL,
    ...
}

GlobalGNB-ID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

GlobalN3IWF-ID ::= SEQUENCE {
    pLMNIdentity      PLMNIdentity,
    n3IWF-ID          N3IWF-ID,
    iE-Extensions     ProtocolExtensionContainer { {GlobalN3IWF-ID-ExtIEs} } OPTIONAL,
    ...
}

GlobalN3IWF-ID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

GlobalNgENB-ID ::= SEQUENCE {
    pLMNIdentity      PLMNIdentity,
    ngENB-ID          NgENB-ID,
    iE-Extensions     ProtocolExtensionContainer { {GlobalNgENB-ID-ExtIEs} } OPTIONAL,
    ...
}

GlobalNgENB-ID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

GlobalRANNodeID ::= CHOICE {
    globalGNB-ID      GlobalGNB-ID,
    globalNgENB-ID    GlobalNgENB-ID,
    globalN3IWF-ID    GlobalN3IWF-ID,
    choice-Extensions ProtocolIE-SingleContainer { {GlobalRANNodeID-ExtIEs} }
}

GlobalRANNodeID-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

GNB-ID ::= CHOICE {
    gNB-ID            BIT STRING (SIZE(22..32)),
    choice-Extensions ProtocolIE-SingleContainer { {GNB-ID-ExtIEs} }
}

GNB-ID-ExtIEs NGAP-PROTOCOL-IES ::= {
```

```

    ...
}

GTP-TEID ::= OCTET STRING (SIZE(4))

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

GTPTunnel-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

GUAMI ::= SEQUENCE {
    pLMNIdentity               PLMNIdentity,
    aMFRegionID                AMFRegionID,
    aMFSetID                    AMFSetID,
    aMFPointer                  AMFPointer,
    iE-Extensions              ProtocolExtensionContainer { {GUAMI-ExtIEs} } OPTIONAL,
    ...
}

GUAMI-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- H

HandoverCommandTransfer ::= SEQUENCE {
    dlForwardingUP-TNLInformation      UPTransportLayerInformation          OPTIONAL,
    qosFlowToBeForwardedList           QosFlowToBeForwardedList           OPTIONAL,
    dataForwardingResponseDRBList      DataForwardingResponseDRBList       OPTIONAL,
    iE-Extensions                      ProtocolExtensionContainer { {HandoverCommandTransfer-ExtIEs} } OPTIONAL,
    ...
}

HandoverCommandTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

HandoverPreparationUnsuccessfulTransfer ::= SEQUENCE {
    cause                          Cause,
    iE-Extensions                  ProtocolExtensionContainer { {HandoverPreparationUnsuccessfulTransfer-ExtIEs} } OPTIONAL,
    ...
}

HandoverPreparationUnsuccessfulTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

HandoverRequestAcknowledgeTransfer ::= SEQUENCE {
    dL-NGU-UP-TNLInformation      UPTransportLayerInformation,
    dLForwardingUP-TNLInformation UPTransportLayerInformation      OPTIONAL,
    securityResult                SecurityResult                    OPTIONAL,
    qosFlowSetupResponseList      QosFlowSetupResponseListHOReqAck,
    qosFlowFailedToSetupList      QosFlowList                    OPTIONAL,
    dataForwardingResponseDRBList DataForwardingResponseDRBList    OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { {HandoverRequestAcknowledgeTransfer-ExtIEs} } OPTIONAL,
    ...
}

HandoverRequestAcknowledgeTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

HandoverRequiredTransfer ::= SEQUENCE {
    directForwardingPathAvailability DirectForwardingPathAvailability OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { {HandoverRequiredTransfer-ExtIEs} } OPTIONAL,
    ...
}

HandoverRequiredTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

HandoverResourceAllocationUnsuccessfulTransfer ::= SEQUENCE {
    cause                         Cause,
    criticalityDiagnostics        CriticalityDiagnostics              OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { {HandoverResourceAllocationUnsuccessfulTransfer-ExtIEs} } OPTIONAL,
    ...
}

HandoverResourceAllocationUnsuccessfulTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

HandoverType ::= ENUMERATED {
    intra5gs,
    fivegs-to-eps,
    eps-to-5gs,
    ...
}

-- I

IMSVoiceSupportIndicator ::= ENUMERATED {
    supported,
    not-supported,
    ...
}

IndexToRFSP ::= INTEGER (1..256, ...)

InfoOnRecommendedCellsAndRANNodesForPaging ::= SEQUENCE {

```

```

    recommendedCellsForPaging      RecommendedCellsForPaging,
    recommendRANNodesForPaging      RecommendedRANNodesForPaging,
    IE-Extensions      ProtocolExtensionContainer { {InfoOnRecommendedCellsAndRANNodesForPaging-ExtIEs} } OPTIONAL,
    ...
}

InfoOnRecommendedCellsAndRANNodesForPaging-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

IntegrityProtectionIndication ::= ENUMERATED {
    required,
    preferred,
    not-needed,
    ...
}

IntegrityProtectionResult ::= ENUMERATED {
    performed,
    not-performed,
    ...
}

IntendedNumberOfPagingAttempts ::= INTEGER (1..16, ...)

InterfacesToTrace ::= BIT STRING (SIZE(8))

-- J
-- K
-- L

LastVisitedCellInformation ::= CHOICE {
    nGRANCell      LastVisitedNGRANCellInformation,
    eUTRANCell     LastVisitedEUTRANCellInformation,
    uUTRANCell     LastVisitedUTRANCellInformation,
    gERANCell      LastVisitedGERANCellInformation,
    choice-Extensions      ProtocolIE-SingleContainer { {LastVisitedCellInformation-ExtIEs} }
}

LastVisitedCellInformation-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

LastVisitedCellItem ::= SEQUENCE {
    lastVisitedCellInformation      LastVisitedCellInformation,
    IE-Extensions      ProtocolExtensionContainer { {LastVisitedCellItem-ExtIEs} } OPTIONAL,
    ...
}

LastVisitedCellItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

LastVisitedEUTRANCellInformation ::= OCTET STRING

LastVisitedGERANCellInformation ::= OCTET STRING

LastVisitedNGRANCellInformation ::= SEQUENCE {
    globalCellID          NGRAN-CGI,
    cellType              CellType,
    timeUEStayedInCell    TimeUEStayedInCell,
    timeUEStayedInCellEnhancedGranularity TimeUEStayedInCellEnhancedGranularity OPTIONAL,
    hOCauseValue          Cause          OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { {LastVisitedNGRANCellInformation-ExtIEs} } OPTIONAL,
    ...
}

LastVisitedNGRANCellInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

LastVisitedUTRANCellInformation ::= OCTET STRING

LocationReportingReferenceID ::= INTEGER (1..64, ...)

LocationReportingRequestType ::= SEQUENCE {
    eventType              EventType,
    reportArea            ReportArea,
    areaOfInterestList    AreaOfInterestList          OPTIONAL,
    locationReportingReferenceIDToBeCancelled LocationReportingReferenceID          OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { {LocationReportingRequestType-ExtIEs} }          OPTIONAL,
    ...
}

LocationReportingRequestType-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- M

MaskedIMEISV ::= BIT STRING (SIZE(64))

MaximumDataBurstVolume ::= INTEGER (0..4095, ...)

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

MaximumIntegrityProtectedDataRate ::= ENUMERATED {
    bitrate64kbs,
    maximum-UE-rate,
    ...
}

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

```



```

MobilityRestrictionList ::= SEQUENCE {
    servingPLMN          PLMNIdentity,
    equivalentPLMNs      EquivalentPLMNs          OPTIONAL,
    rATRestrictions      RATRestrictions          OPTIONAL,
    forbiddenAreaInformation ForbiddnAreaInformation OPTIONAL,
    serviceAreaInformation ServiceAreaInformation OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { {MobilityRestrictionList-ExtIEs} } OPTIONAL,
    ...
}

MobilityRestrictionList-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

MultipleTNLInformation ::= SEQUENCE {
    tNLInformationList    TNLInformationList,
    iE-Extensions        ProtocolExtensionContainer { {MultipleTNLInformation-ExtIEs} } OPTIONAL,
    ...
}

MultipleTNLInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- N

N3IWF-ID ::= CHOICE {
    n3IWF-ID              BIT STRING (SIZE(16)),
    choice-Extensions     ProtocolIE-SingleContainer { {N3IWF-ID-ExtIEs} }
}

N3IWF-ID-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

NAS-PDU ::= OCTET STRING

NASSecurityParametersFromNGRAN ::= OCTET STRING

NetworkInstance ::= INTEGER (1..256, ...)

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

NextHopChainingCount ::= INTEGER (0..7)

NextPagingAreaScope ::= ENUMERATED {
    same,
    changed,
    ...
}

```

```

NgENB-ID ::= CHOICE {
    macroNgENB-ID          BIT STRING (SIZE(20)),
    shortMacroNgENB-ID    BIT STRING (SIZE(18)),
    longMacroNgENB-ID     BIT STRING (SIZE(21)),
    choice-Extensions     ProtocolIE-SingleContainer { {NgENB-ID-ExtIEs} }
}

NgENB-ID-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

NGRAN-CGI ::= CHOICE {
    nR-CGI          NR-CGI,
    eUTRA-CGI      EUTRA-CGI,
    choice-Extensions ProtocolIE-SingleContainer { {NGRAN-CGI-ExtIEs} }
}

NGRAN-CGI-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

NGRANTraceID ::= OCTET STRING (SIZE(8))

NonDynamic5QIDescriptor ::= SEQUENCE {
    fiveQI          FiveQI,
    priorityLevelQos PriorityLevelQos OPTIONAL,
    averagingWindow AveragingWindow OPTIONAL,
    maximumDataBurstVolume MaximumDataBurstVolume OPTIONAL,
    iE-Extensions  ProtocolExtensionContainer { {NonDynamic5QIDescriptor-ExtIEs} } OPTIONAL,
    ...
}

NonDynamic5QIDescriptor-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

NotAllowedTACs ::= SEQUENCE (SIZE(1..maxnoofAllowedAreas)) OF TAC

NotificationCause ::= ENUMERATED {
    fulfilled,
    not-fulfilled,
    ...
}

NotificationControl ::= ENUMERATED {
    notification-requested,
    ...
}

NRCellIdentity ::= BIT STRING (SIZE(36))

NR-CGI ::= SEQUENCE {
    pLMNIdentity PLMNIdentity,
    nRCellIdentity NRCellIdentity,
}

```

```

    iE-Extensions      ProtocolExtensionContainer { {NR-CGI-ExtIEs} } OPTIONAL,
    ...
}
NR-CGI-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
NR-CGIList ::= SEQUENCE (SIZE(1..maxnoofCellsingNB)) OF NR-CGI
NR-CGIListForWarning ::= SEQUENCE (SIZE(1..maxnoofCellIDforWarning)) OF NR-CGI
NRencryptionAlgorithms ::= BIT STRING (SIZE(16, ...))
NRintegrityProtectionAlgorithms ::= BIT STRING (SIZE(16, ...))
NRPPa-PDU ::= OCTET STRING
NumberOfBroadcasts ::= INTEGER (0..65535)
NumberOfBroadcastsRequested ::= INTEGER (0..65535)
-- 0
OverloadAction ::= ENUMERATED {
    reject-non-emergency-mo-dt,
    reject-rrc-cr-signalling,
    permit-emergency-sessions-and-mobile-terminated-services-only,
    permit-high-priority-sessions-and-mobile-terminated-services-only,
    ...
}
OverloadResponse ::= CHOICE {
    overloadAction      OverloadAction,
    choice-Extensions  ProtocolIE-SingleContainer { {OverloadResponse-ExtIEs} }
}
OverloadResponse-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}
OverloadStartNSSAIIList ::= SEQUENCE (SIZE (1..maxnoofSliceItems)) OF OverloadStartNSSAIItem
OverloadStartNSSAIItem ::= SEQUENCE {
    sliceOverloadList      SliceOverloadList,
    sliceOverloadResponse  OverloadResponse OPTIONAL,
    sliceTrafficLoadReductionIndication TrafficLoadReductionIndication OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { {OverloadStartNSSAIItem-ExtIEs} } OPTIONAL,
    ...
}
OverloadStartNSSAIItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```
-- P
PacketDelayBudget ::= INTEGER (0..1023, ...)

PacketErrorRate ::= SEQUENCE {
    pERScalar      INTEGER (0..9, ...),
    pERExponent    INTEGER (0..9, ...),
    iE-Extensions  ProtocolExtensionContainer { {PacketErrorRate-ExtIEs} } OPTIONAL,
    ...
}

PacketErrorRate-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PacketLossRate ::= INTEGER (0..1000, ...)

PagingAttemptInformation ::= SEQUENCE {
    pagingAttemptCount          PagingAttemptCount,
    intendedNumberOfPagingAttempts  IntendedNumberOfPagingAttempts,
    nextPagingAreaScope          NextPagingAreaScope OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { {PagingAttemptInformation-ExtIEs} } OPTIONAL,
    ...
}

PagingAttemptInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PagingAttemptCount ::= INTEGER (1..16, ...)

