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Foreword

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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".
- [30] 3GPP TS 29.531: "5G System; Network Slice Selection Services; Stage 3".
- [31] 3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC); Stage 2".
- [32] 3GPP TS 37.340: " Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Multi-connectivity; Stage 2".
- [33] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to support Vehicle-to-Everything (V2X) services".
- [34] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".
- [35] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".
- [36] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".
- [37] CableLabs WR-TR-5WWC-ARCH: "5G Wireless Wireline Converged Core Architecture".
- [38] 3GPP TS 36.401: "E-UTRAN Architecture Description".
- [39] 3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".
- [40] 3GPP TS 36.423: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 Application Protocol (X2AP) ".
- [41] 3GPP TS 37.320: "Universal Terrestrial Radio Access (UTRA), Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Radio measurement collection for Minimization of Drive Tests (MDT); Overall description; Stage 2".
- [42] 3GPP TS 36.306: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio access capabilities".

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].

ACL functionality: as defined in TS 36.413 [16].

CAG cell: as defined in TS 38.300 [8].

DAPS Handover: as defined in TS 38.300 [8].

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.

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

gNB: as defined in TS 38.300 [8].

NB-IoT: as defined in TS 36.300 [17].

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

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

Non-CAG cell: as defined in TS 38.300 [8].

PDU session resource: as defined in TS 38.401 [2].

Public Network Integrated NPN: as defined in TS 23.501 [9].

Stand-alone Non-Public Network: as defined in TS 23.501 [9].

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 |

| | |
|---------------|---|
| ACL | Access Control List |
| AMF | Access and Mobility Management Function |
| CAG | Closed Access Group |
| CGI | Cell Global Identifier |
| CP | Control Plane |
| DAPS | Dual Active Protocol Stacks |
| DC | Dual Connectivity |
| DL | Downlink |
| EPC | Evolved Packet Core |
| FN-RG | Fixed Network Residential Gateway |
| GUAMI | Globally Unique AMF Identifier |
| HFC | Hybrid Fiber-Coax |
| IAB | Integrated Access and Backhaul |
| IMEISV | International Mobile station Equipment Identity and Software Version number |
| LMF | Location Management Function |
| N3IWF | Non 3GPP InterWorking Function |
| NB-IoT | Narrow Band Internet of Things |
| NID | Network Identifier |
| NGAP | NG Application Protocol |
| NPN | Non-Public Network |
| NRPPa | NR Positioning Protocol Annex |
| NSCI | New Security Context Indicator |
| NSSAI | Network Slice Selection Assistance Information |
| OTDOA | Observed Time Difference of Arrival |
| PNI-NPN | Public Network Integrated Non-Public Network |
| PSCell | Primary SCG Cell |
| RIM | Remote Interference Management |
| RIM-RS | RIM Reference Signal |
| RSN | Redundancy Sequence Number |
| SCG | Secondary Cell Group |
| SCTP | Stream Control Transmission Protocol |
| SgNB | Secondary gNB |
| SMF | Session Management Function |
| S-NG-RAN node | Secondary NG-RAN node |
| SNPN | Stand-alone Non-Public Network |
| S-NSSAI | Single Network Slice Selection Assistance Information |
| TAC | Tracking Area Code |
| TAI | Tracking Area Identity |
| TNAP | Trusted Non-3GPP Access Point |
| TNGF | Trusted Non-3GPP Gateway Function |
| TNLA | Transport Network Layer Association |
| TWAP | Trusted WLAN Access Point |
| TWIF | Trusted WLAN Interworking Function |
| UL | Uplink |
| UP | User Plane |
| UPF | User Plane Function |
| V2X | Vehicle-to-Everything |
| W-AGF | Wireline Access Gateway Function |
| WUS | Wake Up Signal |

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 Italic font 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 | |
| UE Context Suspend | UE CONTEXT SUSPEND REQUEST | UE CONTEXT SUSPEND RESPONSE | UE CONTEXT SUSPEND FAILURE |
| UE Context Resume | UE CONTEXT RESUME REQUEST | UE CONTEXT RESUME RESPONSE | UE CONTEXT RESUME FAILURE |
| UE Radio Capability ID Mapping | UE RADIO CAPABILITY ID MAPPING REQUEST | UE RADIO CAPABILITY ID MAPPING 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 |
| Secondary RAT Data Usage Report | SECONDARY RAT DATA USAGE REPORT |
| Uplink RIM Information Transfer | UPLINK RIM INFORMATION TRANSFER |
| Downlink RIM Information Transfer | DOWNLINK RIM INFORMATION TRANSFER |
| Retrieve UE Information | RETRIEVE UE INFORMATION |
| UE Information Transfer | UE INFORMATION TRANSFER |
| RAN CP Relocation Indication | RAN CP RELOCATION INDICATION |
| Connection Establishment Indication | CONNECTION ESTABLISHMENT INDICATION |
| AMF CP Relocation Indication | AMF CP RELOCATION INDICATION |
| Handover Success | HANDOVER SUCCESS |
| Uplink RAN Early Status Transfer | UPLINK RAN EARLY STATUS TRANSFER |
| Downlink RAN Early Status Transfer | DOWNLINK RAN EARLY STATUS TRANSFER |

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

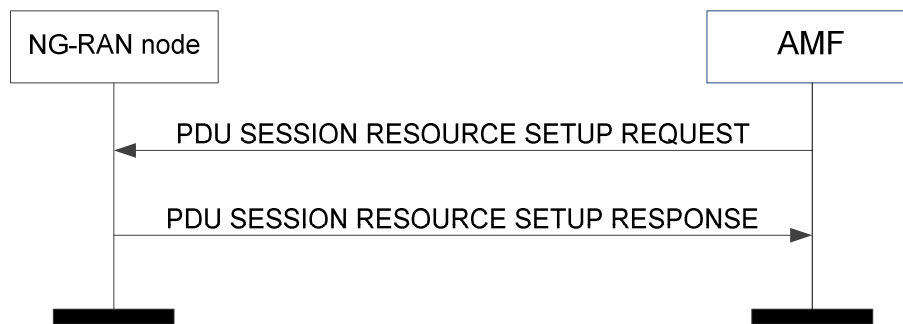


Figure 8.2.1.2-1: PDU session resource setup: successful operation

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 allocate for this split PDU session resources for an additional NG-U transport bearer for some or all of the QoS flows present in the *QoS Flow Setup Request List IE* and it shall indicate these QoS flows in the *Additional DL QoS Flow per TNL Information IE* in the *PDU Session Resource Setup Response Transfer IE*. In case the *Additional DL 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.

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 and the *Common Network Instance IE* is not present, 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 *Common 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 *Redundant UL NG-U UP TNL Information 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, if supported, use it as the uplink termination point for the user plane data for this PDU session for the redundant

transmission and it shall include the *Redundant QoS Flow per TNL Information IE* in the *PDU Session Resource Setup Response Transfer IE* as described in TS 23.501 [9].

For each PDU session, if the *Additional Redundant 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 allocate for this split PDU session resources for an additional redundant NG-U transport bearer for some or all of the QoS flows present in the *QoS Flow Setup Request List IE* and it shall indicate these QoS flows in the *Additional Redundant DL QoS Flow per TNL Information IE* in the *PDU Session Resource Setup Response Transfer IE*. In case the *Additional Redundant DL QoS Flow per TNL Information IE* is not included the SMF shall consider the proposed additional Redundant UL NG-U UP TNL information as available again.

For each PDU session, if the *Redundant Common 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 for the redundant transmission as specified in TS 23.501 [9].

For each PDU session, if the *TSC Traffic Characteristics 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, store it and use it 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", the NG-RAN node may perform appropriate header compression for the concerned PDU session, or if it is set to "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 Downlink IE* or the *Maximum Integrity Protected Data Rate Uplink IE* are 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 limits corresponding to the received values, 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 PDU session in the PDU SESSION RESOURCE SETUP REQUEST message, if the *Alternative QoS Parameters Set List* IE is included in the *GBR QoS Flow Information* IE in the *PDU Session Resource Setup Request Transfer* IE of the PDU SESSION RESOURCE SETUP REQUEST message, the NG-RAN node may accept the setup of the QoS flow when notification control has been enabled if the requested QoS parameters or at least one of the alternative QoS parameters sets can be fulfilled at the time of setup. In case the NG-RAN node accepts the setup fulfilling one of the alternative QoS parameters it shall indicate the alternative QoS parameters set which it currently fulfils in the *Current QoS Parameters Set Index* IE within the *PDU Session Resource Setup Response Transfer* IE of the PDU SESSION RESOURCE SETUP RESPONSE message.

For each QoS flow which has been successfully established, the NG-RAN node shall store the *Redundant QoS Flow Indicator* IE if included in the *PDU Session Resource Setup Request Transfer* IE contained in the PDU SESSION RESOURCE SETUP REQUEST message and consider it for the redundant transmission as specified in TS 23.501 [9].

For each QoS flow which has been successfully established, if the *QoS Monitoring Request* IE was included in the *QoS Flow Level QoS Parameters* IE contained in the PDU SESSION RESOURCE SETUP REQUEST message, the NG-RAN node shall store this information, and, if supported, perform delay measurement and QoS monitoring, as specified in TS 23.501 [9].

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].

For each PDU session, if the *Redundant PDU Session 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 shall, if supported, store the received information in the UE context and setup the redundant user plane for the

redundant PDU session as specified in TS38.300 [8] and TS 23.501 [9]. If the *PDU Session Type* IE is set to “ethernet” and the redundancy requirement is fulfilled using a secondary NG-RAN node, the NG-RAN node shall, if supported, include the *Global RAN Node ID of Secondary NG-RAN Node* IE in the *PDU Session Resource Setup Response Transfer* IE of the PDU SESSION RESOURCE SETUP RESPONSE message.

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.

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.

Upon reception of the PDU SESSION RESOURCE SETUP 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 Setup Response Transfer* IE or in the *PDU Session Resource Setup Unsuccessful Transfer* IE with cause value "IMS voice EPS fallback or RAT fallback triggered".

For each PDU session for which the *Global RAN Node ID of Secondary NG-RAN Node* IE is included in the *PDU Session Resource Setup Response Transfer* IE of the PDU SESSION RESOURCE SETUP RESPONSE message, the SMF shall, if supported, handle this information as specified in TS 23.501 [9].

The *UE Aggregate Maximum Bit Rate* IE should be sent to the NG-RAN node if the AMF has not sent it previously. If it is included in the PDU SESSION RESOURCE SETUP REQUEST 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].

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 RESPONSE message with an appropriate cause value.

If the NG-RAN node receives a PDU SESSION RESOURCE SETUP REQUEST message containing a *QoS Flow Setup Request List* IE in the *PDU Session Resource Setup Request Transfer* IE including at least one Non-GBR QoS flow but the *PDU Session Aggregate Maximum Bit Rate* IE is not present, the NG-RAN node shall report the establishment of the corresponding PDU session as failed in the PDU SESSION RESOURCE SETUP REQUEST message with an appropriate cause value.