PagingDRX ::= ENUMERATED {
    v32,
    v64,
    v128,
    v256,
    ...
}

PagingOrigin ::= ENUMERATED {
    non-3gpp,
    ...
}

PagingPriority ::= ENUMERATED {
    priolevel1,
    priolevel2,
    priolevel3,
    priolevel4,
    priolevel5,
    priolevel6,
    priolevel7,
    priolevel8,
```

```

}
...
}
PathSwitchRequestAcknowledgeTransfer ::= SEQUENCE {
    uL-NGU-UP-TNLInformation      UPTransportLayerInformation      OPTIONAL,
    securityIndication            SecurityIndication                OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { {PathSwitchRequestAcknowledgeTransfer-ExtIEs} } OPTIONAL,
    ...
}
PathSwitchRequestAcknowledgeTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
PathSwitchRequestSetupFailedTransfer ::= SEQUENCE {
    cause                         Cause,
    iE-Extensions                 ProtocolExtensionContainer { {PathSwitchRequestSetupFailedTransfer-ExtIEs} } OPTIONAL,
    ...
}
PathSwitchRequestSetupFailedTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
PathSwitchRequestTransfer ::= SEQUENCE {
    dL-NGU-UP-TNLInformation      UPTransportLayerInformation,
    dL-NGU-TNLInformationReused   DL-NGU-TNLInformationReused      OPTIONAL,
    userPlaneSecurityInformation  UserPlaneSecurityInformation     OPTIONAL,
    qosFlowAcceptedList          QosFlowAcceptedList,
    iE-Extensions                 ProtocolExtensionContainer { {PathSwitchRequestTransfer-ExtIEs} } OPTIONAL,
    ...
}
PathSwitchRequestTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
PathSwitchRequestUnsuccessfulTransfer ::= SEQUENCE {
    cause                         Cause,
    iE-Extensions                 ProtocolExtensionContainer { {PathSwitchRequestUnsuccessfulTransfer-ExtIEs} } OPTIONAL,
    ...
}
PathSwitchRequestUnsuccessfulTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
PDUSessionAggregateMaximumBitRate ::= SEQUENCE {
    pDUSessionAggregateMaximumBitRateDL      BitRate,
    pDUSessionAggregateMaximumBitRateUL      BitRate,
    iE-Extensions                 ProtocolExtensionContainer { {PDUSessionAggregateMaximumBitRate-ExtIEs} } OPTIONAL,
    ...
}

```

```

PDUSessionAggregateMaximumBitRate-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionID ::= INTEGER (0..255)

PDUSessionResourceAdmittedList ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceAdmittedItem

PDUSessionResourceAdmittedItem ::= SEQUENCE {
    pDUSessionID                PDUSessionID,
    handoverRequestAcknowledgeTransfer  OCTET STRING (CONTAINING HandoverRequestAcknowledgeTransfer),
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceAdmittedItem-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceAdmittedItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceFailedToModifyListModCfm ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceFailedToModifyItemModCfm

PDUSessionResourceFailedToModifyItemModCfm ::= SEQUENCE {
    pDUSessionID                PDUSessionID,
    pDUSessionResourceModifyIndicationUnsuccessfulTransfer  OCTET STRING (CONTAINING PDUSessionResourceModifyIndicationUnsuccessfulTransfer),
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceFailedToModifyItemModCfm-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceFailedToModifyItemModCfm-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceFailedToModifyListModRes ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceFailedToModifyItemModRes

PDUSessionResourceFailedToModifyItemModRes ::= SEQUENCE {
    pDUSessionID                PDUSessionID,
    pDUSessionResourceModifyUnsuccessfulTransfer  OCTET STRING (CONTAINING PDUSessionResourceModifyUnsuccessfulTransfer),
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceFailedToModifyItemModRes-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceFailedToModifyItemModRes-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceFailedToSetupListCxtFail ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceFailedToSetupItemCxtFail

PDUSessionResourceFailedToSetupItemCxtFail ::= SEQUENCE {
    pDUSessionID                PDUSessionID,
    pDUSessionResourceSetupUnsuccessfulTransfer  OCTET STRING (CONTAINING PDUSessionResourceSetupUnsuccessfulTransfer),
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceFailedToSetupItemCxtFail-ExtIEs} } OPTIONAL,
    ...
}

```

```

PDUSessionResourceFailedToSetupItemCxtFail-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceFailedToSetupListCxtRes ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceFailedToSetupItemCxtRes

PDUSessionResourceFailedToSetupItemCxtRes ::= SEQUENCE {
    pduSessionID                PDUSessionID,
    pduSessionResourceSetupUnsuccessfulTransfer OCTET STRING (CONTAINING PDUSessionResourceSetupUnsuccessfulTransfer),
    iE-Extensions               ProtocolExtensionContainer { {PDUSessionResourceFailedToSetupItemCxtRes-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceFailedToSetupItemCxtRes-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceFailedToSetupListHOAck ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceFailedToSetupItemHOAck

PDUSessionResourceFailedToSetupItemHOAck ::= SEQUENCE {
    pduSessionID                PDUSessionID,
    handoverResourceAllocationUnsuccessfulTransfer OCTET STRING (CONTAINING HandoverResourceAllocationUnsuccessfulTransfer),
    iE-Extensions               ProtocolExtensionContainer { {PDUSessionResourceFailedToSetupItemHOAck-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceFailedToSetupItemHOAck-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceFailedToSetupListPSReq ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceFailedToSetupItemPSReq

PDUSessionResourceFailedToSetupItemPSReq ::= SEQUENCE {
    pduSessionID                PDUSessionID,
    pathSwitchRequestSetupFailedTransfer OCTET STRING (CONTAINING PathSwitchRequestSetupFailedTransfer),
    iE-Extensions               ProtocolExtensionContainer { {PDUSessionResourceFailedToSetupItemPSReq-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceFailedToSetupItemPSReq-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceFailedToSetupListSRes ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceFailedToSetupItemSRes

PDUSessionResourceFailedToSetupItemSRes ::= SEQUENCE {
    pduSessionID                PDUSessionID,
    pduSessionResourceSetupUnsuccessfulTransfer OCTET STRING (CONTAINING PDUSessionResourceSetupUnsuccessfulTransfer),
    iE-Extensions               ProtocolExtensionContainer { {PDUSessionResourceFailedToSetupItemSRes-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceFailedToSetupItemSRes-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

}

PDUSessionResourceHandoverList ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceHandoverItem

PDUSessionResourceHandoverItem ::= SEQUENCE {
    pduSessionID          PDUSessionID,
    handoverCommandTransfer OCTET STRING (CONTAINING HandoverCommandTransfer),
    iE-Extensions         ProtocolExtensionContainer { {PDUSessionResourceHandoverItem-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceHandoverItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceInformationList ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceInformationItem

PDUSessionResourceInformationItem ::= SEQUENCE {
    pduSessionID          PDUSessionID,
    qosFlowInformationList QosFlowInformationList,
    drBsToQosFlowsMappingList DRBsToQosFlowsMappingList OPTIONAL,
    iE-Extensions         ProtocolExtensionContainer { {PDUSessionResourceInformationItem-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceInformationItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceListCxtRelCpl ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceItemCxtRelCpl

PDUSessionResourceItemCxtRelCpl ::= SEQUENCE {
    pduSessionID          PDUSessionID,
    iE-Extensions         ProtocolExtensionContainer { {PDUSessionResourceItemCxtRelCpl-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceItemCxtRelCpl-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceListCxtRelReq ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceItemCxtRelReq

PDUSessionResourceItemCxtRelReq ::= SEQUENCE {
    pduSessionID          PDUSessionID,
    iE-Extensions         ProtocolExtensionContainer { {PDUSessionResourceItemCxtRelReq-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceItemCxtRelReq-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceListHORqd ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceItemHORqd

```



```

PDUSessionResourceItemHORqd ::= SEQUENCE {
    pduSessionID          PDUSessionID,
    handoverRequiredTransfer OCTET STRING (CONTAINING HandoverRequiredTransfer),
    iE-Extensions         ProtocolExtensionContainer { {PDUSessionResourceItemHORqd-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceItemHORqd-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceModifyConfirmTransfer ::= SEQUENCE {
    qosFlowModifyConfirmList      QosFlowModifyConfirmList,
    tNLMappingList                TNLMappingList                OPTIONAL,
    qosFlowFailedToModifyList     QosFlowList                OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { {PDUSessionResourceModifyConfirmTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceModifyConfirmTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceModifyIndicationUnsuccessfulTransfer ::= SEQUENCE {
    cause                        Cause,
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceModifyIndicationUnsuccessfulTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceModifyIndicationUnsuccessfulTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceModifyRequestTransfer ::= SEQUENCE {
    protocolIEs                 ProtocolIE-Container { {PDUSessionResourceModifyRequestTransferIEs} },
    ...
}

PDUSessionResourceModifyRequestTransferIEs NGAP-PROTOCOL-IES ::= {
    { ID id-PDUSessionAggregateMaximumBitRate CRITICALITY reject TYPE PDUSessionAggregateMaximumBitRate PRESENCE optional } |
    { ID id-UL-NGU-UP-TNLModifyList          CRITICALITY reject TYPE UL-NGU-UP-TNLModifyList          PRESENCE optional } |
    { ID id-NetworkInstance                  CRITICALITY reject TYPE NetworkInstance                  PRESENCE optional } |
    { ID id-QosFlowAddOrModifyRequestList    CRITICALITY reject TYPE QosFlowAddOrModifyRequestList    PRESENCE optional } |
    { ID id-QosFlowToReleaseList            CRITICALITY reject TYPE QosFlowList                        PRESENCE optional } |
    { ID id-AdditionalUL-NGU-UP-TNLInformation CRITICALITY reject TYPE UPTransportLayerInformation PRESENCE optional } |
    ...
}

PDUSessionResourceModifyResponseTransfer ::= SEQUENCE {
    dl-NGU-UP-TNLInformation          UPTransportLayerInformation          OPTIONAL,
    ul-NGU-UP-TNLInformation          UPTransportLayerInformation          OPTIONAL,
    qosFlowAddOrModifyResponseList    QosFlowAddOrModifyResponseList      OPTIONAL,
    additionalQosFlowPerTNLInformation QosFlowPerTNLInformation            OPTIONAL,
}

```

```

    qosFlowFailedToAddOrModifyList      QosFlowList                                OPTIONAL,
    iE-Extensions      ProtocolExtensionContainer { {PDUSessionResourceModifyResponseTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceModifyResponseTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceModifyIndicationTransfer ::= SEQUENCE {
    dL-UP-TNLInformation      UP-TNLInformation                                OPTIONAL,
    iE-Extensions      ProtocolExtensionContainer { {PDUSessionResourceModifyIndicationTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceModifyIndicationTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceModifyListModCfm ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceModifyItemModCfm

PDUSessionResourceModifyItemModCfm ::= SEQUENCE {
    pDUSessionID      PDUSessionID,
    pDUSessionResourceModifyConfirmTransfer      OCTET STRING (CONTAINING PDUSessionResourceModifyConfirmTransfer),
    iE-Extensions      ProtocolExtensionContainer { {PDUSessionResourceModifyItemModCfm-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceModifyItemModCfm-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceModifyListModInd ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceModifyItemModInd

PDUSessionResourceModifyItemModInd ::= SEQUENCE {
    pDUSessionID      PDUSessionID,
    pDUSessionResourceModifyIndicationTransfer      OCTET STRING (CONTAINING PDUSessionResourceModifyIndicationTransfer),
    iE-Extensions      ProtocolExtensionContainer { {PDUSessionResourceModifyItemModInd-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceModifyItemModInd-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceModifyListModReq ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceModifyItemModReq

PDUSessionResourceModifyItemModReq ::= SEQUENCE {
    pDUSessionID      PDUSessionID,
    nAS-PDU      NAS-PDU                                OPTIONAL,
    pDUSessionResourceModifyRequestTransfer      OCTET STRING (CONTAINING PDUSessionResourceModifyRequestTransfer),
    iE-Extensions      ProtocolExtensionContainer { {PDUSessionResourceModifyItemModReq-ExtIEs} } OPTIONAL,
    ...
}

```

```

PDUSessionResourceModifyItemModReq-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceModifyListModRes ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceModifyItemModRes

PDUSessionResourceModifyItemModRes ::= SEQUENCE {
    pduSessionID                PDUSessionID,
    pduSessionResourceModifyResponseTransfer OCTET STRING (CONTAINING PDUSessionResourceModifyResponseTransfer) OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceModifyItemModRes-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceModifyItemModRes-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceModifyUnsuccessfulTransfer ::= SEQUENCE {
    cause                        Cause,
    criticalityDiagnostics       CriticalityDiagnostics OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceModifyUnsuccessfulTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceModifyUnsuccessfulTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceNotifyList ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceNotifyItem

PDUSessionResourceNotifyItem ::= SEQUENCE {
    pduSessionID                PDUSessionID,
    pduSessionResourceNotifyTransfer OCTET STRING (CONTAINING PDUSessionResourceNotifyTransfer),
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceNotifyItem-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceNotifyItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceNotifyReleasedTransfer ::= SEQUENCE {
    cause                        Cause,
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceNotifyReleasedTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceNotifyReleasedTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceNotifyTransfer ::= SEQUENCE {
    qosFlowNotifyList           QosFlowNotifyList OPTIONAL,

```

```

    qosFlowReleasedList      QosFlowList                                OPTIONAL,
    iE-Extensions            ProtocolExtensionContainer { {PDUSessionResourceNotifyTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceNotifyTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceReleaseCommandTransfer ::= SEQUENCE {
    cause                    Cause,
    iE-Extensions            ProtocolExtensionContainer { {PDUSessionResourceReleaseCommandTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceReleaseCommandTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceReleasedListNot ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceReleasedItemNot

PDUSessionResourceReleasedItemNot ::= SEQUENCE {
    pduSessionID            PDUSessionID,
    pduSessionResourceNotifyReleasedTransfer OCTET STRING (CONTAINING PDUSessionResourceNotifyReleasedTransfer),
    iE-Extensions            ProtocolExtensionContainer { {PDUSessionResourceReleasedItemNot-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceReleasedItemNot-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceReleasedListPSAck ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceReleasedItemPSAck

PDUSessionResourceReleasedItemPSAck ::= SEQUENCE {
    pduSessionID            PDUSessionID,
    pathSwitchRequestUnsuccessfulTransfer OCTET STRING (CONTAINING PathSwitchRequestUnsuccessfulTransfer),
    iE-Extensions            ProtocolExtensionContainer { {PDUSessionResourceReleasedItemPSAck-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceReleasedItemPSAck-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceReleasedListPSFail ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceReleasedItemPSFail

PDUSessionResourceReleasedItemPSFail ::= SEQUENCE {
    pduSessionID            PDUSessionID,
    pathSwitchRequestUnsuccessfulTransfer OCTET STRING (CONTAINING PathSwitchRequestUnsuccessfulTransfer),
    iE-Extensions            ProtocolExtensionContainer { {PDUSessionResourceReleasedItemPSFail-ExtIEs} } OPTIONAL,
    ...
}

```

```

PDUSessionResourceReleasedItemPSFail-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceReleasedListRelRes ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceReleasedItemRelRes

PDUSessionResourceReleasedItemRelRes ::= SEQUENCE {
    pduSessionID                PDUSessionID,
    pduSessionResourceReleaseResponseTransfer OCTET STRING (CONTAINING PDUSessionResourceReleaseResponseTransfer),
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceReleasedItemRelRes-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceReleasedItemRelRes-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceReleaseResponseTransfer ::= SEQUENCE {
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceReleaseResponseTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceReleaseResponseTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceSetupListCxtReq ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceSetupItemCxtReq

PDUSessionResourceSetupItemCxtReq ::= SEQUENCE {
    pduSessionID                PDUSessionID,
    nAS-PDU                      NAS-PDU                                OPTIONAL,
    s-NSSAI                      S-NSSAI,
    pduSessionResourceSetupRequestTransfer OCTET STRING (CONTAINING PDUSessionResourceSetupRequestTransfer),
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceSetupItemCxtReq-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceSetupItemCxtReq-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceSetupListCxtRes ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceSetupItemCxtRes

PDUSessionResourceSetupItemCxtRes ::= SEQUENCE {
    pduSessionID                PDUSessionID,
    pduSessionResourceSetupResponseTransfer OCTET STRING (CONTAINING PDUSessionResourceSetupResponseTransfer),
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceSetupItemCxtRes-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceSetupItemCxtRes-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

PDUSessionResourceSetupListHOReq ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceSetupItemHOReq

PDUSessionResourceSetupItemHOReq ::= SEQUENCE {
    pduSessionID          PDUSessionID,
    s-NSSAI                S-NSSAI,
    handoverRequestTransfer OCTET STRING (CONTAINING PDUSessionResourceSetupRequestTransfer),
    iE-Extensions         ProtocolExtensionContainer { {PDUSessionResourceSetupItemHOReq-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceSetupItemHOReq-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceSetupListSUReq ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceSetupItemSUReq

PDUSessionResourceSetupItemSUReq ::= SEQUENCE {
    pduSessionID          PDUSessionID,
    pduSessionNAS-PDU     NAS-PDU                                OPTIONAL,
    s-NSSAI                S-NSSAI,
    pduSessionResourceSetupRequestTransfer OCTET STRING (CONTAINING PDUSessionResourceSetupRequestTransfer),
    iE-Extensions         ProtocolExtensionContainer { {PDUSessionResourceSetupItemSUReq-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceSetupItemSUReq-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceSetupListSURes ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceSetupItemSURes

PDUSessionResourceSetupItemSURes ::= SEQUENCE {
    pduSessionID          PDUSessionID,
    pduSessionResourceSetupResponseTransfer OCTET STRING (CONTAINING PDUSessionResourceSetupResponseTransfer),
    iE-Extensions         ProtocolExtensionContainer { {PDUSessionResourceSetupItemSURes-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceSetupItemSURes-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceSetupRequestTransfer ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container { {PDUSessionResourceSetupRequestTransferIEs} },
    ...
}

PDUSessionResourceSetupRequestTransferIEs NGAP-PROTOCOL-IES ::= {
    { ID id-PDUSessionAggregateMaximumBitRate    CRITICALITY reject TYPE PDUSessionAggregateMaximumBitRate PRESENCE optional }|
    { ID id-UL-NGU-UP-TNLInformation             CRITICALITY reject TYPE UPTransportLayerInformation PRESENCE mandatory }|
    { ID id-AdditionalUL-NGU-UP-TNLInformation   CRITICALITY reject TYPE UPTransportLayerInformation PRESENCE optional }|
    { ID id-DataForwardingNotPossible            CRITICALITY reject TYPE DataForwardingNotPossible PRESENCE optional }|
    { ID id-PDUSessionType                       CRITICALITY reject TYPE PDUSessionType PRESENCE mandatory }|
    { ID id-SecurityIndication                   CRITICALITY reject TYPE SecurityIndication PRESENCE optional }|
}

```

```

    { ID id-NetworkInstance          CRITICALITY reject TYPE NetworkInstance          PRESENCE optional   }|
    { ID id-QosFlowSetupRequestList  CRITICALITY reject TYPE QosFlowSetupRequestList PRESENCE mandatory  },
    ...
}

PDUSessionResourceSetupResponseTransfer ::= SEQUENCE {
    qosFlowPerTNLInformation          QosFlowPerTNLInformation,
    additionalQosFlowPerTNLInformation QosFlowPerTNLInformation          OPTIONAL,
    securityResult                    SecurityResult                    OPTIONAL,
    qosFlowFailedToSetupList          QosFlowList                      OPTIONAL,
    iE-Extensions                     ProtocolExtensionContainer { {PDUSessionResourceSetupResponseTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceSetupResponseTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceSetupUnsuccessfulTransfer ::= SEQUENCE {
    cause                Cause,
    criticalityDiagnostics CriticalityDiagnostics          OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { {PDUSessionResourceSetupUnsuccessfulTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceSetupUnsuccessfulTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceSwitchedList ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceSwitchedItem

PDUSessionResourceSwitchedItem ::= SEQUENCE {
    pduSessionID          PDUSessionID,
    pathSwitchRequestAcknowledgeTransfer OCTET STRING (CONTAINING PathSwitchRequestAcknowledgeTransfer),
    iE-Extensions         ProtocolExtensionContainer { { PDUSessionResourceSwitchedItem-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceSwitchedItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceToBeSwitchedDLList ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceToBeSwitchedDLItem

PDUSessionResourceToBeSwitchedDLItem ::= SEQUENCE {
    pduSessionID          PDUSessionID,
    pathSwitchRequestTransfer OCTET STRING (CONTAINING PathSwitchRequestTransfer),
    iE-Extensions         ProtocolExtensionContainer { { PDUSessionResourceToBeSwitchedDLItem-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceToBeSwitchedDLItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

PDUSessionResourceToReleaseListHOCmd ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceToReleaseItemHOCmd

PDUSessionResourceToReleaseItemHOCmd ::= SEQUENCE {
    pduSessionID                PDUSessionID,
    handoverPreparationUnsuccessfulTransfer  OCTET STRING (CONTAINING HandoverPreparationUnsuccessfulTransfer),
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceToReleaseItemHOCmd-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceToReleaseItemHOCmd-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceToReleaseListRelCmd ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceToReleaseItemRelCmd

PDUSessionResourceToReleaseItemRelCmd ::= SEQUENCE {
    pduSessionID                PDUSessionID,
    pduSessionResourceReleaseCommandTransfer  OCTET STRING (CONTAINING PDUSessionResourceReleaseCommandTransfer),
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionResourceToReleaseItemRelCmd-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceToReleaseItemRelCmd-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionType ::= ENUMERATED {
    ipv4,
    ipv6,
    ipv4v6,
    ethernet,
    unstructured,
    ...
}

PeriodicRegistrationUpdateTimer ::= BIT STRING (SIZE(8))

PLMNIdentity ::= OCTET STRING (SIZE(3))

PLMNSupportList ::= SEQUENCE (SIZE(1..maxnoofPLMNs)) OF PLMNSupportItem

PLMNSupportItem ::= SEQUENCE {
    plmnIdentity                PLMNIdentity,
    sliceSupportList            SliceSupportList,
    iE-Extensions                ProtocolExtensionContainer { {PLMNSupportItem-ExtIEs} } OPTIONAL,
    ...
}

PLMNSupportItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PortNumber ::= OCTET STRING (SIZE(2))

```



```

Pre-emptionCapability ::= ENUMERATED {
    shall-not-trigger-pre-emption,
    may-trigger-pre-emption,
    ...
}

Pre-emptionVulnerability ::= ENUMERATED {
    not-pre-emptable,
    pre-emptable,
    ...
}

PriorityLevelARP ::= INTEGER (1..15)

PriorityLevelQos ::= INTEGER (1..127, ...)

PWSFailedCellIDList ::= CHOICE {
    eUTRA-CGI-PWSFailedList      EUTRA-CGIList,
    nR-CGI-PWSFailedList        NR-CGIList,
    choice-Extensions           ProtocolIE-SingleContainer { {PWSFailedCellIDList-ExtIEs} }
}

PWSFailedCellIDList-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

-- Q

QosCharacteristics ::= CHOICE {
    nonDynamic5QI      NonDynamic5QIDescriptor,
    dynamic5QI         Dynamic5QIDescriptor,
    choice-Extensions  ProtocolIE-SingleContainer { {QosCharacteristics-ExtIEs} }
}

QosCharacteristics-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

QosFlowAcceptedList ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowAcceptedItem

QosFlowAcceptedItem ::= SEQUENCE {
    qosFlowIdentifier      QosFlowIdentifier,
    iE-Extensions         ProtocolExtensionContainer { {QosFlowAcceptedItem-ExtIEs} } OPTIONAL,
    ...
}

QosFlowAcceptedItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

QosFlowAddOrModifyRequestList ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowAddOrModifyRequestItem

QosFlowAddOrModifyRequestItem ::= SEQUENCE {
    qosFlowIdentifier      QosFlowIdentifier,

```

```

    qosFlowLevelQosParameters      QosFlowLevelQosParameters      OPTIONAL,
    e-RAB-ID                       E-RAB-ID                       OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {QosFlowAddOrModifyRequestItem-ExtIEs} } OPTIONAL,
    ...
}

QosFlowAddOrModifyRequestItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

QosFlowAddOrModifyResponseList ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowAddOrModifyResponseItem

QosFlowAddOrModifyResponseItem ::= SEQUENCE {
    qosFlowIdentifier              QosFlowIdentifier,
    iE-Extensions                  ProtocolExtensionContainer { {QosFlowAddOrModifyResponseItem-ExtIEs} } OPTIONAL,
    ...
}

QosFlowAddOrModifyResponseItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

QosFlowIdentifier ::= INTEGER (0..63, ...)

QosFlowInformationList ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowInformationItem

QosFlowInformationItem ::= SEQUENCE {
    qosFlowIdentifier              QosFlowIdentifier,
    dlForwarding                  DLForwarding                                OPTIONAL,
    iE-Extensions                  ProtocolExtensionContainer { {QosFlowInformationItem-ExtIEs} } OPTIONAL,
    ...
}

QosFlowInformationItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

QosFlowLevelQosParameters ::= SEQUENCE {
    qosCharacteristics             QosCharacteristics,
    allocationAndRetentionPriority AllocationAndRetentionPriority,
    gBR-QosInformation             GBR-QosInformation                                OPTIONAL,
    reflectiveQosAttribute         ReflectiveQosAttribute                            OPTIONAL,
    additionalQosFlowInformation   AdditionalQosFlowInformation                            OPTIONAL,
    iE-Extensions                  ProtocolExtensionContainer { {QosFlowLevelQosParameters-ExtIEs} } OPTIONAL,
    ...
}

QosFlowLevelQosParameters-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

QosFlowList ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowItem

QosFlowItem ::= SEQUENCE {

```

```

    qosFlowIdentifier      QosFlowIdentifier,
    cause                  Cause,
    iE-Extensions         ProtocolExtensionContainer { {QosFlowItem-ExtIEs} } OPTIONAL,
    ...
}

QosFlowItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

QosFlowModifyConfirmList ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowModifyConfirmItem

QosFlowModifyConfirmItem ::= SEQUENCE {
    qosFlowIdentifier      QosFlowIdentifier,
    iE-Extensions         ProtocolExtensionContainer { {QosFlowModifyConfirmItem-ExtIEs} } OPTIONAL,
    ...
}

QosFlowModifyConfirmItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

QosFlowNotifyList ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowNotifyItem

QosFlowNotifyItem ::= SEQUENCE {
    qosFlowIdentifier      QosFlowIdentifier,
    notificationCause      NotificationCause,
    iE-Extensions         ProtocolExtensionContainer { {QosFlowNotifyItem-ExtIEs} } OPTIONAL,
    ...
}

QosFlowNotifyItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

QosFlowPerTNLInformation ::= SEQUENCE {
    uPTransportLayerInformation      UPTransportLayerInformation,
    associatedQosFlowList            AssociatedQosFlowList,
    iE-Extensions                   ProtocolExtensionContainer { { QosFlowPerTNLInformation-ExtIEs} } OPTIONAL,
    ...
}

QosFlowPerTNLInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

QosFlowSetupRequestList ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowSetupRequestItem

QosFlowSetupRequestItem ::= SEQUENCE {
    qosFlowIdentifier      QosFlowIdentifier,
    qosFlowLevelQosParameters      QosFlowLevelQosParameters,
    e-RAB-ID                E-RAB-ID                                OPTIONAL,
    iE-Extensions           ProtocolExtensionContainer { {QosFlowSetupRequestItem-ExtIEs} } OPTIONAL,
    ...
}

```

```

}

QosFlowSetupRequestItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

QosFlowSetupResponseListHOReqAck ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowSetupResponseItemHOReqAck

QosFlowSetupResponseItemHOReqAck ::= SEQUENCE {
    qosFlowIdentifier          QosFlowIdentifier,
    dataForwardingAccepted     DataForwardingAccepted          OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { {QosFlowSetupResponseItemHOReqAck-ExtIEs} } OPTIONAL,
    ...
}

QosFlowSetupResponseItemHOReqAck-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

QosFlowSetupResponseListSUsRes ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowSetupResponseItemSUsRes

QosFlowSetupResponseItemSUsRes ::= SEQUENCE {
    qosFlowIdentifier          QosFlowIdentifier,
    iE-Extensions              ProtocolExtensionContainer { {QosFlowSetupResponseItemSUsRes-ExtIEs} } OPTIONAL,
    ...
}

QosFlowSetupResponseItemSUsRes-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

QosFlowToBeForwardedList ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowToBeForwardedItem

QosFlowToBeForwardedItem ::= SEQUENCE {
    qosFlowIdentifier          QosFlowIdentifier,
    iE-Extensions              ProtocolExtensionContainer { {QosFlowToBeForwardedItem-ExtIEs} } OPTIONAL,
    ...
}

QosFlowToBeForwardedItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- R

RANNodeName ::= PrintableString (SIZE(1..150, ...))