If the NG-RAN node receives a PDU SESSION RESOURCE SETUP REQUEST message containing a *QoS Flow Level QoS Parameters* IE in the *PDU Session Resource Setup Request Transfer* IE for a GBR QoS flow but the *GBR QoS Flow Information* IE is not present, the NG-RAN node shall report the establishment of the corresponding QoS flow as failed in the *PDU Session Resource Setup Response Transfer* IE of 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 the *Delay Critical* IE in the *Dynamic 5QI Descriptor* IE of the *QoS Flow Level QoS Parameters* IE of the *PDU Session Resource Setup Request Transfer* IE set to the value “delay critical” but the *Maximum Data Burst Volume* IE is not present, the NG-RAN node shall report the establishment of the corresponding QoS flow as failed in the *PDU Session Resource Setup Response Transfer* IE of the PDU SESSION RESOURCE SETUP RESPONSE 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

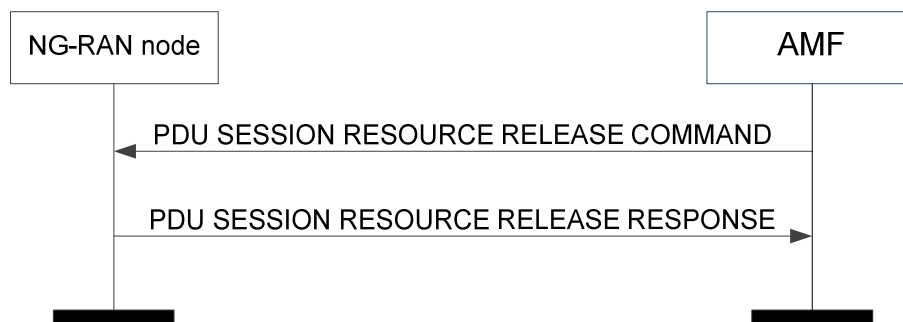


Figure 8.2.2.2-1: PDU session resource release: successful operation

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 any.

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].

For each PDU session for which the *Secondary RAT Usage Information IE* is included in the *PDU Session Resource Release Response Transfer IE*, the SMF shall handle this information as specified in TS 23.502 [10].

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.

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

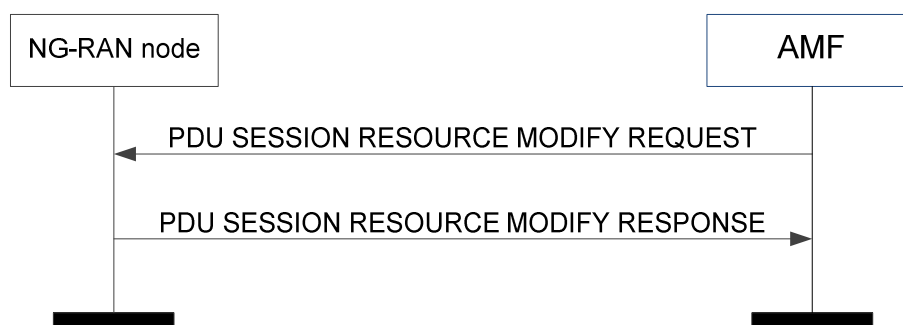


Figure 8.2.3.2-1: PDU session resource modify: successful operation

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 *S-NSSAI* IE is included in the *PDU Session Resource Modify Request Item* IE contained in the PDU SESSION RESOURCE MODIFY REQUEST message, the NG-RAN node shall replace the previously provided S-NSSAI by the received S-NSSAI for the concerned PDU session and use it as specified in TS 23.502 [10].

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 and the *Common Network Instance* IE is not present, the NG-RAN node shall, if supported, use it as specified in TS 23.501 [9].

For each PDU session, if the *Common 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, if the *Redundant Common 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 for the redundant transmission as specified in TS 23.501 [9].

For each PDU session, if the *TSC Traffic Characteristics* 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, store it and use it as specified in TS 23.501 [9].

For each PDU session, if the *Redundant QoS Flow Indicator* IE is included and set to “false” for all QoS flows, the NG-RAN node shall, if supported, stop the redundant transmission and release the redundant tunnel for the concerned PDU session as specified in TS 23.501 [9].

For each PDU session in the PDU SESSION RESOURCE MODIFY REQUEST message, if the *Alternative QoS Parameters Set List* IE is included in the *GBR QoS Flow Information* IE in the *PDU Session Resource Modify Request Transfer* IE of the PDU SESSION RESOURCE MODIFY REQUEST message, the NG-RAN node may accept the setup of the QoS flow when notification control has been enabled if the requested QoS parameters or at least one of the alternative QoS parameters sets can be fulfilled at the time of setup. In case the NG-RAN node accepts the setup fulfilling one of the alternative QoS parameters it shall indicate the alternative QoS parameters set which it currently fulfils in the *Current QoS Parameters Set Index* IE within the *PDU Session Resource Setup Response Transfer* IE of the PDU SESSION RESOURCE MODIFY RESPONSE message.

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, if the *Redundant QoS Flow Indicator* IE is included, the NG-RAN node shall, if supported, store it and consider it for the redundant transmission as specified in TS 23.501 [9].
- For each QoS flow included in the *QoS Flow Add or Modify Request List* IE, if the *QoS Flow Add or Modify Request Item* IE is included for an existing *QoS Flow Identifier* IE, the NG-RAN node shall overwrite the content of the full *QoS Flow Add or Modify Request Item* IE.
- 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.
- If the *NAS-PDU* IE is received for the PDU session, the NG-RAN node shall pass it to the UE when modifying the Data Radio Bearer configuration. The NG-RAN node does not send the NAS PDU received for the PDU session when all the QoS flows to be added or modified are failed and no QoS flow was requested to be released, even if e.g. the NG-U UP TNL modification is successful.
- 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 Modify List* 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 bearers 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 DL QoS Flow per TNL Information* IE in the *PDU Session Resource Modify Response Transfer* IE. In case the *Additional DL 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.
- In case more than one NG-U transport bearers have been set up for the PDU session, if all the QoS flows associated to one existing NG-U transport bearer are included in the *QoS Flow to Release List* IE in the *PDU Session Resource Modify Request Transfer* IE, the NG-RAN node and 5GC shall consider that the concerned NG-U transport bearer is removed for the PDU session, and both NG-RAN node and 5GC shall therefore consider the related NG-U UP TNL information as available again.
- If the *Redundant 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 *Redundant 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 Redundant 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 redundant 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 Redundant DL QoS Flow per TNL Information* IE in the *PDU Session Resource Modify Response Transfer* IE. In case the *Additional Redundant DL QoS Flow per TNL Information* IE is not included the SMF shall consider the proposed additional Redundant UL NG-U UP TNL information as available again.

For each QoS flow which has been successfully added or modified, if the *QoS Monitoring Request* IE was included in the *QoS Flow Level QoS Parameters* IE contained in the PDU SESSION RESOURCE MODIFY REQUEST message, the NG-RAN node shall store this information, and, if supported, perform delay measurement and QoS monitoring, as specified in TS 23.501 [9].

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.
- For each PDU session, if the *DL NG-U UP TNL Information* IE is included in the *PDU Session Resource Modify Response Transfer* IE in the PDU SESSION RESOURCE MODIFY RESPONSE message, it shall be considered by the SMF as the new DL transport layer address for the PDU session. The NG-RAN also may indicate the mapping between each new DL transport layer address and the corresponding UL transport layer address assigned by the 5GC.
- For each PDU session, if the *Additional NG-U UP TNL Information* IE is included in the *PDU Session Resource Modify Response Transfer* IE in the PDU SESSION RESOURCE MODIFY RESPONSE message, it shall be considered by the SMF as the new DL transport layer address(es) for the PDU session. The NG-RAN also may

indicate the mapping between each new DL transport layer address and the corresponding UL transport layer address assigned by the 5GC.

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 or in the *PDU Session Resource Modify Unsuccessful 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.

If the NG-RAN node receives a PDU SESSION RESOURCE MODIFY REQUEST message containing a *QoS Flow Level QoS Parameters* IE in the *PDU Session Resource Modify Request Transfer* IE for a GBR QoS flow but the *GBR QoS Flow Information* IE is not present, the NG-RAN node shall report the addition or modification of the corresponding QoS flow as failed in the *PDU Session Resource Modify Response Transfer* IE of 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 the *Delay Critical* IE in the *Dynamic 5QI Descriptor* IE of the *QoS Flow Level QoS Parameters* IE of the *PDU Session Resource Modify Request Transfer* IE set to the value "delay critical" but the *Maximum Data Burst Volume* IE is not present, the NG-RAN node shall report the addition or modification of the corresponding QoS flow as failed in the *PDU Session Resource Modify Response Transfer* IE of 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

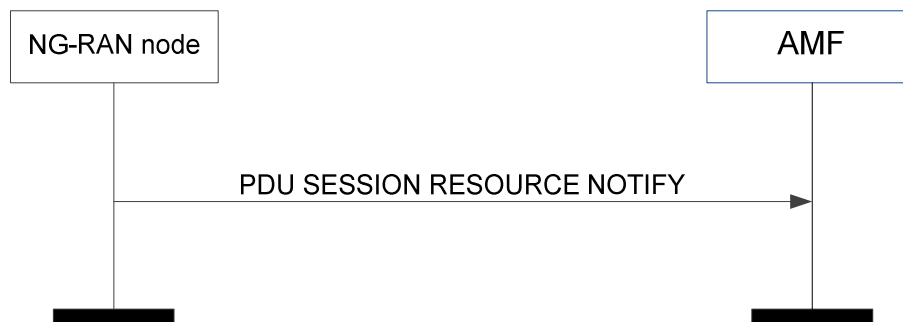


Figure 8.2.4.2-1: PDU session resource notify

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 a QoS flow indicated as not fulfilled anymore the NG-RAN node may also indicate an alternative QoS parameters set which it can currently fulfil in the *Current QoS Parameters Set Index 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.

For each PDU session for which the *Secondary RAT Usage Information IE* is included in the *PDU Session Resource Notify Transfer IE* or the *PDU Session Resource Notify Released Transfer IE*, the SMF shall handle this information as specified in TS 23.502 [10].

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

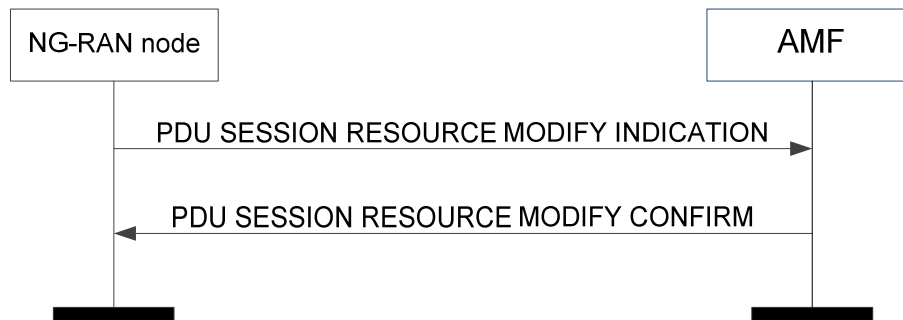


Figure 8.2.5.2-1: PDU session resource modify indication: successful operation

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.

For each PDU session for which the *DL QoS Flow per TNL Information* IE is included in the *PDU Session Resource Modify Indication Transfer* IE in the PDU SESSION RESOURCE MODIFY INDICATION message, the SMF shall consider the included DL transport layer address as the DL transport layer address for the included associated QoS flows and it may provide the associated UL transport layer address in the *UL NG-U UP TNL Information* IE in the *PDU Session Resource Modify Confirm Transfer* IE in the PDU SESSION RESOURCE MODIFY CONFIRM message.