RANPagingPriority ::= INTEGER (1..256)

RANStatusTransfer-TransparentContainer ::= SEQUENCE {
    drBsSubjectToStatusTransferList DRBsSubjectToStatusTransferList,
    iE-Extensions              ProtocolExtensionContainer { {RANStatusTransfer-TransparentContainer-ExtIEs} } OPTIONAL,
    ...
}

```

```

RANStatusTransfer-TransparentContainer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

RAN-UE-NGAP-ID ::= INTEGER (0..4294967295)

RATRestrictions ::= SEQUENCE (SIZE(0..maxnoofEPLMNsPlusOne)) OF RATRestrictions-Item

RATRestrictions-Item ::= SEQUENCE {
  pLMNIdentity          PLMNIdentity,
  rATRestrictionInformation RATRestrictionInformation,
  iE-Extensions         ProtocolExtensionContainer { {RATRestrictions-Item-ExtIEs} } OPTIONAL,
  ...
}

RATRestrictions-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

RATRestrictionInformation ::= BIT STRING (SIZE(8, ...))

RecommendedCellsForPaging ::= SEQUENCE {
  recommendedCellList      RecommendedCellList,
  iE-Extensions            ProtocolExtensionContainer { {RecommendedCellsForPaging-ExtIEs} } OPTIONAL,
  ...
}

RecommendedCellsForPaging-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

RecommendedCellList ::= SEQUENCE (SIZE(1..maxnoofRecommendedCells)) OF RecommendedCellItem

RecommendedCellItem ::= SEQUENCE {
  nGRAN-CGI                NGRAN-CGI,
  timeStayedInCell         INTEGER (0..4095) OPTIONAL,
  iE-Extensions            ProtocolExtensionContainer { {RecommendedCellItem-ExtIEs} } OPTIONAL,
  ...
}

RecommendedCellItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

RecommendedRANNodesForPaging ::= SEQUENCE {
  recommendedRANNodeList   RecommendedRANNodeList,
  iE-Extensions            ProtocolExtensionContainer { {RecommendedRANNodesForPaging-ExtIEs} } OPTIONAL,
  ...
}

RecommendedRANNodesForPaging-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

```

```
RecommendedRANNodeList ::= SEQUENCE (SIZE(1..maxnoofRecommendedRANNodes)) OF RecommendedRANNodeItem

RecommendedRANNodeItem ::= SEQUENCE {
    amFPagingTarget      AMFPagingTarget,
    iE-Extensions        ProtocolExtensionContainer { {RecommendedRANNodeItem-ExtIEs} } OPTIONAL,
    ...
}

RecommendedRANNodeItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

ReflectiveQosAttribute ::= ENUMERATED {
    subject-to,
    ...
}

ReferenceID ::= INTEGER (1..64, ...)

RelativeAMFCapacity ::= INTEGER (0..255)

ReportArea ::= ENUMERATED {
    cell,
    ...
}

RepetitionPeriod ::= INTEGER (0..131071)

ResetAll ::= ENUMERATED {
    reset-all,
    ...
}

ResetType ::= CHOICE {
    nG-Interface          ResetAll,
    partOfNG-Interface    UE-associatedLogicalNG-connectionList,
    choice-Extensions     ProtocolIE-SingleContainer { {ResetType-ExtIEs} }
}

ResetType-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

RoutingID ::= OCTET STRING

RRCContainer ::= OCTET STRING

RRCEstablishmentCause ::= ENUMERATED {
    emergency,
    highPriorityAccess,
    mt-Access,
    mo-Signalling,
    mo-Data,
}
```

```

    mo-VoiceCall,
    mo-VideoCall,
    mo-SMS,
    mps-PriorityAccess,
    mcs-PriorityAccess,
    ...
}

RRCInactiveTransitionReportRequest ::= ENUMERATED {
    subsequent-state-transition-report,
    single-rrc-connected-state-report,
    cancel-report,
    ...
}

RRCState ::= ENUMERATED {
    inactive,
    connected,
    ...
}

-- S

SD ::= OCTET STRING (SIZE(3))

SecurityContext ::= SEQUENCE {
    nextHopChainingCount      NextHopChainingCount,
    nextHopNH                 SecurityKey,
    iE-Extensions            ProtocolExtensionContainer { {SecurityContext-ExtIEs} } OPTIONAL,
    ...
}

SecurityContext-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

SecurityIndication ::= SEQUENCE {
    integrityProtectionIndication      IntegrityProtectionIndication,
    confidentialityProtectionIndication ConfidentialityProtectionIndication,
    maximumIntegrityProtectedDataRate  MaximumIntegrityProtectedDataRate      OPTIONAL,
    iE-Extensions                      ProtocolExtensionContainer { {SecurityIndication-ExtIEs} } OPTIONAL,
    ...
}

SecurityIndication-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

SecurityKey ::= BIT STRING (SIZE(256))

SecurityResult ::= SEQUENCE {
    integrityProtectionResult      IntegrityProtectionResult,
    confidentialityProtectionResult ConfidentialityProtectionResult,
    iE-Extensions                 ProtocolExtensionContainer { {SecurityResult-ExtIEs} } OPTIONAL,

```

```

}
...
}
SecurityResult-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
SerialNumber ::= BIT STRING (SIZE(16))
ServedGUAMIList ::= SEQUENCE (SIZE(1..maxnoofServedGUAMIs)) OF ServedGUAMIItem
ServedGUAMIItem ::= SEQUENCE {
  gUAMI          GUAMI,
  backupAMFName  AMFName                               OPTIONAL,
  iE-Extensions  ProtocolExtensionContainer { {ServedGUAMIItem-ExtIEs} } OPTIONAL,
  ...
}
ServedGUAMIItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
ServiceAreaInformation ::= SEQUENCE (SIZE(1.. maxnoofEPLMNsPlusOne)) OF ServiceAreaInformation-Item
ServiceAreaInformation-Item ::= SEQUENCE {
  pLMNIdentity    PLMNIdentity,
  allowedTACs     AllowedTACs                               OPTIONAL,
  notAllowedTACs  NotAllowedTACs                           OPTIONAL,
  iE-Extensions   ProtocolExtensionContainer { {ServiceAreaInformation-Item-ExtIEs} } OPTIONAL,
  ...
}
ServiceAreaInformation-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
SingleTNLInformation ::= SEQUENCE {
  uPTransportLayerInformation  UPTransportLayerInformation,
  iE-Extensions                ProtocolExtensionContainer { {SingleTNLInformation-ExtIEs} }   OPTIONAL,
  ...
}
SingleTNLInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
SliceOverloadList ::= SEQUENCE (SIZE(1..maxnoofSliceItems)) OF SliceOverloadItem
SliceOverloadItem ::= SEQUENCE {
  s-NSSAI          S-NSSAI,
  iE-Extensions    ProtocolExtensionContainer { {SliceOverloadItem-ExtIEs} }   OPTIONAL,
  ...
}

```



```

SliceOverloadItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

SliceSupportList ::= SEQUENCE (SIZE(1..maxnoofSliceItems)) OF SliceSupportItem

SliceSupportItem ::= SEQUENCE {
  s-NSSAI          S-NSSAI,
  iE-Extensions   ProtocolExtensionContainer { {SliceSupportItem-ExtIEs} }   OPTIONAL,
  ...
}

SliceSupportItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

S-NSSAI ::= SEQUENCE {
  sST          SST,
  sD          SD          OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { { S-NSSAI-ExtIEs} }   OPTIONAL,
  ...
}

S-NSSAI-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

SONConfigurationTransfer ::= SEQUENCE {
  targetRANNodeID      TargetRANNodeID,
  sourceRANNodeID      SourceRANNodeID,
  sONInformation        SONInformation,
  xnTNLConfigurationInfo XnTNLConfigurationInfo,
  iE-Extensions        ProtocolExtensionContainer { {SONConfigurationTransfer-ExtIEs} }   OPTIONAL,
  ...
}

SONConfigurationTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

SONInformation ::= CHOICE {
  sONInformationRequest      SONInformationRequest,
  sONInformationReply        SONInformationReply,
  choice-Extensions         ProtocolIE-SingleContainer { {SONInformation-ExtIEs} }
}

SONInformation-ExtIEs NGAP-PROTOCOL-IES ::= {
  ...
}

SONInformationReply ::= SEQUENCE {
  xnTNLConfigurationInfo      XnTNLConfigurationInfo          OPTIONAL,
  iE-Extensions               ProtocolExtensionContainer { {SONInformationReply-ExtIEs} }   OPTIONAL,
  ...
}

```

```

}
SONInformationReply-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
SONInformationRequest ::= ENUMERATED {
  xn-TNL-configuration-info,
  ...
}
SourceNGRANNode-ToTargetNGRANNode-TransparentContainer ::= SEQUENCE {
  rRCContainer                RRCContainer,
  pduSessionResourceInformationList  PDUSessionResourceInformationList OPTIONAL,
  e-RABInformationList        E-RABInformationList OPTIONAL,
  targetCell-ID              NGRAN-CGI,
  indexToRFSP                IndexToRFSP OPTIONAL,
  ueHistoryInformation        UEHistoryInformation,
  ie-Extensions               ProtocolExtensionContainer { {SourceNGRANNode-ToTargetNGRANNode-TransparentContainer-ExtIEs} } OPTIONAL,
  ...
}
SourceNGRANNode-ToTargetNGRANNode-TransparentContainer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
SourceOfUEActivityBehaviourInformation ::= ENUMERATED {
  subscription-information,
  statistics,
  ...
}
SourceRANNodeID ::= SEQUENCE {
  globalRANNodeID            GlobalRANNodeID,
  selectedTAI                TAI,
  ie-Extensions              ProtocolExtensionContainer { {SourceRANNodeID-ExtIEs} } OPTIONAL,
  ...
}
SourceRANNodeID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
SourceToTarget-TransparentContainer ::= OCTET STRING
-- This IE includes a transparent container from the source RAN node to the target RAN node.
-- The octets of the OCTET STRING are encoded according to the specifications of the target system.
SST ::= OCTET STRING (SIZE(1))
SupportedTAList ::= SEQUENCE (SIZE(1..maxnoofTACs)) OF SupportedTAItem
SupportedTAItem ::= SEQUENCE {
  tAC                        TAC,
  broadcastPLMNList          BroadcastPLMNList,

```

```

    iE-Extensions      ProtocolExtensionContainer { {SupportedTAItem-ExtIEs} } OPTIONAL,
    ...
}

SupportedTAItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- T

TAC ::= OCTET STRING (SIZE(3))

TAI ::= SEQUENCE {
    plMNIdentity      PLMNIdentity,
    tAC               TAC,
    iE-Extensions     ProtocolExtensionContainer { {TAI-ExtIEs} } OPTIONAL,
    ...
}

TAI-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

TAIBroadcastEUTRA ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAIBroadcastEUTRA-Item

TAIBroadcastEUTRA-Item ::= SEQUENCE {
    tAI               TAI,
    completedCellsInTAI-EUTRA    CompletedCellsInTAI-EUTRA,
    iE-Extensions     ProtocolExtensionContainer { {TAIBroadcastEUTRA-Item-ExtIEs} } OPTIONAL,
    ...
}

TAIBroadcastEUTRA-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

TAIBroadcastNR ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAIBroadcastNR-Item

TAIBroadcastNR-Item ::= SEQUENCE {
    tAI               TAI,
    completedCellsInTAI-NR    CompletedCellsInTAI-NR,
    iE-Extensions     ProtocolExtensionContainer { {TAIBroadcastNR-Item-ExtIEs} } OPTIONAL,
    ...
}

TAIBroadcastNR-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

TAICancelledEUTRA ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAICancelledEUTRA-Item

TAICancelledEUTRA-Item ::= SEQUENCE {
    tAI               TAI,
    cancelledCellsInTAI-EUTRA    CancelledCellsInTAI-EUTRA,

```

```

    iE-Extensions      ProtocolExtensionContainer { {TAICancelledEUTRA-Item-ExtIEs} } OPTIONAL,
    ...
}

TAICancelledEUTRA-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

TAICancelledNR ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAICancelledNR-Item

TAICancelledNR-Item ::= SEQUENCE {
    tAI                TAI,
    cancelledCellsInTAI-NR    CancelledCellsInTAI-NR,
    iE-Extensions      ProtocolExtensionContainer { {TAICancelledNR-Item-ExtIEs} } OPTIONAL,
    ...
}

TAICancelledNR-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

TAILlistForInactive ::= SEQUENCE (SIZE(1..maxnoofTAIforInactive)) OF TAILlistForInactiveItem

TAILlistForInactiveItem ::= SEQUENCE {
    tAI                TAI,
    iE-Extensions      ProtocolExtensionContainer { {TAILlistForInactiveItem-ExtIEs} } OPTIONAL,
    ...
}

TAILlistForInactiveItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

TAILlistForPaging ::= SEQUENCE (SIZE(1..maxnoofTAIforPaging)) OF TAILlistForPagingItem

TAILlistForPagingItem ::= SEQUENCE {
    tAI                TAI,
    iE-Extensions      ProtocolExtensionContainer { {TAILlistForPagingItem-ExtIEs} } OPTIONAL,
    ...
}

TAILlistForPagingItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

TAILlistForRestart ::= SEQUENCE (SIZE(1..maxnoofTAIforRestart)) OF TAI

TAILlistForWarning ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAI

TargeteNB-ID ::= SEQUENCE {
    globaleNB-ID      GlobalNgENB-ID,
    selected-EPS-TAI    EPS-TAI,
    iE-Extensions      ProtocolExtensionContainer { {TargeteNB-ID-ExtIEs} } OPTIONAL,
    ...
}

```

```

}

TargeteNB-ID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

TargetID ::= CHOICE {
  targetRANNodeID      TargetRANNodeID,
  targeteNB-ID         TargeteNB-ID,
  choice-Extensions   ProtocolIE-SingleContainer { {TargetID-ExtIEs} }
}

TargetID-ExtIEs NGAP-PROTOCOL-IES ::= {
  ...
}

TargetNGRANNode-ToSourceNGRANNode-TransparentContainer ::= SEQUENCE {
  rRCContainer          RCCContainer,
  iE-Extensions        ProtocolExtensionContainer { {TargetNGRANNode-ToSourceNGRANNode-TransparentContainer-ExtIEs} } OPTIONAL,
  ...
}

TargetNGRANNode-ToSourceNGRANNode-TransparentContainer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

TargetRANNodeID ::= SEQUENCE {
  globalRANNodeID      GlobalRANNodeID,
  selectedTAI          TAI,
  iE-Extensions        ProtocolExtensionContainer { {TargetRANNodeID-ExtIEs} } OPTIONAL,
  ...
}

TargetRANNodeID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

TargetToSource-TransparentContainer ::= OCTET STRING
-- This IE includes a transparent container from the target RAN node to the source RAN node.
-- The octets of the OCTET STRING are encoded according to the specifications of the target system.