For each PDU session for which the *Additional DL QoS Flow per TNL Information* IE is included in the *PDU Session Resource Modify Indication Transfer* IE in the PDU SESSION RESOURCE MODIFY INDICATION message, the SMF shall, if supported, consider for this split PDU session each included DL transport layer address(es) as the DL transport layer address(es) for the included associated QoS flows and it may provide the associated UL transport layer address(es) in the *Additional NG-U UP TNL Information* IE in the *PDU Session Resource Modify Confirm Transfer* IE in the PDU SESSION RESOURCE MODIFY CONFIRM message.

In case more than one NG-U transport bearers have been set up for the PDU session, the *DL QoS Flow per TNL Information* IE and the *Additional DL QoS Flow per TNL Information* IE in the *PDU Session Resource Modify Indication Transfer* IE in the PDU SESSION RESOURCE MODIFY INDICATION message shall be included if at least one QoS flow is associated to their respective NG-U transport bearer; if no QoS flow is associated to one existing NG-U transport bearer after the modification, the NG-RAN node and 5GC shall consider that the concerned NG-U transport bearer is removed for the PDU session, and both NG-RAN node and 5GC shall therefore consider the related NG-U UP TNL information as available again.

For each PDU session for which the *Redundant DL QoS Flow per TNL Information* IE is included in the *PDU Session Resource Modify Indication Transfer* IE in the PDU SESSION RESOURCE MODIFY INDICATION message, the SMF shall consider the included DL transport layer address as the new DL transport layer address for the included associated QoS flows for redundant transmission and it may provide the associated UL transport layer address in the *Redundant UL NG-U UP TNL Information* IE in the *PDU Session Resource Modify Confirm Transfer* IE in the PDU SESSION RESOURCE MODIFY CONFIRM message.

For each PDU session for which the *Additional Redundant DL QoS Flow per TNL Information* IE is included in the *PDU Session Resource Modify Indication Transfer* IE in the PDU SESSION RESOURCE MODIFY INDICATION message, the SMF shall consider for this split PDU session each included DL transport layer address(es) as the new downlink termination point(s) for the included associated QoS flows and it may provide the associated UL transport layer address(es) in the *Additional Redundant NG-U UP TNL Information* IE in the *PDU Session Resource Modify Confirm Transfer* IE in the PDU SESSION RESOURCE MODIFY CONFIRM message for the redundant transmission.

For each PDU session for which the *Global RAN Node ID of Secondary NG-RAN Node* IE is included in the *PDU Session Resource Modify Indication Transfer* IE of the PDU SESSION RESOURCE MODIFY INDICATION message, the SMF shall, if supported, handle this information as specified in TS 23.501 [9].

If the *Security Result* IE is included in the *PDU Session Resource Modify Indication Transfer* IE in the PDU SESSION RESOURCE MODIFY INDICATION message, it may be considered by the SMF as the new security status of the PDU session.

For each PDU session for which the *Secondary RAT Usage Information* IE is included in the *PDU Session Resource Modify Indication Transfer* IE, the SMF shall handle this information as specified in TS 23.502 [10].

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.
- For each PDU session which failed to be modified, the *PDU Session Resource Modify Indication Unsuccessful 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 Indication Unsuccessful 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.

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

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.

For signalling only connections and if the *UE Context Request IE* is not received in the Initial UE Message, the AMF may be configured to trigger the procedure for all NAS procedures or on a per NAS procedure basis depending on operator's configuration.

8.3.1.2 Successful Operation

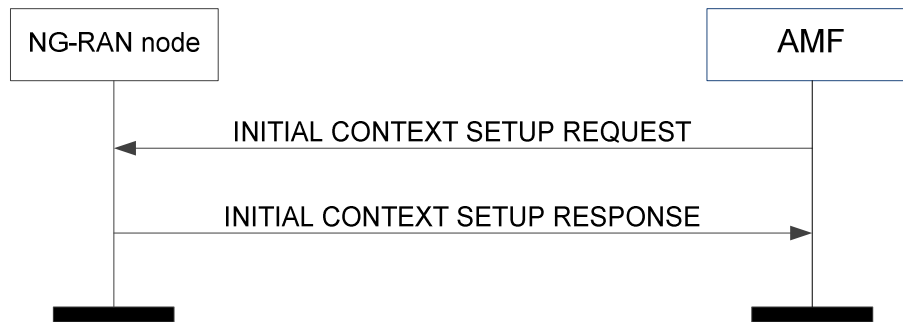


Figure 8.3.1.2-1: Initial context setup: successful operation

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 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 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.
- if supported, store the received SRVCC Operation Possible in the UE context and use it as defined in TS 23.216 [31].
- store the received NR V2X Services Authorization information, if supported, in the UE context;
- store the received LTE V2X Services Authorization information, if supported, in the UE context;

- store the received NR UE Sidelink Aggregate Maximum Bit Rate, if supported, in the UE context, and use it for the concerned UE's sidelink communication in network scheduled mode for NR V2X services;
- store the received LTE UE Sidelink Aggregate Maximum Bit Rate, if supported, in the UE context, and use it for the concerned UE's sidelink communication in network scheduled mode for LTE V2X services.
- store the received PC5 QoS Parameters, if supported, in the UE context and use it as defined in TS 23.287 [33].
- store the received Management Based MDT PLMN List information, if supported, in the UE context.
- if supported, store the received IAB Authorization information in the UE context.

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]. In particular, the NG-RAN node shall, if supported:

- if the *Trace Activation* IE includes the *MDT Activation* IE set to "Immediate MDT and Trace", initiate the requested trace session and MDT session as described in TS 32.422 [11];
- if the *Trace Activation* IE includes the *MDT Activation* IE set to "Immediate MDT Only", "Logged MDT only", initiate the requested MDT session as described in TS 32.422 [11] and the NG-RAN node shall ignore the *Interfaces To Trace* IE and the *Trace Depth* IE;
- if the *Trace Activation* IE includes the *MDT Location Information* IE within the *MDT Configuration* IE, store this information and take it into account in the requested MDT session;
- if the *Trace Activation* IE includes the *Signalling Based MDT PLMN List* IE within the *MDT Configuration* IE, the NG-RAN node may use it to propagate the MDT Configuration as described in TS 37.320 [41].
- if the *Trace Activation* IE includes the *Bluetooth Measurement Configuration* IE within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [41].
- if the *Trace Activation* IE includes the *WLAN Measurement Configuration* IE within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [41].
- if the *Trace Activation* IE includes the *Sensor Measurement Configuration* IE within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [41].

- if the *Trace Activation* IE includes the *MDT Configuration* IE and if the NG-RAN node is a gNB at least the *MDT Configuration-NR* IE shall be present, while if the NG-RAN node is an ng-eNB at least the *MDT Configuration-EUTRA* IE shall be present.

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 for RRC INACTIVE* 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 *CN Assisted RAN Parameters Tuning* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the NG-RAN node may use it as described in TS 23.501 [9].

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.

If the *Redirection for Voice EPS Fallback* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the NG-RAN node shall, if supported, store it and use it in a subsequent decision of EPS fallback for voice as specified in TS 23.502 [10].

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

If the *Enhanced Coverage Restriction* 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 as defined in TS 23.501 [9].

If the *Extended Connected Time* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the NG-RAN node shall use it as described in TS 23.501 [9].

If the *UE Differentiation 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 for further use according to TS 23.501 [9].

If the *CE-mode-B Restricted* IE is included in the INITIAL CONTEXT SETUP REQUEST message and the *Enhanced Coverage Restriction* IE is not set to "restricted" and the Enhanced Coverage Restriction information stored in the UE context is not set to "restricted", the NG-RAN node shall, if supported, store this information in the UE context and use it as defined in TS 23.501 [9].

If the *UE User Plane CIoT Support Indicator* 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 consider that User Plane CIoT 5GS Optimisation as specified in TS 23.501 [9] is supported for the UE.

If the *Management Based MDT PLMN List* IE is contained in the INITIAL CONTEXT SETUP REQUEST message, the NG-RAN node shall, if supported, use it to allow subsequent selection of the UE for management based MDT defined in TS 32.422 [11].

If the INITIAL CONTEXT SETUP REQUEST message contains the *UE Radio Capability ID* IE, the NG-RAN node shall, if supported, use it as specified in TS 23.501 [9] and TS 23.502 [10].

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

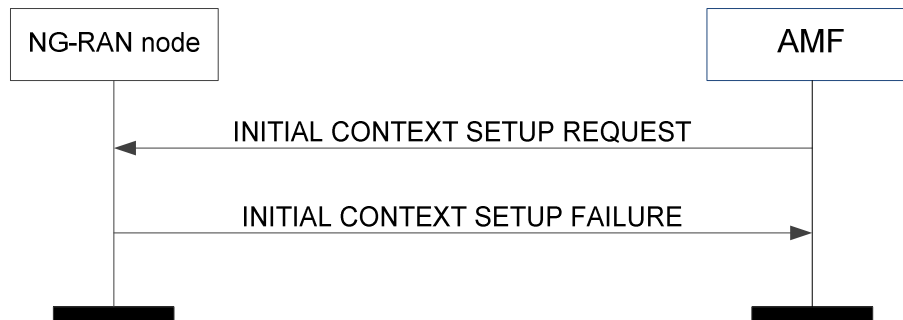


Figure 8.3.1.3-1: Initial context setup: unsuccessful operation

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 FAILURE message the AMF shall, for each PDU session indicated in the *PDU Session ID* IE, transfer transparently the *PDU Session Resource Setup Unsuccessful Transfer* IE to the SMF associated with the concerned PDU session.

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

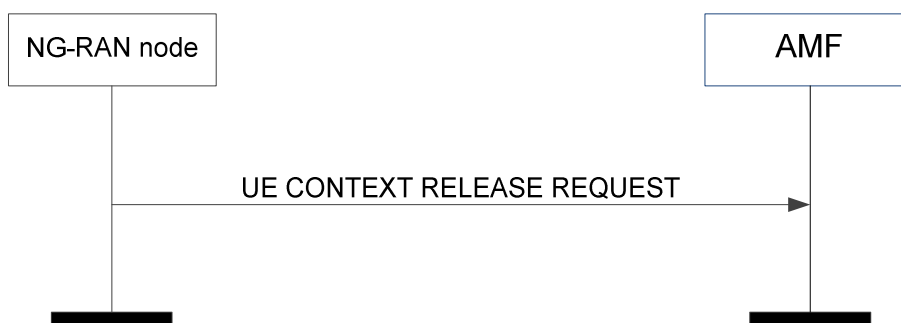


Figure 8.3.2.2-1: UE context release request

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., "TXnRELOCOverall Expiry", "Redirection", for the requested UE-associated logical NG-connection release.

If the *PDU Session Resource List* IE is included in the UE CONTEXT RELEASE REQUEST message, the AMF shall handle this information as specified in TS 23.502 [10].

Interactions with UE Context Release procedure:

The UE Context Release procedure should be initiated upon reception of a UE CONTEXT RELEASE REQUEST message. If the UE was configured with DC radio resources at the time UE Context Release Request procedure was triggered, and the PSCell information was available, the NG-RAN node shall store the PSCell information in the UE context.

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

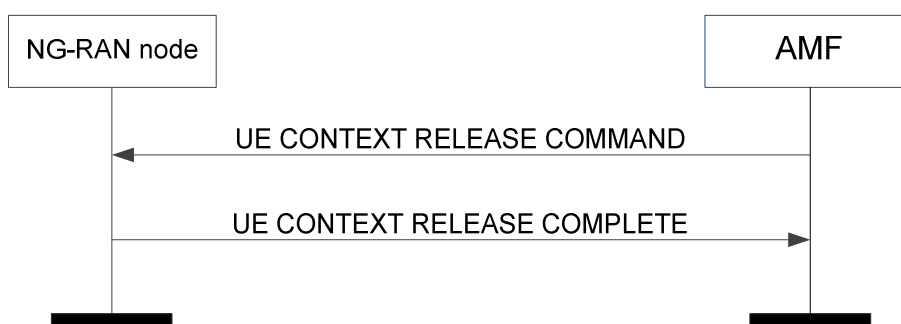


Figure 8.3.3.2-1: UE context release: successful operation

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 *PDU Session Resource List* 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 *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.

For each PDU session for which the *Secondary RAT Usage Information* IE is included in the *PDU Session Resource Release Response Transfer* IE, the SMF shall handle this information as specified in TS 23.502 [10].

If the *Paging Assistance Data for CE Capable UE* IE is included in the UE CONTEXT RELEASE COMPLETE message, the AMF shall, if supported, store it and use it for subsequent paging, as specified in TS 23.502 [10].

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 $T_{NGRELOCoverall}$, 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 $T_{NGRELOCoverall}$, the NG-RAN node shall stop the timer $T_{NGRELOCoverall}$ 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

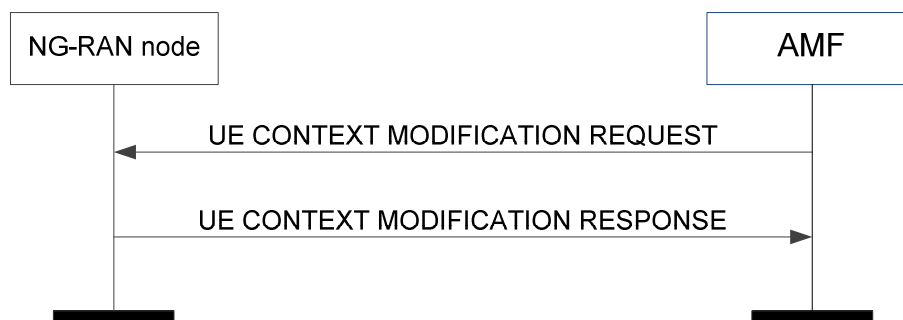


Figure 8.3.4.2-1: UE context modification: successful operation

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

- if supported, store the received IAB Authorization information in the UE context.

If the *Security Key* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node shall store it and perform AS key re-keying according to TS 33.501 [13].

If the *UE Security Capabilities* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node shall store them and take them into use together with the received keys according to TS 33.501 [13].

If the *Index to RAT/Frequency Selection Priority* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node shall, if supported, 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 for RRC INACTIVE* 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 *CN Assisted RAN Parameters Tuning* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node may use it as described in TS 23.501 [9].

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.

If the *New GUAMI* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node shall replace the previously stored GUAMI as specified in TS 23.501 [9].

If the *SRVCC Operation Possible* IE is included in UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node shall, if supported, store the content of the received *SRVCC Operation Possible* IE in the UE context and use it as defined in TS 23.216 [31].

If the *NR V2X Services Authorized* IE is contained in the UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node shall, if supported, update its V2X services authorization information for the UE accordingly. If the *NR V2X Services Authorized* IE includes one or more IEs set to "not authorized", the NG-RAN node shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant service(s).

If the *LTE V2X Services Authorized* IE is contained in the UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node shall, if supported, update its V2X services authorization information for the UE accordingly. If the *LTE V2X Services Authorized* IE includes one or more IEs set to "not authorized", the NG-RAN node shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant service(s).

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

- replace the previously provided NR UE Sidelink Aggregate Maximum Bit Rate, if available in the UE context, with the received value;
- use the received value for the concerned UE's sidelink communication in network scheduled mode for NR V2X services.

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

- replace the previously provided LTE UE Sidelink Aggregate Maximum Bit Rate, if available in the UE context, with the received value;
- use the received value for the concerned UE's sidelink communication in network scheduled mode for LTE V2X services.

If the *PC5 QoS Parameters* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node shall, if supported, use it as defined in TS 23.287 [33].

If the UE CONTEXT MODIFICATION REQUEST message contains the *UE Radio Capability ID* IE, the NG-RAN node shall, if supported, use it as specified in TS 23.501 [9] and TS 23.502 [10].

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

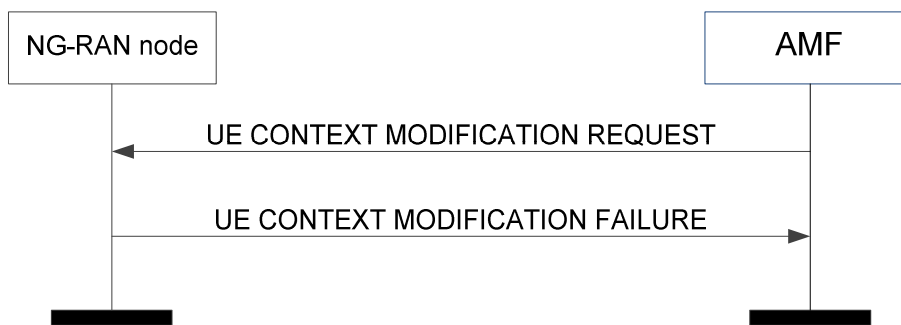


Figure 8.3.4.3-1: UE context modification: unsuccessful operation

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.

If the *New AMF UE NGAP ID* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the NG-RAN node may use the received *New AMF UE NGAP ID* IE or *Old AMF UE NGAP ID* IE in the UE CONTEXT MODIFICATION FAILURE message.

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

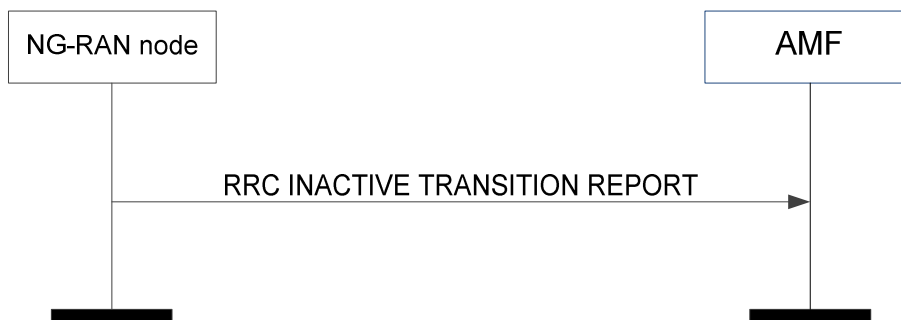


Figure 8.3.5.2-1: RRC Inactive transition report

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.

8.3.6 Connection Establishment Indication

8.3.6.1 General

The purpose of the Connection Establishment Indication procedure is to enable the AMF to complete the establishment of the UE-associated logical NG-connection, The procedure uses UE-associated signalling. This procedure applies only if the NG-RAN node is an ng-eNB.

8.3.6.2 Successful Operation

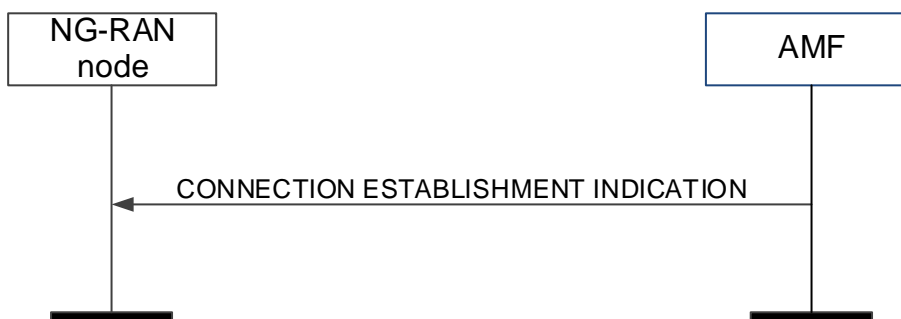


Figure 8.3.6.2-1: Connection Establishment Indication procedure. Successful operation.

The AMF initiates the procedure by sending a CONNECTION ESTABLISHMENT INDICATION 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 it in the CONNECTION ESTABLISHMENT INDICATION message.

If the *UE Radio Capability* IE is included in the CONNECTION ESTABLISHMENT INDICATION message, the NG-RAN node shall store this information in the UE context, and use it as defined in TS 38.300 [8].

If the *End Indication* IE is included in the CONNECTION ESTABLISHMENT INDICATION message and set to "no further data", the NG-RAN node shall consider that there are no further NAS PDUs to be transmitted for this UE.

If the *S-NSSAI* IE is contained in the CONNECTION ESTABLISHMENT INDICATION message, the NG-RAN node shall store this information in the UE context, and use it as specified in TS 23.501 [9].

If the *Allowed NSSAI* IE is contained in the CONNECTION ESTABLISHMENT INDICATION message, the NG-RAN node shall store this information in the UE context, and use it as specified in TS 23.501 [9].

If the *UE Differentiation Information* IE is included in the CONNECTION ESTABLISHMENT INDICATION message, the NG-RAN node shall, if supported, store this information in the UE context for further use according to TS 23.501 [9].

If the *DL CP Security Information* IE is included in the CONNECTION ESTABLISHMENT INDICATION message, the NG-RAN node shall forward this information to the UE as described in TS 36.300 [14].

If the *NB-IoT UE Priority* IE is contained in the CONNECTION ESTABLISHMENT INDICATION message, the NG-RAN node shall, if supported, store this information in the UE context, and use it as specified in TS 23.501 [9].

8.3.6.3 Abnormal Conditions

Void.

8.3.7 AMF CP Relocation Indication

8.3.7.1 General

The purpose of the AMF CP Relocation Indication procedure is to inform the NG-RAN node that the UE's connection is to be relocated to another NG-RAN node as described in TS 38.300 [8], for a UE using Control Plane ClIoT 5GS Optimisation. This procedure applies only if the NG-RAN node is an ng-eNB.

The procedure uses UE-associated signalling.

8.3.7.2 Successful Operation

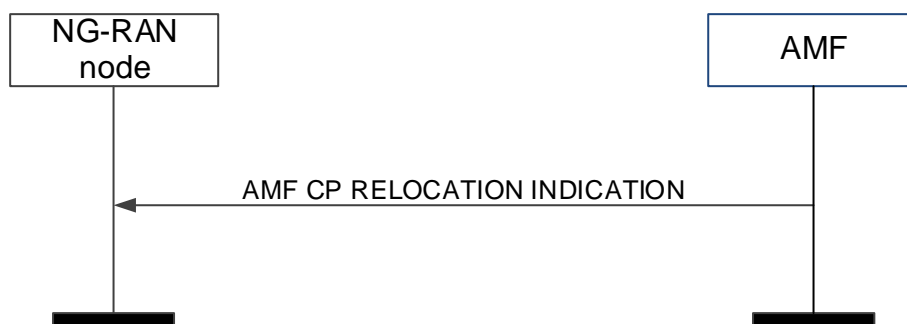


Figure 8.3.7.2-1: AMF CP Relocation Indication. Successful operation.