TimerApproachForGUAMIRemoval ::= ENUMERATED {
  apply-timer,
  ...
}

TimeStamp ::= OCTET STRING (SIZE(4))

TimeToWait ::= ENUMERATED {v1s, v2s, v5s, v10s, v20s, v60s, ...}

TimeUEStayedInCell ::= INTEGER (0..4095)

TimeUEStayedInCellEnhancedGranularity ::= INTEGER (0..40950)

```

```

TNLAddressWeightFactor ::= INTEGER (0..255)

TNLAssociationList ::= SEQUENCE (SIZE(1..maxnoofTNLAssociations)) OF TNLAssociationItem

TNLAssociationItem ::= SEQUENCE {
    tNLAssociationAddress      CPTransportLayerInformation,
    cause                      Cause,
    iE-Extensions              ProtocolExtensionContainer { {TNLAssociationItem-ExtIEs} } OPTIONAL,
    ...
}

TNLAssociationItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

TNLAssociationUsage ::= ENUMERATED {
    ue,
    non-ue,
    both,
    ...
}

TNLInformationList ::= SEQUENCE (SIZE(1..maxnoofMultiConnectivities)) OF TNLInformationItem

TNLInformationItem ::= SEQUENCE {
    qosFlowPerTNLInformation    QosFlowPerTNLInformation,
    iE-Extensions              ProtocolExtensionContainer { {TNLInformationItem-ExtIEs} } OPTIONAL,
    ...
}

TNLInformationItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

TNLMappingList ::= SEQUENCE (SIZE(1..maxnoofMultiConnectivities)) OF TNLMappingItem

TNLMappingItem ::= SEQUENCE {
    dL-NGU-UP-TNLInformation    UPTransportLayerInformation,
    uL-NGU-UP-TNLInformation    UPTransportLayerInformation,
    iE-Extensions              ProtocolExtensionContainer { {TNLMappingItem-ExtIEs} } OPTIONAL,
    ...
}

TNLMappingItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

TraceActivation ::= SEQUENCE {
    nGRANTraceID                NGRANTraceID,
    interfacesToTrace           InterfacesToTrace,
    traceDepth                  TraceDepth,
    traceCollectionEntityIPAddress TransportLayerAddress,
    iE-Extensions              ProtocolExtensionContainer { {TraceActivation-ExtIEs} } OPTIONAL,
    ...
}

```

```

}
TraceActivation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
TraceDepth ::= ENUMERATED {
  minimum,
  medium,
  maximum,
  minimumWithoutVendorSpecificExtension,
  mediumWithoutVendorSpecificExtension,
  maximumWithoutVendorSpecificExtension,
  ...
}
TrafficLoadReductionIndication ::= INTEGER (1..99)
TransportLayerAddress ::= BIT STRING (SIZE(1..160, ...))
TypeOfError ::= ENUMERATED {
  not-understood,
  missing,
  ...
}
-- U
UEAggregateMaximumBitRate ::= SEQUENCE {
  uEAggregateMaximumBitRateDL      BitRate,
  uEAggregateMaximumBitRateUL      BitRate,
  iE-Extensions                     ProtocolExtensionContainer { {UEAggregateMaximumBitRate-ExtIEs} } OPTIONAL,
  ...
}
UEAggregateMaximumBitRate-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
UE-associatedLogicalNG-connectionList ::= SEQUENCE (SIZE(1..maxnoofNGConnectionsToReset)) OF UE-associatedLogicalNG-connectionItem
UE-associatedLogicalNG-connectionItem ::= SEQUENCE {
  aMF-UE-NGAP-ID      AMF-UE-NGAP-ID                                OPTIONAL,
  rAN-UE-NGAP-ID      RAN-UE-NGAP-ID                                OPTIONAL,
  iE-Extensions       ProtocolExtensionContainer { {UE-associatedLogicalNG-connectionItem-ExtIEs} } OPTIONAL,
  ...
}
UE-associatedLogicalNG-connectionItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...}
UEContextRequest ::= ENUMERATED {requested, ...}
UEHistoryInformation ::= SEQUENCE (SIZE(1..maxnoofCellsinUEHistoryInfo)) OF LastVisitedCellItem

```

```

UEIdentityIndexValue ::= CHOICE {
    indexLength10          BIT STRING (SIZE(10)),
    choice-Extensions      ProtocolIE-SingleContainer { {UEIdentityIndexValue-ExtIEs} }
}

UEIdentityIndexValue-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

UE-NGAP-IDs ::= CHOICE {
    uE-NGAP-ID-pair        UE-NGAP-ID-pair,
    aMF-UE-NGAP-ID         AMF-UE-NGAP-ID,
    choice-Extensions      ProtocolIE-SingleContainer { {UE-NGAP-IDs-ExtIEs} }
}

UE-NGAP-IDs-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

UE-NGAP-ID-pair ::= SEQUENCE {
    aMF-UE-NGAP-ID         AMF-UE-NGAP-ID,
    rAN-UE-NGAP-ID         RAN-UE-NGAP-ID,
    iE-Extensions          ProtocolExtensionContainer { {UE-NGAP-ID-pair-ExtIEs} } OPTIONAL,
    ...
}

UE-NGAP-ID-pair-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

UEPagingIdentity ::= CHOICE {
    fiveG-S-TMSI          FiveG-S-TMSI,
    choice-Extensions      ProtocolIE-SingleContainer { {UEPagingIdentity-ExtIEs} }
}

UEPagingIdentity-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

UEPresence ::= ENUMERATED {in, out, unknown, ...}

UEPresenceInAreaOfInterestList ::= SEQUENCE (SIZE(1..maxnoofAoI)) OF UEPresenceInAreaOfInterestItem

UEPresenceInAreaOfInterestItem ::= SEQUENCE {
    locationReportingReferenceID      LocationReportingReferenceID,
    uEPresence                        UEPresence,
    iE-Extensions                      ProtocolExtensionContainer { {UEPresenceInAreaOfInterestItem-ExtIEs} } OPTIONAL,
    ...
}

UEPresenceInAreaOfInterestItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```



```

UERadioCapability ::= OCTET STRING

UERadioCapabilityForPaging ::= SEQUENCE {
    uERadioCapabilityForPagingOfNR          UERadioCapabilityForPagingOfNR          OPTIONAL,
    uERadioCapabilityForPagingOfEUTRA      UERadioCapabilityForPagingOfEUTRA      OPTIONAL,
    iE-Extensions                          ProtocolExtensionContainer { {UERadioCapabilityForPaging-ExtIEs} } OPTIONAL,
    ...
}

UERadioCapabilityForPaging-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

UERadioCapabilityForPagingOfNR ::= OCTET STRING

UERadioCapabilityForPagingOfEUTRA ::= OCTET STRING

UESecurityCapabilities ::= SEQUENCE {
    nRencryptionAlgorithms                  NRencryptionAlgorithms,
    nRintegrityProtectionAlgorithms        NRintegrityProtectionAlgorithms,
    eUTRAEncryptionAlgorithms              EUTRAEncryptionAlgorithms,
    eUTRAIntegrityProtectionAlgorithms     EUTRAIntegrityProtectionAlgorithms,

    iE-Extensions                          ProtocolExtensionContainer { {UESecurityCapabilities-ExtIEs} } OPTIONAL,
    ...
}

UESecurityCapabilities-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

UL-NGU-UP-TNLModifyList ::= SEQUENCE (SIZE(0..maxnoofMultiConnectivities)) OF UL-NGU-UP-TNLModifyItem

UL-NGU-UP-TNLModifyItem ::= SEQUENCE {
    uL-NGU-UP-TNLInformation                UPTransportLayerInformation,
    dL-NGU-UP-TNLInformation                UPTransportLayerInformation,
    iE-Extensions                          ProtocolExtensionContainer { {UL-NGU-UP-TNLModifyItem-ExtIEs} } OPTIONAL,
    ...
}

UL-NGU-UP-TNLModifyItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

UnavailableGUAMIList ::= SEQUENCE (SIZE(1..maxnoofServedGUAMIs)) OF UnavailableGUAMIItem

UnavailableGUAMIItem ::= SEQUENCE {
    gUAMI                                    GUAMI,
    timerApproachForGUAMIRemoval            TimerApproachForGUAMIRemoval            OPTIONAL,
    backupAMFName                           AMFName                                OPTIONAL,
    iE-Extensions                          ProtocolExtensionContainer { {UnavailableGUAMIItem-ExtIEs} } OPTIONAL,
    ...
}

```

```

UnavailableGUAMIItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

UP-TNLInformation ::= CHOICE {
  singleTNLInformation      SingleTNLInformation,
  multipleTNLInformation    MultipleTNLInformation,
  choice-Extensions        ProtocolIE-SingleContainer { {UP-TNLInformation-ExtIEs} }
}

UP-TNLInformation-ExtIEs NGAP-PROTOCOL-IES ::= {
  ...
}

UPTransportLayerInformation ::= CHOICE {
  gTPTunnel                GTPtunnel,
  choice-Extensions        ProtocolIE-SingleContainer { {UPTransportLayerInformation-ExtIEs} }
}

UPTransportLayerInformation-ExtIEs NGAP-PROTOCOL-IES ::= {
  ...
}

UserLocationInformation ::= CHOICE {
  userLocationInformationEUTRA  UserLocationInformationEUTRA,
  userLocationInformationNR     UserLocationInformationNR,
  userLocationInformationN3IWF  UserLocationInformationN3IWF,
  choice-Extensions            ProtocolIE-SingleContainer { {UserLocationInformation-ExtIEs} }
}

UserLocationInformation-ExtIEs NGAP-PROTOCOL-IES ::= {
  ...
}

UserLocationInformationEUTRA ::= SEQUENCE {
  eUTRA-CGI                EUTRA-CGI,
  tAI                      TAI,
  timeStamp                TimeStamp
  iE-Extensions            ProtocolExtensionContainer { {UserLocationInformationEUTRA-ExtIEs} }
  ...
}
OPTIONAL,
OPTIONAL,

UserLocationInformationEUTRA-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

UserLocationInformationN3IWF ::= SEQUENCE {
  ipAddress                TransportLayerAddress,
  portNumber               PortNumber,
  iE-Extensions            ProtocolExtensionContainer { {UserLocationInformationN3IWF-ExtIEs} }
  ...
}
OPTIONAL,

```

```

UserLocationInformationN3IWF-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

UserLocationInformationNR ::= SEQUENCE {
    nR-CGI          NR-CGI,
    tAI             TAI,
    timeStamp      TimeStamp
    iE-Extensions  ProtocolExtensionContainer { {UserLocationInformationNR-ExtIEs} } OPTIONAL,
    ...
}

UserLocationInformationNR-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

UserPlaneSecurityInformation ::= SEQUENCE {
    securityResult      SecurityResult,
    securityIndication  SecurityIndication,
    iE-Extensions      ProtocolExtensionContainer { {UserPlaneSecurityInformation-ExtIEs} } OPTIONAL,
    ...
}

UserPlaneSecurityInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- V
-- W

WarningAreaCoordinates ::= OCTET STRING (SIZE(1..1024))

WarningAreaList ::= CHOICE {
    eUTRA-CGIListForWarning      EUTRA-CGIListForWarning,
    nR-CGIListForWarning         NR-CGIListForWarning,
    tAIListForWarning            TAIListForWarning,
    emergencyAreaIDList         EmergencyAreaIDList,
    choice-Extensions           ProtocolIE-SingleContainer { {WarningAreaList-ExtIEs} }
}

WarningAreaList-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

WarningMessageContents ::= OCTET STRING (SIZE(1..9600))

WarningSecurityInfo ::= OCTET STRING (SIZE(50))

WarningType ::= OCTET STRING (SIZE(2))

-- X

XnExtTLAs ::= SEQUENCE (SIZE(1..maxnoofXnExtTLAs)) OF XnExtTLA-Item