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

Upon reception of the AMF CP RELOCATION INDICATION message, the NG-RAN node shall terminate the delivery of NAS messages that have been received from the AMF.

If the *S-NSSAI* IE is contained in the AMF CP RELOCATION INDICATION message, the NG-RAN node shall store this information in the UE context, and use it as specified in TS 23.501 [9].

If the *Allowed NSSAI* IE is contained in the AMF CP RELOCATION INDICATION message, the NG-RAN node shall store this information in the UE context, and use it as specified in TS 23.501 [9].

Interactions with NAS Non Delivery Indication procedure:

On reception of the AMF CP RELOCATION INDICATION message, the NG-RAN node may initiate NAS Non Delivery Indication procedure(s) to report the non-delivery of any NAS PDUs previously received from the AMF.

8.3.7.3 Abnormal Conditions

Void.

8.3.8 RAN CP Relocation Indication**8.3.8.1 General**

The purpose of the RAN CP Relocation Indication procedure is to request the AMF to authenticate the UE's re-establishment request, and trigger the establishment of the respective UE-associated logical NG-connection, for a NB-IoT UE using Control Plane Clot 5GS Optimisation. This procedure applies only if the NG-RAN node is an ng-eNB.

The procedure uses UE-associated signalling.

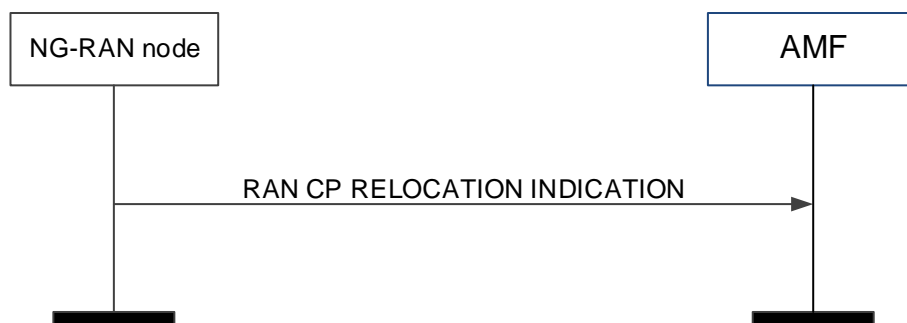
8.3.8.2 Successful Operation

Figure 8.3.8.2-1: RAN CP Relocation Indication.

The NG-RAN node initiates the procedure by sending a RAN CP RELOCATION INDICATION 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 RAN CP RELOCATION INDICATION message.

When the NG-RAN node receives the *RRCConnectionReestablishmentRequest* message, it triggers the RAN CP Relocation Indication procedure including NAS-level security information received from the UE. If the AMF authenticates the request, it initiates the Connection Establishment Indication procedure including NAS-level security information to be sent to the UE in the *RRCConnectionReestablishment* message.

In case the AMF cannot authenticate the UE's request, the CONNECTION ESTABLISHMENT INDICATION message does not contain security information, and the NG-RAN node shall fail the RRC Re-establishment.

In case of authentication failure, the NG-RAN node and the AMF should locally release the allocated NG resources, if any.

Interactions with the AMF CP Relocation and UE Context Release procedures:

In case of successful UE authentication, the AMF initiates the UE Context Release procedure to release the UE's NG-connection in the old NG-RAN node. The AMF may initiate the AMF CP Relocation procedure before the release procedure in order to trigger the old NG-RAN node to return non-delivered NAS PDUs to the AMF.

8.3.8.3 Abnormal Conditions

Void.

8.3.9 Retrieve UE Information

8.3.9.1 General

The purpose of the Retrieve UE Information procedure is for the NG-RAN node to request the UE information including NB-IoT UE Priority and UE Radio Capability from the AMF, for a NB-IoT UE using Control Plane CIoT 5GS Optimisation. This procedure applies only if the NG-RAN node is an ng-eNB.

8.3.9.2 Successful Operation

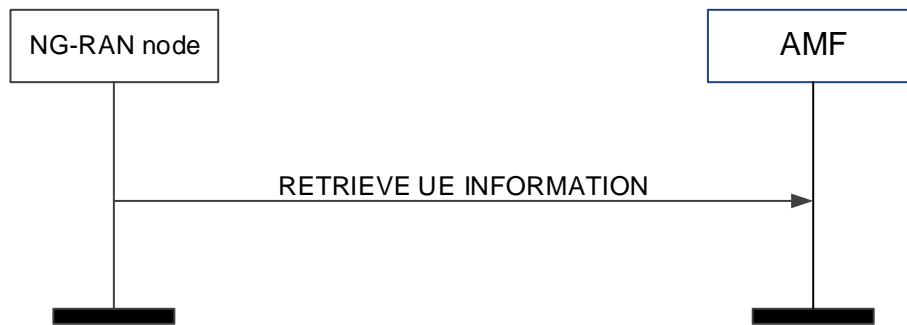


Figure 8.3.9.2-1: Retrieve UE Information

The NG-RAN node initiates the procedure by sending the RETRIEVE UE INFORMATION message to the AMF.

8.3.9.3 Abnormal Conditions

Void.

8.3.10 UE Information Transfer

8.3.10.1 General

The purpose of the UE Information Transfer procedure is for the AMF to send the UE information including NB-IoT UE Priority and UE Radio Capability to the NG-RAN node, for a NB-IoT UE using Control Plane CIoT 5GS Optimisation. This procedure applies only if the NG-RAN node is an ng-eNB.

8.3.10.2 Successful Operation

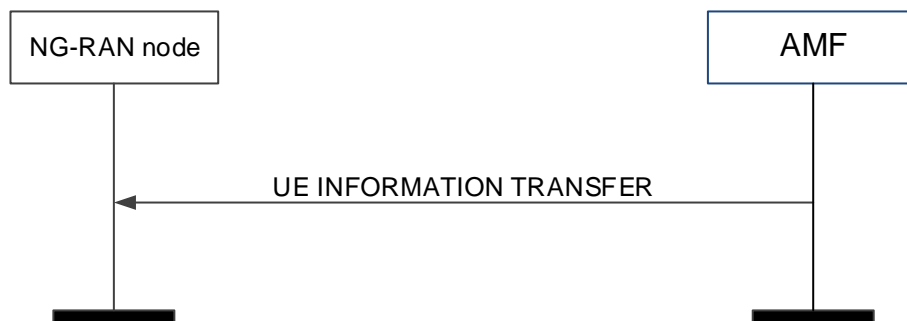


Figure 8.3.10.2-1: UE Information Transfer

The AMF initiates the procedure by sending the UE INFORMATION TRANSFER message to the NG-RAN node.

If the *NB-IoT UE Priority* IE is contained in the UE INFORMATION TRANSFER message, the NG-RAN node shall store this information in the UE context, and use it as specified in TS 23.501 [9].

If the *UE Radio Capability* IE is contained in the UE INFORMATION TRANSFER message, the NG-RAN node shall store this information in the UE context, and use it as specified in TS 23.501 [9].

If the *S-NSSAI* IE is contained in the UE INFORMATION TRANSFER message, the NG-RAN node shall store this information in the UE context, and use it as specified in TS 23.501 [9].

If the *Allowed NSSAI* IE is contained in the UE INFORMATION TRANSFER message, the NG-RAN node shall store this information in the UE context, and use it as specified in TS 23.501 [9].

If the *UE Differentiation Information* IE is included in the UE INFORMATION TRANSFER message, the NG-RAN node shall, if supported, store this information in the UE context for further use according to TS 23.501 [9].

8.3.10.3 Abnormal Conditions

Void.

8.3.11 UE Context Suspend

8.3.11.1 General

The purpose of the UE Context Suspend procedure is to suspend the UE-associated logical NG-connection and the NG-U transport bearer with the 5GC while keeping the UE context in the NG-RAN node.

In this version of the specification, this procedure applies only if the NG-RAN node is an ng-eNB.

8.3.11.2 Successful Operation

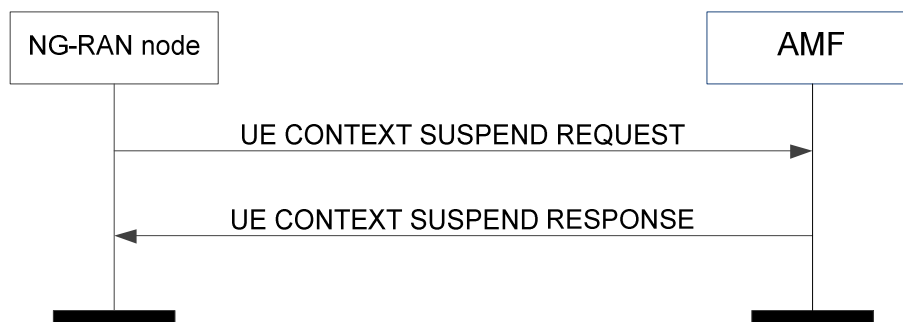


Figure 8.3.11.2-1: UE Context Suspend: Successful operation.

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

Upon receipt of the UE CONTEXT SUSPEND REQUEST message the AMF shall act as defined in TS 23.502 [10].

Upon receipt of the UE CONTEXT SUSPEND RESPONSE message the NG-RAN node shall suspend the UE context, the UE-associated logical NG-connection and the related PDU session contexts and send the UE to RRC_IDLE.

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

If the *Paging Assistance Data for CE Capable UE* IE is included in the UE CONTEXT SUSPEND REQUEST message, the AMF shall, if supported, store it and use it for subsequent paging, as specified in TS 23.502 [10].

If the *Security Context* IE is included in the UE CONTEXT SUSPEND RESPONSE message, the NG-RAN node shall store the received *Security Context* IE in the UE context and remove any existing unused stored {NH, NCC} as specified in TS 33.501 [13].

If the *Suspend Indicator* IE is included in the UE CONTEXT SUSPEND REQUEST message, the SMF shall, if supported, consider the associated PDU session as suspended.

8.3.11.3 Unsuccessful Operation

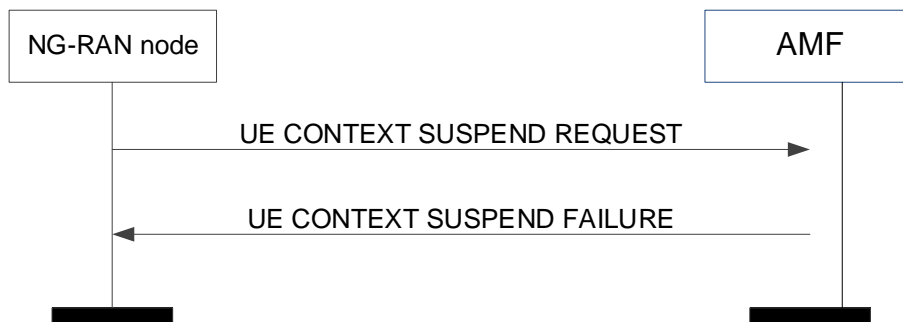


Figure 8.3.11.3-1: UE Context Suspend: unsuccessful operation.

If the AMF decides to not suspend the connection e.g. due to pending downlink data to be sent, it shall send the UE CONTEXT SUSPEND FAILURE message to the NG-RAN node.

8.3.11.4 Abnormal Conditions

Void.

8.3.12 UE Context Resume

8.3.12.1 General

The purpose of the UE Context Resume procedure is to resume the UE context, the suspended UE-associated logical NG-connection and the related NG-U transport bearer in the 5GC for this UE.

In this version of the specification, this procedure applies only if the NG-RAN node is an ng-eNB.

8.3.12.2 Successful Operation

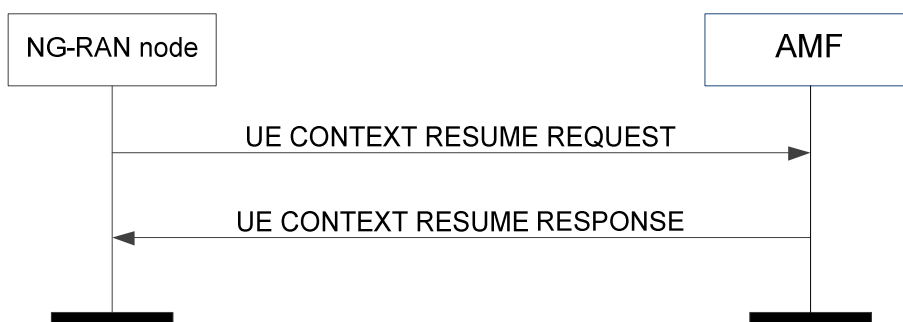


Figure 8.3.12.2-1: UE Context Resume procedure. Successful operation.

The NG-RAN node initiates the procedure by sending the UE CONTEXT RESUME REQUEST message to the AMF. If the NG-RAN node is not able to admit any suspended PDU sessions, the NG-RAN node shall indicate this in the *PDU Session Resource Failed to Resume List* IE. If the NG-RAN node is not able to admit certain QoS flows for a PDU session, the NG-RAN node shall indicate this in the *QoS Flow Failed to Resume List* IE included in the *UE Context Resume Request Transfer* IE for that PDU session.

Upon receipt of the UE CONTEXT RESUME REQUEST message the AMF shall act as defined in TS 23.502 [10] and respond with the UE CONTEXT RESUME RESPONSE message. If the AMF is not able to admit any suspended PDU sessions, the AMF shall indicate this in the *PDU Session Resource Failed to Resume List* IE. If the SMF is not able to admit certain QoS flows for a PDU session, the SMF shall indicate this in the *QoS Flow Failed to Resume List* IE included in the *UE Context Resume Response Transfer* IE for that PDU session.

The NG-RAN node shall release resources for each PDU session or QoS flow failed to resume and shall assume that the 5GC has released respective resources as well.

If the *Security Context IE* is included in the UE CONTEXT RESUME RESPONSE message, the NG-RAN node shall store the received *Security Context IE* in the UE context and the NG-RAN node shall use it for the next suspend/resume or Xn handover or Intra NG-RAN node handovers as specified in TS 33.501 [13].

If the *Suspend Request Indication IE* is included in the UE CONTEXT RESUME REQUEST message, the AMF shall, if supported, consider that the NG-RAN node is requesting immediate transition to RRC IDLE with Suspend as specified in TS 23.502 [10]. If the *Suspend Response Indication IE* is included in the UE CONTEXT RESUME RESPONSE message, the NG-RAN node shall suspend the UE context, the UE-associated logical NG-connection and the related PDU session contexts and send the UE to RRC_IDLE.

If the *Extended Connected Time IE* is included in the UE CONTEXT RESUME RESPONSE message, the NG-RAN node shall, if supported, use it as described in TS 23.501 [9].

8.3.12.3 Unsuccessful Operation

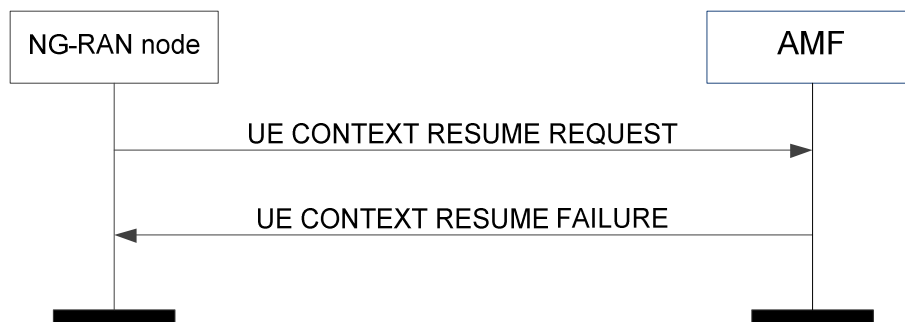


Figure 8.3.12.3-1: UE Context resume: unsuccessful operation.

If the AMF is not able to resume a single PDU session, it releases the UE-associated logical NG-connection by sending the UE CONTEXT RESUME FAILURE message to the NG-RAN node. Upon reception of the UE CONTEXT RESUME FAILURE message the NG-RAN node shall release the RRC connection as specified in TS 36.331 [21] and release all related signalling and user data transport resources.

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

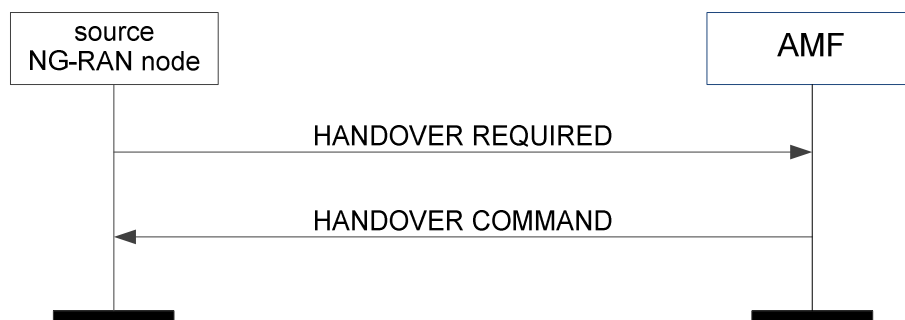


Figure 8.4.1.2-1: Handover preparation: successful operation

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 $TN_{GRELOCprep}$. 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 *UL 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 "UL forwarding proposed", it indicates that the source NG-RAN node proposes forwarding of uplink 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.

In case of intra-system handover, if the HANOVER COMMAND message contains the *DL Forwarding UP TNL Information* IE for a given DRB within the *Data Forwarding Response DRB List* IE in 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 direct data forwarding is applied for inter-system handover, if the *Data Forwarding Response E-RAB List* IE in the *Handover Command Transfer* IE is included in the HANOVER COMMAND message, the source NG-RAN node shall consider that forwarding of downlink data for this E-RAB is accepted by the target eNB.

If the HANOVER COMMAND message contains the *UL Forwarding UP TNL Information* IE for a given PDU session within the *Handover Command Transfer* IE, the source NG-RAN node shall consider that the forwarding of uplink data of the QoS flows is accepted by the target NG-RAN node.

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. In case of intra-system handover, the AMF shall include the *PDU Session Resource Handover List* IE in the HANOVER COMMAND message.

Upon reception of the HANOVER COMMAND message the source NG-RAN node shall stop the timer $TN_{GRELOCprep}$ and start the timer $TN_{GRELOCoverall}$.

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

NOTE: As an exception in case of inter-system handover to LTE, the AMF generates the *Handover Preparation Unsuccessful Transfer IE* in the *PDU Session Resource 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 over the forwarding tunnel specified in the *DL Forwarding UP TNL Information IE* as specified in TS 38.300 [8].

If the HANOVER COMMAND message contains the *Additional DL Forwarding UP TNL Information IE* within the *Handover Command Transfer IE*, the source NG-RAN node should initiate data forwarding of the PDU session split in different tunnel and shall use the received UP transport layer information for the forwarding QoS flows associated to it.

If the HANOVER COMMAND message contains the *Additional UL Forwarding UP TNL Information IE* within the *Handover Command Transfer IE*, the source NG-RAN node should initiate data forwarding of the PDU session split in different tunnels using the received UP transport layer information.

If the *NAS Security Parameters from NG-RAN IE* is included in the HANOVER COMMAND message the NG-RAN node shall use it as specified in TS 33.501 [13].

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].

If the *DAPS Request Information IE* is included for a DRB in the *Source NG-RAN Node to Target NG-RAN Node Transparent Container IE* within the HANOVER REQUIRED message, it indicates that the request concerns a DAPS Handover for that DRB, as described in TS 38.300 [8].

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

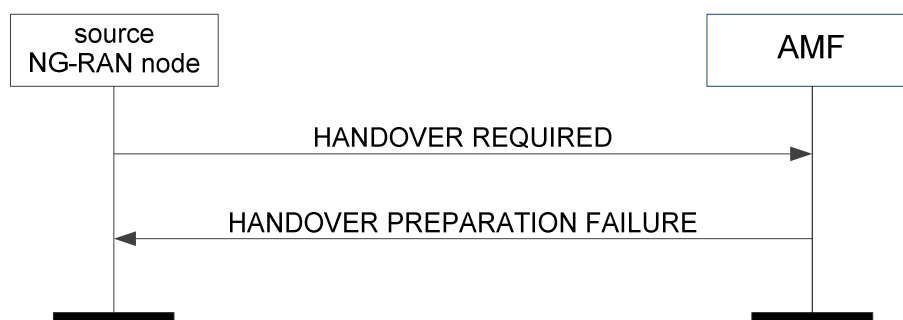


Figure 8.4.1.3-1: Handover preparation: unsuccessful operation

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.

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

If the *Target to Source Failure Transparent Container* IE is received in the HANOVER PREPARATION FAILURE message including the *Cell CAG Information* IE, the source NG-RAN node shall, if supported, store and replace the PNI-NPN information associated with the indicated cell.

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 received 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 *HANDOVER 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 *HANDOVER 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 *HANDOVER 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*.
- The redundant UP transport layer information to be used for the redundant transmission for 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 *HANDOVER REQUEST ACKNOWLEDGE* message 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* included in the *HANDOVER REQUEST ACKNOWLEDGE* message, if the *Current QoS Parameters Set Index IE* is included for a QoS flow in the *QoS Flow Setup Response List IE* within the *Handover Request Acknowledge Transfer IE* the SMF shall consider it as the currently fulfilled QoS parameters set among the alternative QoS parameters for the involved QoS flow.

Upon reception of the *HANDOVER 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 *HANDOVER 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*.

If the *HANDOVER REQUEST* message contains the *Redundant PDU Session Information IE* associated with a given *PDU session* within the *Handover Request Transfer IE*, the target NG-RAN node shall, if supported, store the received information in the UE context and use it for redundant *PDU session* setup as specified in TS38.300 [8] and TS 23.501 [9]. If the *PDU Session Type IE* is set to "ethernet" and the redundancy requirement is fulfilled using a secondary NG-RAN node, the NG-RAN node shall, if supported, include the *Global RAN Node ID of Secondary NG-RAN Node IE* in the *Handover Request Acknowledge Transfer IE* of the *HANDOVER REQUEST ACKNOWLEDGE* message.