```

```

XnExtTLA-Item ::= SEQUENCE {
    iPsecTLA                TransportLayerAddress    OPTIONAL,
    gTP-TLAs                XnGTP-TLAs              OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { {XnExtTLA-Item-ExtIEs} } OPTIONAL,
    ...
}

XnExtTLA-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

XnGTP-TLAs ::= SEQUENCE (SIZE(1..maxnoofXnGTP-TLAs)) OF TransportLayerAddress

XnTLAs ::= SEQUENCE (SIZE(1..maxnoofXnTLAs)) OF TransportLayerAddress

XnTNLConfigurationInfo ::= SEQUENCE {
    xnTransportLayerAddresses    XnTLAs,
    xnExtendedTransportLayerAddresses    XnExtTLAs                OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { {XnTNLConfigurationInfo-ExtIEs} } OPTIONAL,
    ...
}

XnTNLConfigurationInfo-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- Y
-- Z

END
-- ASN1STOP

```

9.4.6 Common Definitions

```

-- ASN1START
-- *****
--
-- Common definitions
--
-- *****

NGAP-CommonDataTypes {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-Access (22) modules (3) ngap (1) version1 (1) ngap-CommonDataTypes (3) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

Criticality ::= ENUMERATED { reject, ignore, notify }

Presence ::= ENUMERATED { optional, conditional, mandatory }

```

```

PrivateIE-ID ::= CHOICE {
    local          INTEGER (0..65535),
    global         OBJECT IDENTIFIER
}

ProcedureCode ::= INTEGER (0..255)

ProtocolExtensionID ::= INTEGER (0..65535)

ProtocolIE-ID ::= INTEGER (0..65535)

TriggeringMessage ::= ENUMERATED { initiating-message, successful-outcome, unsuccessful-outcome }

END
-- ASN1STOP

```

9.4.7 Constant Definitions

```

-- ASN1START
-- *****
--
-- Constant definitions
--
-- *****

NGAP-Constants {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-Access (22) modules (3) ngap (1) version1 (1) ngap-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS

    ProcedureCode,
    ProtocolIE-ID
FROM NGAP-CommonDataTypes;

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

```

id-AMFConfigurationUpdate	ProcedureCode ::= 0
id-AMFStatusIndication	ProcedureCode ::= 1
id-CellTrafficTrace	ProcedureCode ::= 2
id-DeactivateTrace	ProcedureCode ::= 3
id-DownlinkNASTransport	ProcedureCode ::= 4
id-DownlinkNonUEAssociatedNRPPaTransport	ProcedureCode ::= 5
id-DownlinkRANConfigurationTransfer	ProcedureCode ::= 6
id-DownlinkRANStatusTransfer	ProcedureCode ::= 7
id-DownlinkUEAssociatedNRPPaTransport	ProcedureCode ::= 8
id-ErrorIndication	ProcedureCode ::= 9
id-HandoverCancel	ProcedureCode ::= 10
id-HandoverNotification	ProcedureCode ::= 11
id-HandoverPreparation	ProcedureCode ::= 12
id-HandoverResourceAllocation	ProcedureCode ::= 13
id-InitialContextSetup	ProcedureCode ::= 14
id-InitialUEMessage	ProcedureCode ::= 15
id-LocationReportingControl	ProcedureCode ::= 16
id-LocationReportingFailureIndication	ProcedureCode ::= 17
id-LocationReport	ProcedureCode ::= 18
id-NASNonDeliveryIndication	ProcedureCode ::= 19
id-NGReset	ProcedureCode ::= 20
id-NGSetup	ProcedureCode ::= 21
id-OverloadStart	ProcedureCode ::= 22
id-OverloadStop	ProcedureCode ::= 23
id-Paging	ProcedureCode ::= 24
id-PathSwitchRequest	ProcedureCode ::= 25
id-PDUSessionResourceModify	ProcedureCode ::= 26
id-PDUSessionResourceModifyIndication	ProcedureCode ::= 27
id-PDUSessionResourceRelease	ProcedureCode ::= 28
id-PDUSessionResourceSetup	ProcedureCode ::= 29
id-PDUSessionResourceNotify	ProcedureCode ::= 30
id-PrivateMessage	ProcedureCode ::= 31
id-PWSCancel	ProcedureCode ::= 32
id-PWSFailureIndication	ProcedureCode ::= 33
id-PWSRestartIndication	ProcedureCode ::= 34
id-RANConfigurationUpdate	ProcedureCode ::= 35
id-RerouteNASRequest	ProcedureCode ::= 36
id-RRCInactiveTransitionReport	ProcedureCode ::= 37
id-TraceFailureIndication	ProcedureCode ::= 38
id-TraceStart	ProcedureCode ::= 39
id-UEContextModification	ProcedureCode ::= 40
id-UEContextRelease	ProcedureCode ::= 41
id-UEContextReleaseRequest	ProcedureCode ::= 42
id-UERadioCapabilityCheck	ProcedureCode ::= 43
id-UERadioCapabilityInfoIndication	ProcedureCode ::= 44
id-UETNLBindingRelease	ProcedureCode ::= 45
id-UplinkNASTransport	ProcedureCode ::= 46
id-UplinkNonUEAssociatedNRPPaTransport	ProcedureCode ::= 47
id-UplinkRANConfigurationTransfer	ProcedureCode ::= 48
id-UplinkRANStatusTransfer	ProcedureCode ::= 49
id-UplinkUEAssociatedNRPPaTransport	ProcedureCode ::= 50
id-WriteReplaceWarning	ProcedureCode ::= 51

-- *****

```

--
-- Extension constants
--
-- *****

maxPrivateIEs                INTEGER ::= 65535
maxProtocolExtensions        INTEGER ::= 65535
maxProtocolIEs               INTEGER ::= 65535

-- *****

--
-- Lists
--
-- *****

    maxnoofAllowedAreas        INTEGER ::= 16
    maxnoofAllowedS-NSSAIs    INTEGER ::= 8
    maxnoofBPLMNs             INTEGER ::= 12
    maxnoofCellIDforWarning   INTEGER ::= 65535
    maxnoofCellinAoI          INTEGER ::= 256
    maxnoofCellinEAI          INTEGER ::= 65535
    maxnoofCellinTAI          INTEGER ::= 65535
    maxnoofCellsingNB         INTEGER ::= 16384
    maxnoofCellsingNB         INTEGER ::= 256
    maxnoofCellsinUEHistoryInfo INTEGER ::= 16
    maxnoofCellsUEMovingTrajectory INTEGER ::= 16
    maxnoofDRBs               INTEGER ::= 32
    maxnoofEmergencyAreaID    INTEGER ::= 65535
    maxnoofEAIforRestart      INTEGER ::= 256
    maxnoofEPLMNs             INTEGER ::= 15
    maxnoofEPLMNsPlusOne      INTEGER ::= 16
    maxnoofE-RABs             INTEGER ::= 256
    maxnoofErrors             INTEGER ::= 256
    maxnoofForbTACs           INTEGER ::= 4096
    maxnoofMultiConnectivities INTEGER ::= 4
    maxnoofNGConnectionsToReset INTEGER ::= 65536
    maxnoofPDUSessions        INTEGER ::= 256
    maxnoofPLMNs              INTEGER ::= 12
    maxnoofQosFlows           INTEGER ::= 64
    maxnoofRANNodeinAoI       INTEGER ::= 64
    maxnoofRecommendedCells   INTEGER ::= 16
    maxnoofRecommendedRANNodes INTEGER ::= 16
    maxnoofAoI                INTEGER ::= 64
    maxnoofServedGUAMIs       INTEGER ::= 256
    maxnoofSliceItems         INTEGER ::= 1024
    maxnoofTACs               INTEGER ::= 256
    maxnoofTAIforInactive     INTEGER ::= 16
    maxnoofTAIforPaging       INTEGER ::= 16
    maxnoofTAIforRestart      INTEGER ::= 2048
    maxnoofTAIforWarning      INTEGER ::= 65535
    maxnoofTAIinAoI           INTEGER ::= 16
    maxnoofTNLAssociations    INTEGER ::= 32
    maxnoofXnExtTLAs          INTEGER ::= 2
    maxnoofXnGTP-TLAs         INTEGER ::= 16

```

```

maxnoofXnTLAs                INTEGER ::= 16

-- *****
--
-- IEs
--
-- *****

id-AllowedNSSAI                ProtocolIE-ID ::= 0
id-AMFName                     ProtocolIE-ID ::= 1
id-AMFOverloadResponse         ProtocolIE-ID ::= 2
id-AMFSetID                    ProtocolIE-ID ::= 3
id-AMF-TNLAssociationFailedToSetupList ProtocolIE-ID ::= 4
id-AMF-TNLAssociationSetupList ProtocolIE-ID ::= 5
id-AMF-TNLAssociationToAddList ProtocolIE-ID ::= 6
id-AMF-TNLAssociationToRemoveList ProtocolIE-ID ::= 7
id-AMF-TNLAssociationToUpdateList ProtocolIE-ID ::= 8
id-AMFTrafficLoadReductionIndication ProtocolIE-ID ::= 9
id-AMF-UE-NGAP-ID             ProtocolIE-ID ::= 10
id-AssistanceDataForPaging     ProtocolIE-ID ::= 11
id-BroadcastCancelledAreaList  ProtocolIE-ID ::= 12
id-BroadcastCompletedAreaList  ProtocolIE-ID ::= 13
id-CancelAllWarningMessages    ProtocolIE-ID ::= 14
id-Cause                       ProtocolIE-ID ::= 15
id-CellIDListForRestart       ProtocolIE-ID ::= 16
id-ConcurrentWarningMessageInd ProtocolIE-ID ::= 17
id-CoreNetworkAssistanceInformation ProtocolIE-ID ::= 18
id-CriticalityDiagnostics      ProtocolIE-ID ::= 19
id-DataCodingScheme           ProtocolIE-ID ::= 20
id-DefaultPagingDRX           ProtocolIE-ID ::= 21
id-DirectForwardingPathAvailability ProtocolIE-ID ::= 22
id-EmergencyAreaIDListForRestart ProtocolIE-ID ::= 23
id-EmergencyFallbackIndicator  ProtocolIE-ID ::= 24
id-EUTRA-CGI                  ProtocolIE-ID ::= 25
id-FiveG-S-TMSI               ProtocolIE-ID ::= 26
id-GlobalRANNodeID            ProtocolIE-ID ::= 27
id-GUAMI                       ProtocolIE-ID ::= 28
id-HandoverType                ProtocolIE-ID ::= 29
id-IMSVoiceSupportIndicator    ProtocolIE-ID ::= 30
id-IndexToRFSP                 ProtocolIE-ID ::= 31
id-InfoOnRecommendedCellsAndRANNodesForPaging ProtocolIE-ID ::= 32
id-LocationReportingRequestType ProtocolIE-ID ::= 33
id-MaskedIMEISV                ProtocolIE-ID ::= 34
id-MessageIdentifier           ProtocolIE-ID ::= 35
id-MobilityRestrictionList     ProtocolIE-ID ::= 36
id-NASC                        ProtocolIE-ID ::= 37
id-NAS-PDU                     ProtocolIE-ID ::= 38
id-NASSecurityParametersFromNGRAN ProtocolIE-ID ::= 39
id-NewAMF-UE-NGAP-ID          ProtocolIE-ID ::= 40
id-NewSecurityContextInd       ProtocolIE-ID ::= 41
id-NGAP-Message                ProtocolIE-ID ::= 42
id-NGRAN-CGI                   ProtocolIE-ID ::= 43
id-NGRANTraceID               ProtocolIE-ID ::= 44
id-NR-CGI                      ProtocolIE-ID ::= 45