For each *PDU session* for which the *Global RAN Node ID of Secondary NG-RAN Node IE* is included in the *Handover Request Acknowledge Transfer IE* of the *HANDOVER REQUEST ACKNOWLEDGE* message, the SMF shall, if supported, handle this information as specified in TS 23.501 [9].

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* as forwarding tunnel for the QoS flows listed in the *QoS Flow Setup Response List IE* of the *HANDOVER REQUEST ACKNOWLEDGE* message.

In case of intra-system handover, if the target NG-RAN node accepts the uplink data forwarding for at least one QoS flow for which the *UL Forwarding IE* is set to "UL forwarding proposed", it may include the *UL 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, for each PDU session for which the *Additional DL UP TNL Information for HO List* IE is included in the *Handover Request Acknowledge Transfer* IE of the HANDOVER REQUEST ACKNOWLEDGE message, the SMF shall consider the included *Additional DL NG-U UP TNL Information* IE as the downlink termination point for the associated flows indicated in the *Additional QoS Flow Setup Response List* IE for this PDU session split in different tunnels and shall consider the *Additional DL Forwarding UP TNL Information* IE, if included, as the forwarding tunnel associated to these QoS flows.

In case of intra-system handover, for each PDU session for which the *Additional UL Forwarding UP TNL Information* IE is included in the *Handover Request Acknowledge Transfer* IE of the HANDOVER REQUEST ACKNOWLEDGE message, the SMF shall consider it as the termination points for the uplink forwarding tunnels for this PDU session split in different tunnels.

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, if the *PDU Session Resource Setup Request Transfer* IE contains the *Direct Forwarding Path Availability* IE set to "direct path available", the target NG-RAN node shall, if supported, and if it accepts downlink data forwarding for the QoS flows mapped to an E-RAB of an admitted PDU session, include the *DL Forwarding UP TNL Information* IE in the *Data Forwarding Response E-RAB List* IE in the *Handover Request Acknowledge Transfer* IE in the HANDOVER REQUEST ACKNOWLEDGE message for that mapped E-RAB.

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 indirect data forwarding is applied for inter-system handover, 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.

In case of inter-system handover from E-UTRAN with direct forwarding, if the target NG-RAN node receives the *SgNB UE X2AP ID* IE in the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE, it may use it for internal forwarding as described in TS 37.340 [32].

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]. In particular, the NG-RAN node shall, if supported:

- if the *Trace Activation* IE includes the *MDT Activation* IE set to "Immediate MDT and Trace", initiate the requested trace session and MDT session as described in TS 32.422 [11];

- if the *Trace Activation* IE includes the *MDT Activation* IE set to "Immediate MDT Only", "Logged MDT only", initiate the requested MDT session as described in TS 32.422 [11] and the target NG-RAN node shall ignore the *Interfaces To Trace* IE and the *Trace Depth* IE;
- if the *Trace Activation* IE includes the *MDT Location Information* IE within the *MDT Configuration* IE, store this information and take it into account in the requested MDT session;
- if the *Trace Activation* IE includes the *Signalling Based MDT PLMN List* IE within the *MDT Configuration* IE, the NG-RAN node may use it to propagate the MDT Configuration as described in TS 37.320 [41].
- if the *Trace Activation* IE includes the *Bluetooth Measurement Configuration* IE within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [41].
- if the *Trace Activation* IE includes the *WLAN Measurement Configuration* IE within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [41].
- if the *Trace Activation* IE includes the *Sensor Measurement Configuration* IE within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [41].
- if the *Trace Activation* IE includes the *MDT Configuration* IE and if the NG-RAN node is a gNB at least the *MDT Configuration-NR* IE shall be present, while if the NG-RAN node is an ng-eNB at least the *MDT Configuration-EUTRA* IE shall be present.

If the *Location Reporting Request Type* IE is included in the HANOVER 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 for RRC INACTIVE* IE is included in the HANOVER 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 *CN Assisted RAN Parameters Tuning* IE is included in the HANOVER REQUEST message, the NG-RAN node may use it as described in TS 23.501 [9].

If the *New Security Context Indicator* IE is included in the HANOVER 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 HANOVER 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 HANOVER REQUEST message, the NG-RAN node shall, if supported, store this information in the UE context.

If the *Redirection for Voice EPS Fallback* IE is included in the HANOVER REQUEST message, the NG-RAN node shall, if supported, store it and use it in a subsequent decision of EPS fallback for voice as specified in TS 23.502 [10].

If the *SRVCC Operation Possible* IE is included in the HANOVER REQUEST message, the target NG-RAN node shall, if supported, store the content of the received *SRVCC Operation Possible* IE in the UE context and use it as defined in TS 23.216 [31].

If the *IAB Authorized* IE is contained in the HANOVER REQUEST message, the NG-RAN node shall, if supported, consider that the handover is for an IAB node.

If the *Enhanced Coverage Restriction* IE is included in the HANOVER REQUEST message, the NG-RAN node shall, if supported, store this information in the UE context and use it as defined in TS 23.501 [9].

If the *UE Differentiation Information* IE is included in the HANOVER REQUEST message, the NG-RAN node shall, if supported, store this information in the UE context for further use according to TS 23.501 [9].

If the *UE User Plane CIoT Support Indicator* IE is included in the HANOVER REQUEST message the NG-RAN node shall, if supported, store this information in the UE context and consider that User Plane CIoT 5GS Optimisation as specified in TS 23.501 [9] is supported for the UE.

Upon reception of the *UE History Information from UE* IE, which is included within the *Source to Target Transparent Container* IE of the HANOVER REQUEST message, the target NG-RAN node shall, if supported, store the collected information and use it for future handover preparations.

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

For each QoS flow which has been established in the target NG-RAN node, if the *QoS Monitoring Request* IE was included in the *QoS Flow Level QoS Parameters* IE contained in the HANOVER REQUEST message, the target NG-RAN node shall store this information, and, if supported, perform delay measurement and QoS monitoring, as specified in TS 23.501 [9].

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

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

If the *NR UE Sidelink Aggregate Maximum Bit Rate* IE is included in the HANOVER REQUEST message, the NG-RAN node shall, if supported, use the received value for the concerned UE's sidelink communication in network scheduled mode for NR V2X services.

If the *LTE UE Sidelink Aggregate Maximum Bit Rate* IE is included in the HANOVER REQUEST message, the NG-RAN node shall, if supported, use the received value for the concerned UE's sidelink communication in network scheduled mode for LTE V2X services.

If the *PC5 QoS Parameters* IE is included in the HANOVER REQUEST message, the NG-RAN node shall, if supported, use it as defined in TS 23.287 [33].

If the *CE-mode-B Restricted* IE is included in the HANOVER REQUEST message and the *Enhanced Coverage Restriction* IE is not set to "restricted" and the Enhanced Coverage Restriction information stored in the UE context is not set to "restricted", the NG-RAN node shall, if supported, store this information in the UE context and use it as defined in TS 23.501 [9].

If the *Management Based MDT PLMN List* IE is contained in the HANOVER REQUEST message, the target NG-RAN node shall, if supported, store the received information in the UE context, and use this information to allow subsequent selections of the UE for management based MDT defined in TS 32.422 [11].

If the HANOVER REQUEST message contains the *UE Radio Capability ID* IE, the NG-RAN node shall, if supported, use it as specified in TS 23.501 [9] and TS 23.502 [10].

If the *DAPS Request Information* IE is included for a DRB in the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE within the HANOVER REQUEST message, the target NG-RAN node shall consider that the request concerns a DAPS Handover for that DRB, as described in in TS 38.300 [8]. The target NG-RAN node shall include the *DAPS Response information List* IE in the *Target NG-RAN Node to Source NG-RAN Node Transparent Container* IE within the HANOVER REQUEST ACKNOWLEDGE message, containing the *DAPS Response Information* IE for each DRB requested to be configured with DAPS Handover.

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.

If the target NG-RAN node receives a HANOVER REQUEST message containing an *Allowed PNI-NPN List IE* in the *Mobility Restriction List IE* which does not allow access to the cell indicated in the *Target Cell ID IE*, the target NG-RAN node shall reject the procedure using the HANOVER FAILURE message with an appropriate cause value and may include the *Cell CAG Information IE* corresponding to this cell and the selected PLMN.

If the target NG-RAN node receives a HANOVER REQUEST message containing a *Serving PLMN IE* and *Serving NID IE* in the *Mobility Restriction List IE* which does not allow access to the cell indicated in the *Target Cell ID IE*, the target NG-RAN node shall reject the procedure using the HANOVER FAILURE message with an appropriate cause value.

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 HANOVER NOTIFY message to the AMF when the UE has been identified in the target cell and the NG-based handover has been successfully completed.

If the *Notify Source NG-RAN Node* IE is included in the HANOVER NOTIFY message, the AMF shall, if supported, notify the source NG-RAN node that the UE has successfully accessed the target NG-RAN node.

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 establish a UE associated signalling connection to the 5GC and, if applicable, 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

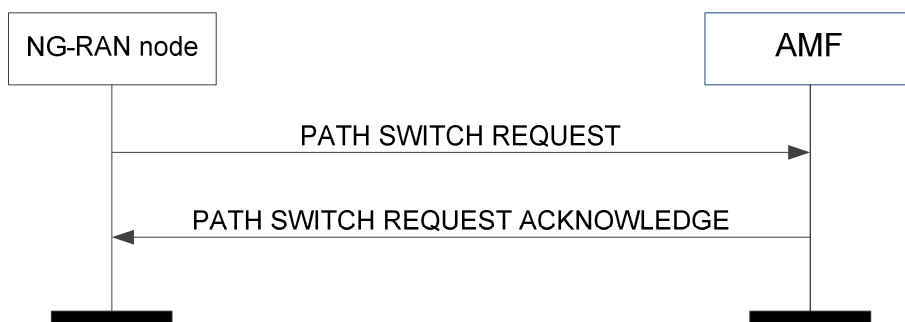


Figure 8.4.4.2-1: Path switch request: successful operation

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.

When the NG-RAN node has received from the radio interface the *RRC Resume Cause* IE, it shall include it in the PATH SWITCH REQUEST message.

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].

For each PDU session for which the *Additional DL QoS Flow per TNL Information* IE is included in the *Path Switch Request Transfer* IE of the PATH SWITCH REQUEST message, the SMF may use each included UP transport layer information as the downlink termination point for the included associated QoS flows for this PDU session split in different tunnels.

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.

For each PDU session for which the *Additional Redundant DL QoS Flow per TNL Information* IE is included in the *Path Switch Request Transfer* IE of the PATH SWITCH REQUEST message, the SMF may use each included UP transport layer information as the downlink termination point for the included associated QoS flows for this PDU session split in different tunnels for the redundant transmission.

For each PDU session for which the *Redundant DL NG-U TNL Information Reused* IE is included in the *Path Switch Request Transfer* IE of the PATH SWITCH REQUEST message, the SMF shall, if supported, consider the included DL transport layer address as the DL transport layer address for the redundant transmission as specified in TS 23.501 [9].

For each PDU session for which the *Global RAN Node ID of Secondary NG-RAN Node* IE is included in the *Path Switch Request Transfer* IE of the PATH SWITCH REQUEST message, the SMF shall, if supported, handle this information as specified in TS 23.501 [9].