```


id-NRPPa-PDU	ProtocolIE-ID ::= 46
id-NumberOfBroadcastsRequested	ProtocolIE-ID ::= 47
id-OldAMF	ProtocolIE-ID ::= 48
id-OverloadStartNSSAList	ProtocolIE-ID ::= 49
id-PagingDRX	ProtocolIE-ID ::= 50
id-PagingOrigin	ProtocolIE-ID ::= 51
id-PagingPriority	ProtocolIE-ID ::= 52
id-PDUSessionResourceAdmittedList	ProtocolIE-ID ::= 53
id-PDUSessionResourceFailedToModifyListModRes	ProtocolIE-ID ::= 54
id-PDUSessionResourceFailedToSetupListCxtRes	ProtocolIE-ID ::= 55
id-PDUSessionResourceFailedToSetupListHOAck	ProtocolIE-ID ::= 56
id-PDUSessionResourceFailedToSetupListPSReq	ProtocolIE-ID ::= 57
id-PDUSessionResourceFailedToSetupListSUSRes	ProtocolIE-ID ::= 58
id-PDUSessionResourceHandoverList	ProtocolIE-ID ::= 59
id-PDUSessionResourceListCxtRelCpl	ProtocolIE-ID ::= 60
id-PDUSessionResourceListHORqd	ProtocolIE-ID ::= 61
id-PDUSessionResourceModifyListModCfm	ProtocolIE-ID ::= 62
id-PDUSessionResourceModifyListModInd	ProtocolIE-ID ::= 63
id-PDUSessionResourceModifyListModReq	ProtocolIE-ID ::= 64
id-PDUSessionResourceModifyListModRes	ProtocolIE-ID ::= 65
id-PDUSessionResourceNotifyList	ProtocolIE-ID ::= 66
id-PDUSessionResourceReleasedListNot	ProtocolIE-ID ::= 67
id-PDUSessionResourceReleasedListPSAck	ProtocolIE-ID ::= 68
id-PDUSessionResourceReleasedListPSFail	ProtocolIE-ID ::= 69
id-PDUSessionResourceReleasedListRelRes	ProtocolIE-ID ::= 70
id-PDUSessionResourceSetupListCxtReq	ProtocolIE-ID ::= 71
id-PDUSessionResourceSetupListCxtRes	ProtocolIE-ID ::= 72
id-PDUSessionResourceSetupListHOReq	ProtocolIE-ID ::= 73
id-PDUSessionResourceSetupListSUSReq	ProtocolIE-ID ::= 74
id-PDUSessionResourceSetupListSUSRes	ProtocolIE-ID ::= 75
id-PDUSessionResourceToBeSwitchedDLLList	ProtocolIE-ID ::= 76
id-PDUSessionResourceSwitchedList	ProtocolIE-ID ::= 77
id-PDUSessionResourceToReleaseListHOCmd	ProtocolIE-ID ::= 78
id-PDUSessionResourceToReleaseListRelCmd	ProtocolIE-ID ::= 79
id-PLMNSupportList	ProtocolIE-ID ::= 80
id-PWSFailedCellIDList	ProtocolIE-ID ::= 81
id-RANNodeName	ProtocolIE-ID ::= 82
id-RANPagingPriority	ProtocolIE-ID ::= 83
id-RANStatusTransfer-TransparentContainer	ProtocolIE-ID ::= 84
id-RAN-UE-NGAP-ID	ProtocolIE-ID ::= 85
id-RelativeAMFCapacity	ProtocolIE-ID ::= 86
id-RepetitionPeriod	ProtocolIE-ID ::= 87
id-ResetType	ProtocolIE-ID ::= 88
id-RoutingID	ProtocolIE-ID ::= 89
id-RRCEstablishmentCause	ProtocolIE-ID ::= 90
id-RRCInactiveTransitionReportRequest	ProtocolIE-ID ::= 91
id-RRCState	ProtocolIE-ID ::= 92
id-SecurityContext	ProtocolIE-ID ::= 93
id-SecurityKey	ProtocolIE-ID ::= 94
id-SerialNumber	ProtocolIE-ID ::= 95
id-ServedGUAMIList	ProtocolIE-ID ::= 96
id-SliceSupportList	ProtocolIE-ID ::= 97
id-SONConfigurationTransferDL	ProtocolIE-ID ::= 98
id-SONConfigurationTransferUL	ProtocolIE-ID ::= 99

```

id-SourceAMF-UE-NGAP-ID ProtocolIE-ID ::= 100
id-SourceToTarget-TransparentContainer ProtocolIE-ID ::= 101
id-SupportedTAList ProtocolIE-ID ::= 102
id-TALListForPaging ProtocolIE-ID ::= 103
id-TALListForRestart ProtocolIE-ID ::= 104
id-TargetID ProtocolIE-ID ::= 105
id-TargetToSource-TransparentContainer ProtocolIE-ID ::= 106
id-TimeToWait ProtocolIE-ID ::= 107
id-TraceActivation ProtocolIE-ID ::= 108
id-TraceCollectionEntityIPAddress ProtocolIE-ID ::= 109
id-UEAggregateMaximumBitRate ProtocolIE-ID ::= 110
id-UE-associatedLogicalNG-connectionList ProtocolIE-ID ::= 111
id-UEContextRequest ProtocolIE-ID ::= 112
id-UE-NGAP-IDs ProtocolIE-ID ::= 114
id-UEPagingIdentity ProtocolIE-ID ::= 115
id-UEPresenceInAreaOfInterestList ProtocolIE-ID ::= 116
id-UERadioCapability ProtocolIE-ID ::= 117
id-UERadioCapabilityForPaging ProtocolIE-ID ::= 118
id-UESecurityCapabilities ProtocolIE-ID ::= 119
id-UnavailableGUAMIList ProtocolIE-ID ::= 120
id-UserLocationInformation ProtocolIE-ID ::= 121
id-WarningAreaList ProtocolIE-ID ::= 122
id-WarningMessageContents ProtocolIE-ID ::= 123
id-WarningSecurityInfo ProtocolIE-ID ::= 124
id-WarningType ProtocolIE-ID ::= 125
id-AdditionalUL-NGU-UP-TNLInformation ProtocolIE-ID ::= 126
id-DataForwardingNotPossible ProtocolIE-ID ::= 127
id-DL-NGU-UP-TNLInformation ProtocolIE-ID ::= 128
id-NetworkInstance ProtocolIE-ID ::= 129
id-PDUSessionAggregateMaximumBitRate ProtocolIE-ID ::= 130
id-PDUSessionResourceFailedToModifyListModCfm ProtocolIE-ID ::= 131
id-PDUSessionResourceFailedToSetupListCxtFail ProtocolIE-ID ::= 132
id-PDUSessionResourceListCxtRelReq ProtocolIE-ID ::= 133
id-PDUSessionType ProtocolIE-ID ::= 134
id-QosFlowAddOrModifyRequestList ProtocolIE-ID ::= 135
id-QosFlowSetupRequestList ProtocolIE-ID ::= 136
id-QosFlowToReleaseList ProtocolIE-ID ::= 137
id-SecurityIndication ProtocolIE-ID ::= 138
id-UL-NGU-UP-TNLInformation ProtocolIE-ID ::= 139
id-UL-NGU-UP-TNLModifyList ProtocolIE-ID ::= 140
id-WarningAreaCoordinates ProtocolIE-ID ::= 141

```

```

END
-- ASN1STOP

```

9.4.8 Container Definitions

```

-- ASN1START
-- *****
--
-- Container definitions
--
-- *****

```

```
NGAP-Containers {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-Access (22) modules (3) ngap (1) version1 (1) ngap-Containers (5) }
```

```
DEFINITIONS AUTOMATIC TAGS ::=
```

```
BEGIN
```

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

```
IMPORTS
```

```
    Criticality,
    Presence,
    PrivateIE-ID,
    ProtocolExtensionID,
    ProtocolIE-ID
FROM NGAP-CommonDataTypes
```

```
    maxPrivateIEs,
    maxProtocolExtensions,
    maxProtocolIEs
FROM NGAP-Constants;
```

```
-- *****
--
-- Class Definition for Protocol IEs
--
-- *****
```

```
NGAP-PROTOCOL-IES ::= CLASS {
    &id          ProtocolIE-ID          UNIQUE,
    &criticality Criticality,
    &Value,
    &presence    Presence
}
WITH SYNTAX {
    ID          &id
    CRITICALITY &criticality
    TYPE        &Value
    PRESENCE    &presence
}
```

```
-- *****
--
-- Class Definition for Protocol IEs
--
-- *****
```

```

NGAP-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
--
-- *****

NGAP-PROTOCOL-EXTENSION ::= CLASS {
    &id                ProtocolExtensionID          UNIQUE,
    &criticality       Criticality,
    &Extension,
    &presence          Presence
}
WITH SYNTAX {
    ID                &id
    CRITICALITY       &criticality
    EXTENSION         &Extension
    PRESENCE          &presence
}

-- *****
--
-- Class Definition for Private IEs
--
-- *****

NGAP-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 {NGAP-PROTOCOL-IES : IEsSetParam} ::=
  SEQUENCE (SIZE (0..maxProtocolIEs)) OF
    ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-SingleContainer {NGAP-PROTOCOL-IES : IEsSetParam} ::=
  ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Field {NGAP-PROTOCOL-IES : IEsSetParam} ::= SEQUENCE {
  id          NGAP-PROTOCOL-IES.&id          ({IEsSetParam}),
  criticality NGAP-PROTOCOL-IES.&criticality ({IEsSetParam}@id),
  value       NGAP-PROTOCOL-IES.&Value      ({IEsSetParam}@id)
}

-- *****
--
-- Container for Protocol IE Pairs
--
-- *****

ProtocolIE-ContainerPair {NGAP-PROTOCOL-IES-PAIR : IEsSetParam} ::=
  SEQUENCE (SIZE (0..maxProtocolIEs)) OF
    ProtocolIE-FieldPair {{IEsSetParam}}

ProtocolIE-FieldPair {NGAP-PROTOCOL-IES-PAIR : IEsSetParam} ::= SEQUENCE {
  id              NGAP-PROTOCOL-IES-PAIR.&id          ({IEsSetParam}),
  firstCriticality NGAP-PROTOCOL-IES-PAIR.&firstCriticality ({IEsSetParam}@id),
  firstValue      NGAP-PROTOCOL-IES-PAIR.&FirstValue  ({IEsSetParam}@id),
  secondCriticality NGAP-PROTOCOL-IES-PAIR.&secondCriticality ({IEsSetParam}@id),
  secondValue     NGAP-PROTOCOL-IES-PAIR.&SecondValue  ({IEsSetParam}@id)
}

-- *****
--
-- Container Lists for Protocol IE Containers
--
-- *****

ProtocolIE-ContainerList {INTEGER : lowerBound, INTEGER : upperBound, NGAP-PROTOCOL-IES : IEsSetParam} ::=
  SEQUENCE (SIZE (lowerBound..upperBound)) OF
    ProtocolIE-SingleContainer {{IEsSetParam}}

ProtocolIE-ContainerPairList {INTEGER : lowerBound, INTEGER : upperBound, NGAP-PROTOCOL-IES-PAIR : IEsSetParam} ::=
  SEQUENCE (SIZE (lowerBound..upperBound)) OF
    ProtocolIE-ContainerPair {{IEsSetParam}}

-- *****
--

```

```
-- Container for Protocol Extensions
--
-- *****

ProtocolExtensionContainer {NGAP-PROTOCOL-EXTENSION : ExtensionSetParam} ::=
  SEQUENCE (SIZE (1..maxProtocolExtensions)) OF
    ProtocolExtensionField {{ExtensionSetParam}}

ProtocolExtensionField {NGAP-PROTOCOL-EXTENSION : ExtensionSetParam} ::= SEQUENCE {
  id                NGAP-PROTOCOL-EXTENSION.&id                ({ExtensionSetParam}),
  criticality       NGAP-PROTOCOL-EXTENSION.&criticality       ({ExtensionSetParam}@id),
  extensionValue    NGAP-PROTOCOL-EXTENSION.&Extension        ({ExtensionSetParam}@id)
}

-- *****
--
-- Container for Private IEs
--
-- *****

PrivateIE-Container {NGAP-PRIVATE-IES : IEsSetParam} ::=
  SEQUENCE (SIZE (1..maxPrivateIEs)) OF
    PrivateIE-Field {{IEsSetParam}}

PrivateIE-Field {NGAP-PRIVATE-IES : IEsSetParam} ::= SEQUENCE {
  id                NGAP-PRIVATE-IES.&id                ({IEsSetParam}),
  criticality       NGAP-PRIVATE-IES.&criticality       ({IEsSetParam}@id),
  value            NGAP-PRIVATE-IES.&Value            ({IEsSetParam}@id)
}

END
-- ASN1STOP
```

9.5 Message Transfer Syntax

NGAP shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax as specified in ITU-T Rec. X.691 [4].

9.6 Timers

$T_{NGRELOCprep}$

- Specifies the maximum time for the Handover Preparation procedure in the source NG-RAN node.

$T_{NGRELOCoverall}$

- Specifies the maximum time for the protection of the overall handover procedure in the source NG-RAN node.

$T_{XnRELOCoverall}$

- Specified in TS 38.423 [24].

10 Handling of Unknown, Unforeseen and Erroneous Protocol Data

10.1 General

Protocol Error cases can be divided into three classes:

- Transfer Syntax Error.
- Abstract Syntax Error.
- Logical Error.

Protocol errors can occur in the following functions within a receiving node:

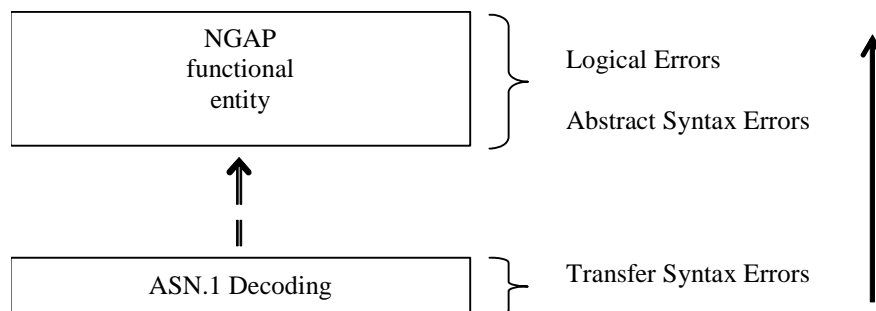


Figure 10.1-1: Protocol Errors in NGAP.

The information stated in subclauses 10.2, 10.3 and 10.4, to be included in the message used when reporting an error, is what at minimum shall be included. Other optional information elements within the message may also be included, if available. This is also valid for the case when the reporting is done with a response message. The latter is an exception to what is stated in subclause 4.1.

10.2 Transfer Syntax Error

A Transfer Syntax Error occurs when the receiver is not able to decode the received physical message. Transfer syntax errors are always detected in the process of ASN.1 decoding. If a Transfer Syntax Error occurs, the receiver should initiate Error Indication procedure with appropriate cause value for the Transfer Syntax protocol error.

Examples for Transfer Syntax Errors are:

- Violation of value ranges in ASN.1 definition of messages. E.g., if an IE has a defined value range of 0 to 10 (ASN.1: INTEGER (0..10)), and 12 will be received, then this will be treated as a transfer syntax error.
- Violation in list element constraints. E.g., if a list is defined as containing 1 to 10 elements, and 12 elements will be received, then this case will be handled as a transfer syntax error.
- Missing mandatory elements in ASN.1 SEQUENCE definitions (as sent by the originator of the message).
- Wrong order of elements in ASN.1 SEQUENCE definitions (as sent by the originator of the message).

10.3 Abstract Syntax Error

10.3.1 General

An Abstract Syntax Error occurs when the receiving functional NGAP entity:

1. receives IEs or IE groups that cannot be understood (unknown IE ID);
2. receives IEs for which the logical range is violated (e.g., ASN.1 definition: 0 to 15, the logical range is 0 to 10, while values 11 to 15 are undefined), and 12 will be received; this case will be handled as an abstract syntax error using criticality information sent by the originator of the message);

3. does not receive IEs or IE groups but according to the specified presence of the concerning object, the IEs or IE groups should have been present in the received message.
4. receives IEs or IE groups that are defined to be part of that message in wrong order or with too many occurrences of the same IE or IE group;
5. receives IEs or IE groups but according to the conditional presence of the concerning object and the specified condition, the IEs or IE groups should not have been present in the received message.

Cases 1 and 2 (not comprehended IE/IE group) are handled based on received Criticality information. Case 3 (missing IE/IE group) is handled based on Criticality information and Presence information for the missing IE/IE group specified in the version of the specification used by the receiver. Case 4 (IEs or IE groups in wrong order or with too many occurrences) and Case 5 (erroneously present conditional IEs or IE groups) result in rejecting the procedure.

If an Abstract Syntax Error occurs, the receiver shall read the remaining message and shall then for each detected Abstract Syntax Error that belong to cases 1-3 act according to the Criticality Information and Presence Information for the IE/IE group due to which Abstract Syntax Error occurred in accordance with subclauses 10.3.4 and 10.3.5. The handling of cases 4 and 5 is specified in subclause 10.3.6.

10.3.2 Criticality Information

In the NGAP messages there is criticality information set for individual IEs and/or IE groups. This criticality information instructs the receiver how to act when receiving an IE or an IE group that is not comprehended, i.e., the entire item (IE or IE group) which is not (fully or partially) comprehended shall be treated in accordance with its own criticality information as specified in subclause 10.3.4.

In addition, the criticality information is used in case of the missing IE/IE group abstract syntax error (see subclause 10.3.5).

The receiving node shall take different actions depending on the value of the Criticality Information. The three possible values of the Criticality Information for an IE/IE group are:

- Reject IE.
- Ignore IE and Notify Sender.
- Ignore IE.

The following rules restrict when a receiving entity may consider an IE, an IE group, or an EP not comprehended (not implemented), and when action based on criticality information is applicable:

1. IE or IE group: When one new or modified IE or IE group is implemented for one EP from a standard version, then other new or modified IEs or IE groups specified for that EP in that standard version shall be considered comprehended by a receiving entity (some may still remain unsupported).
2. EP: The comprehension of different EPs within a standard version or between different standard versions is not mandated. Any EP that is not supported may be considered not comprehended, even if another EP from that standard version is comprehended, and action based on criticality shall be applied.

10.3.3 Presence Information

For many IEs/IE groups which are optional according to the ASN.1 transfer syntax, NGAP specifies separately if the presence of these IEs/IE groups is optional or mandatory with respect to RNS application by means of the presence field of the concerning object of class NGAP-PROTOCOL-IES, NGAP-PROTOCOL-IES-PAIR, NGAP-PROTOCOL-EXTENSION or NGAP-PRIVATE-IES.

The presence field of the indicated classes supports three values:

1. Optional;
2. Conditional;
3. Mandatory.

If an IE/IE group is not included in a received message and the presence of the IE/IE group is mandatory or the presence is conditional and the condition is true according to the version of the specification used by the receiver, an abstract syntax error occurs due to a missing IE/IE group.

If an IE/IE group is included in a received message and the presence of the IE/IE group is conditional and the condition is false according to the version of the specification used by the receiver, an abstract syntax error occurs due to this erroneously present conditional IE/IE group.

10.3.4 Not comprehended IE/IE group

10.3.4.1 Procedure Code

The receiving node shall treat the different types of received criticality information of the *Procedure Code* IE according to the following:

Reject IE:

- If a message is received with a *Procedure Code* IE marked with "*Reject IE*" which the receiving node does not comprehend, the receiving node shall reject the procedure using the Error Indication procedure.

Ignore IE and Notify Sender:

- If a message is received with a *Procedure Code* IE marked with "*Ignore IE and Notify Sender*" which the receiving node does not comprehend, the receiving node shall ignore the procedure and initiate the Error Indication procedure.

Ignore IE:

- If a message is received with a *Procedure Code* IE marked with "*Ignore IE*" which the receiving node does not comprehend, the receiving node shall ignore the procedure.

When using the Error Indication procedure to reject a procedure or to report an ignored procedure it shall include the *Procedure Code* IE, the *Triggering Message* IE, and the *Procedure Criticality* IE in the *Criticality Diagnostics* IE.

10.3.4.1A Type of Message

When the receiving node cannot decode the *Type of Message* IE, the Error Indication procedure shall be initiated with an appropriate cause value.

10.3.4.2 IEs other than the Procedure Code and Type of Message

The receiving node shall treat the different types of received criticality information of an IE/IE group other than the *Procedure Code* IE and *Type of Message* IE according to the following:

Reject IE:

- If a message *initiating* a procedure is received containing one or more IEs/IE group marked with "*Reject IE*" which the receiving node does not comprehend; none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the rejection of one or more IEs/IE group using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- If a message *initiating* a procedure that does not have a message to report unsuccessful outcome is received containing one or more IEs/IE groups marked with "*Reject IE*" which the receiving node does not comprehend, the receiving node shall terminate the procedure and initiate the Error Indication procedure.
- If a *response* message is received containing one or more IEs marked with "*Reject IE*", that the receiving node does not comprehend, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

Ignore IE and Notify Sender:

- If a message *initiating* a procedure is received containing one or more IEs/IE groups marked with "*Ignore IE and Notify Sender*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received (except for the reporting) using the understood IEs/IE groups, and report in the response message of the procedure that one or more IEs/IE groups have been ignored. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the response message, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- if a message *initiating* a procedure that does not have a message to report the outcome of the procedure is received containing one or more IEs/IE groups marked with "*Ignore IE and Notify Sender*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received (except for the reporting) using the understood IEs/IE groups, and initiate the Error Indication procedure to report that one or more IEs/IE groups have been ignored.
- If a *response* message is received containing one or more IEs/IE groups marked with "*Ignore IE and Notify Sender*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received (except for the reporting) using the understood IEs/IE groups and initiate the Error Indication procedure.

Ignore IE:

- If a message *initiating* a procedure is received containing one or more IEs/IE groups marked with "*Ignore IE*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups and continue with the procedure as if the not comprehended IEs/IE groups were not received using the understood IEs/IE groups.
- If a *response* message is received containing one or more IEs/IE groups marked with "*Ignore IE*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups and continue with the procedure as if the not comprehended IEs/IE groups were not received using the understood IEs/IE groups.

When reporting not comprehended IEs/IE groups marked with "*Reject IE*" or "*Ignore IE and Notify Sender*" using a response message defined for the procedure, the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group.

When reporting not comprehended IEs/IE groups marked with "*Reject IE*" or "*Ignore IE and Notify Sender*" using the Error Indication procedure, the *Procedure Code* IE, the *Triggering Message* IE, *Procedure Criticality* IE, and the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group.

10.3.5 Missing IE or IE group

The receiving node shall treat the missing IE/IE group according to the criticality information for the missing IE/IE group in the received message specified in the version of this specification used by the receiver:

Reject IE:

- if a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "*Reject IE*"; none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the missing IEs/IE groups using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- if a received message *initiating* a procedure that does not have a message to report unsuccessful outcome is missing one or more IEs/IE groups with specified criticality "*Reject IE*", the receiving node shall terminate the procedure and initiate the Error Indication procedure.
- if a received *response* message is missing one or more IEs/IE groups with specified criticality "*Reject IE*", the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

Ignore IE and Notify Sender:

- if a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and report in the response message of the procedure that one or more IEs/IE groups were missing. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the response message, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- if a received message *initiating* a procedure that does not have a message to report the outcome of the procedure is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and initiate the Error Indication procedure to report that one or more IEs/IE groups were missing.
- if a received *response* message is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and initiate the Error Indication procedure to report that one or more IEs/IE groups were missing.

Ignore IE:

- if a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "*Ignore IE*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message.
- if a received *response* message is missing one or more IEs/IE groups with specified criticality "*Ignore IE*", the receiving node shall ignore that those IEs/IE groups are missing and continue with the procedure based on the other IEs/IE groups present in the message.

When reporting missing IEs/IE groups with specified criticality "*Reject IE*" or "*Ignore IE and Notify Sender*" using a response message defined for the procedure, the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group.

When reporting missing IEs/IE groups with specified criticality "*Reject IE*" or "*Ignore IE and Notify Sender*" using the Error Indication procedure, the *Procedure Code* IE, the *Triggering Message* IE, *Procedure Criticality* IE, and the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group.

10.3.6 IEs or IE groups received in wrong order or with too many occurrences or erroneously present

If a message with IEs or IE groups in wrong order or with too many occurrences is received or if IEs or IE groups with a conditional presence are present when the condition is not met (i.e., erroneously present), the receiving node shall behave according to the following:

- If a message *initiating* a procedure is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the cause value "Abstract Syntax Error (Falsely Constructed Message)" using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- If a message *initiating* a procedure that does not have a message to report unsuccessful outcome is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, the receiving node shall terminate the procedure and initiate the Error Indication procedure, and use cause value "Abstract Syntax Error (Falsely Constructed Message)".
- If a *response* message is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

When determining the correct order only the IEs specified in the specification version used by the receiver shall be considered.

10.4 Logical Error

Logical error situations occur when a message is comprehended correctly, but the information contained within the message is not valid (i.e., semantic error), or describes a procedure which is not compatible with the state of the receiver. In these conditions, the following behaviour shall be performed (unless otherwise specified) as defined by the class of the elementary procedure, irrespective of the criticality information of the IEs/IE groups containing the erroneous values.

Class 1:

Where the logical error occurs in a request message of a class 1 procedure, and the procedure has a message to report this unsuccessful outcome, this message shall be sent with an appropriate cause value. Typical cause values are:

- Semantic Error.
- Message not compatible with receiver state.

Where the logical error is contained in a request message of a class 1 procedure, and the procedure does not have a message to report this unsuccessful outcome, the procedure shall be terminated and the Error Indication procedure shall be initiated with an appropriate cause value. The *Procedure Code* IE and the *Triggering Message* IE within the *Criticality Diagnostics* IE shall then be included in order to identify the message containing the logical error.

Where the logical error exists in a response message of a class 1 procedure, the procedure shall be considered as unsuccessfully terminated and local error handling shall be initiated.

Class 2:

Where the logical error occurs in a message of a class 2 procedure, the procedure shall be terminated and the Error Indication procedure shall be initiated with an appropriate cause value. The *Procedure Code* IE and the *Triggering Message* IE within the *Criticality Diagnostics* IE shall then be included in order to identify the message containing the logical error.

10.5 Exceptions

The error handling for all the cases described hereafter shall take precedence over any other error handling described in the other subclasses of clause 10.

- If any type of error (Transfer Syntax Error, Abstract Syntax Error or Logical Error) is detected in the ERROR INDICATION message, it shall not trigger the Error Indication procedure in the receiving Node but local error handling.
- In case a response message or Error Indication message needs to be returned, but the information necessary to determine the receiver of that message is missing, the procedure shall be considered as unsuccessfully terminated and local error handling shall be initiated.
- If an error that terminates a procedure occurs, the returned cause value shall reflect the error that caused the termination of the procedure even if one or more abstract syntax errors with criticality "ignore and notify" have earlier occurred within the same procedure.
- If an AP ID error is detected, the error handling as described in subclause 10.6 shall be applied.

10.6 Handling of AP ID

NOTE: The "first message", the "first returned message" and the "last message" as used below correspond to messages for a UE-associated logical connection. The "first message" has a new AP ID from the sending node and the "first returned message" is the first response message, which has a new AP ID from the node sending the "first returned message". Thereafter the two AP IDs are included in all messages over the UE-associated logical connection unless otherwise allowed by the specification. The "last message" is a message sent by a node in order to complete the termination of a given UE-associated logical connection, such that no other messages for the same connection are expected in either direction. The nodes should ensure as far as possible that previously allocated AP ID are not immediately reused.

If a node receives a message (other than the first or first returned messages) including an erroneous AP ID that is either an unknown local AP ID, or an inconsistent remote AP ID (i.e. it is different to the remote AP ID stored previously for this UE-associated logical connection) for the same NG interface:

- if this message is not the last message for this UE-associated logical connection, the node shall initiate an Error Indication procedure with inclusion of the received AP ID(s) from the peer node and an appropriate cause value. Both nodes shall initiate a local release of any established UE-associated logical connection (for the same NG interface) having the erroneous AP ID as either the local or remote identifier.
- if this message is the last message for this UE-associated logical connection, the receiving node shall initiate a local release of any established UE-associated logical connection (for the same NG interface) having the erroneous AP ID as either the local or remote identifier.

Annex A (informative): Change history

Change history							
Date	Meeting	Tdoc	CR	Rev	Cat	Subject/Comment	New version
2017-04	R3#95b	R3-171209	-	-	-	TS skeleton	0.0.0
2017-04	R3#95b	R3-171311	-	-	-	Incorporated agreed TPs from R3#95b	0.0.1
2017-05	R3#96	R3-171480	-	-	-	Update of title page and change history	0.0.2
2017-05	R3#96	R3-171975	-	-	-	Incorporated agreed TPs from R3#96	0.1.0
2017-07	R3 NR#2	R3-172604	-	-	-	Incorporated agreed TPs from R3 NR#2 Adhoc	0.2.0
2017-08	R3#97	R3-173447	-	-	-	Incorporated agreed TPs from R3#97	0.3.0
2017-10	R3#97b	R3-174239	-	-	-	Incorporated agreed TPs from R3#97b	0.4.0
2017-12	R3#98	R3-175056	-	-	-	Incorporated agreed TPs from R3#98	0.5.0
2018-01	R3 NR#1	R3-180651	-	-	-	Incorporated agreed TPs from R3 NR Adhoc 1801	0.6.0
2018-03	R3#99	R3-181588	-	-	-	Incorporated agreed TPs from R3#99	0.7.0
2018-04	R3#99b	R3-182524	-	-	-	Incorporated agreed TPs from R3#99b	0.8.0
2018-05	R3#100	R3-183592	-	-	-	Incorporated agreed TPs from R3#100	0.9.0
2018-06	RAN#80	RP-180737	-	-	-	For approval	1.0.0
2018-06	RAN#80	-	-	-	-	Specification approved at TSG-RAN and placed under change control	15.0.0
2018-09	RAN#81	RP-181922	0001	2	F	NR Corrections (38.413 Baseline CR covering RAN3-101 agreements)	15.1.0
2018-12	RAN#82	RP-182448	0003	2	F	Baseline CR for TS 38.413	15.2.0

History

Document history		
V15.0.0	July 2018	Publication
V15.1.0	September 2018	Publication
V15.2.0	April 2019	Publication