For each PDU session included in the PATH SWITCH REQUEST message, if the *Current QoS Parameters Set Index* IE is included in the *Path Switch Request Transfer* IE the SMF shall consider it as the currently fulfilled QoS parameters set among the alternative QoS parameters for the involved QoS flow.

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 *Additional 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 the included *UL NG-U UP TNL Information* IE(s) as the uplink termination point(s) of the user plane data for this PDU session split in different tunnel.

If the *Redundant 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 the redundant transmission for this PDU session as specified in TS 23.501 [9].

If the *Additional Redundant 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 the included *UL NG-U UP TNL Information* IE(s) as the uplink termination point(s) of the user plane data for this PDU session split in different tunnel.

If the *Core Network Assistance Information for RRC INACTIVE* 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 *CN Assisted RAN Parameters Tuning* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node may use it as described in TS 23.501 [9].

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 *Redirection for Voice EPS Fallback* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall, if supported, store it and use it in a subsequent decision of EPS fallback for voice as specified in TS 23.502 [10].

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.

If the *SRVCC Operation Possible* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall, if supported, store the content of the received *SRVCC Operation Possible* IE in the UE context and use it as defined in TS 23.216 [31].

If the *Enhanced Coverage Restriction* 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 as defined in TS 23.501 [9].

If the *Extended Connected Time* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall, if supported, use it as described in TS 23.501 [9].

If the *UE Differentiation 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 for further use according to TS 23.501 [9].

If the *NR V2X Services Authorized* IE is contained in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall, if supported, update its NR V2X services authorization information for the UE accordingly. If the *NR V2X Services Authorized* IE includes one or more IEs set to "not authorized", the NG-RAN node shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant service(s).

If the *LTE V2X Services Authorized* IE is contained in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall, if supported, update its LTE V2X services authorization information for the UE accordingly. If the *LTE V2X Services Authorized* IE includes one or more IEs set to "not authorized", the NG-RAN node shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant service(s).

If the *NR UE Sidelink Aggregate Maximum Bit Rate* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall, if supported:

- replace the previously provided UE Sidelink Aggregate Maximum Bit Rate, if available in the UE context, with the received value;
- use the received value for the concerned UE's sidelink communication in network scheduled mode for NR V2X services.

If the *LTE UE Sidelink Aggregate Maximum Bit Rate* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall, if supported:

- replace the previously provided UE Sidelink Aggregate Maximum Bit Rate, if available in the UE context, with the received value;
- use the received value for the concerned UE's sidelink communication in network scheduled mode for LTE V2X services.

If the *PC5 QoS Parameters IE* is included in the *PATH SWITCH REQUEST ACKNOWLEDGE* message, the NG-RAN node shall, if supported, use it as defined in TS 23.287 [33].

If the *CE-mode-B Restricted IE* is included in the *PATH SWITCH REQUEST ACKNOWLEDGE* message and the *Enhanced Coverage Restriction IE* is not set to "restricted" and the Enhanced Coverage Restriction information stored in the UE context is not set to "restricted", the NG-RAN node shall, if supported, store this information in the UE context and use it as defined in TS 23.501 [9].

If the *UE User Plane Clot Support Indicator 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 consider that User Plane Clot 5GS Optimisation as specified in TS 23.501 [9] is supported for the UE.

If the *PATH SWITCH REQUEST ACKNOWLEDGE* message contains the *UE Radio Capability ID IE*, the NG-RAN node shall, if supported, use it as specified in TS 23.501 [9] and TS 23.502 [10].

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" and the UE is in *RRC_CONNECTED* state, 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 "single RRC connected state report" and the UE is in *RRC_INACTIVE* state, the NG-RAN node shall, if supported, send to the AMF one *RRC INACTIVE TRANSITION REPORT* message plus one subsequent *RRC INACTIVE TRANSITION REPORT* message when the RRC state transitions to *RRC_CONNECTED* state.

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

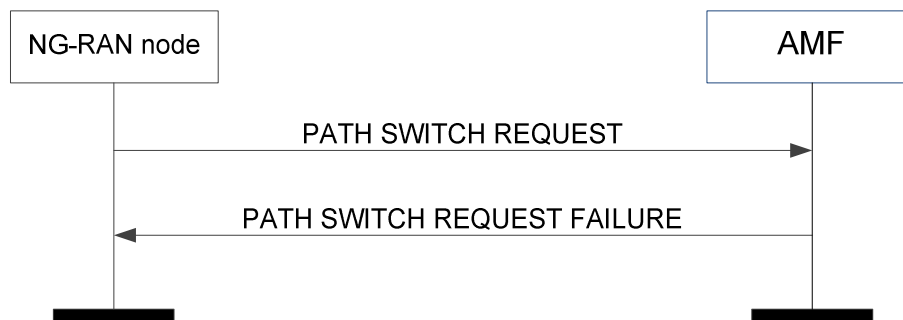


Figure 8.4.4.3-1: Path switch request: unsuccessful operation

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.

NOTE: As an exception, the AMF generates the *Path Switch Request Unsuccessful Transfer* IE.

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

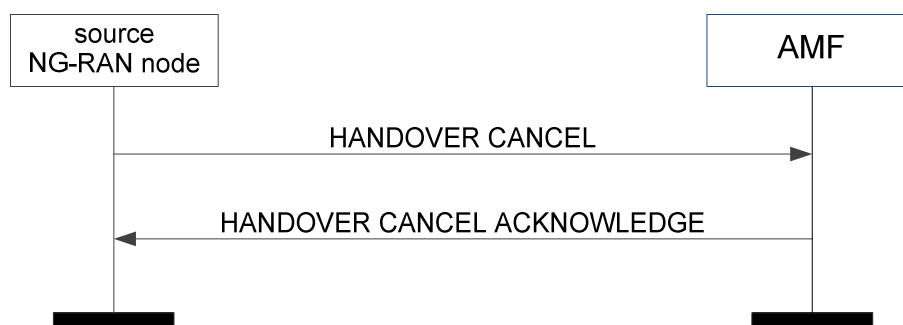


Figure 8.4.5.2-1: Handover cancel: successful operation

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

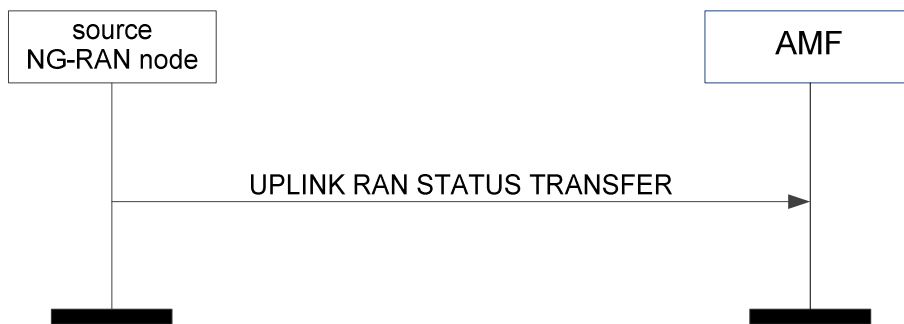


Figure 8.4.6.2-1: Uplink RAN status transfer

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

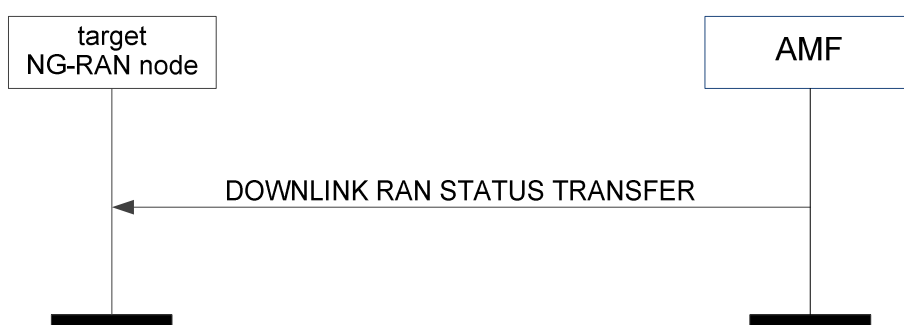


Figure 8.4.7.2-1: Downlink RAN status transfer

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.

8.4.8 Handover Success

8.4.8.1 General

The Handover Success procedure is used during a DAPS Handover, to inform the source NG-RAN node that the UE has successfully accessed the target NG-RAN node. The procedure uses UE-associated signalling.

8.4.8.2 Successful Operation



Figure 8.4.8.2-1: Handover Success

The AMF initiates the procedure by sending the HANDOVER SUCCESS message to the source NG-RAN node.

8.4.8.3 Abnormal Conditions

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

8.4.9 Uplink RAN Early Status Transfer

8.4.9.1 General

The purpose of the Uplink RAN Early Status Transfer procedure is to transfer the COUNT of the first downlink SDU that the source NG-RAN node forwards to the target NG-RAN node, from the source NG-RAN node to the target NG-RAN node via the AMF during NG DAPS Handover. The procedure uses UE-associated signalling.

8.4.9.2 Successful Operation



Figure 8.4.9.2-1: Uplink RAN Early Status Transfer

The source NG-RAN node initiates the procedure by sending the UPLINK RAN EARLY STATUS TRANSFER message to the AMF when it considers at least a DRB to be simultaneously served by the source and the target NG-RAN nodes during NG DAPS Handover.

For each DRB for which DAPS Handover applies, the source NG-RAN node shall include the *DRB ID IE* and the *FIRST DL COUNT Value IE* within the *DRBs Subject To Early Status Transfer Item IE* in the *Early Status Transfer Transparent Container IE* of the UPLINK RAN EARLY STATUS TRANSFER message.

8.4.9.3 Abnormal Conditions

Void.

8.4.10 Downlink RAN Early Status Transfer

8.4.10.1 General

The purpose of the Downlink RAN Early Status Transfer procedure is to transfer the COUNT of the first downlink SDU that the source NG-RAN node forwards to the target NG-RAN node, from the source NG-RAN node to the target NG-RAN node via the AMF during NG DAPS Handover. The procedure uses UE-associated signalling.

8.4.10.2 Successful Operation

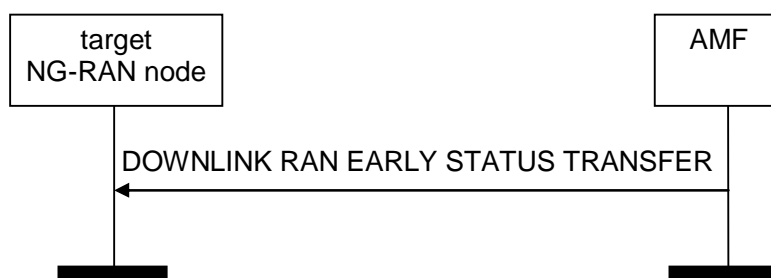


Figure 8.4.10.2-1: Downlink RAN Early Status Transfer

The AMF initiates the procedure by sending the DOWNLINK RAN EARLY STATUS TRANSFER message to the target NG-RAN node.

For each DRB for which the *FIRST DL COUNT Value IE* is received in the DOWNLINK RAN EARLY STATUS TRANSFER message, the target NG-RAN node shall use it as the COUNT of the first downlink SDU that the source NG-RAN node forwards to the target NG-RAN node.

8.4.10.3 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

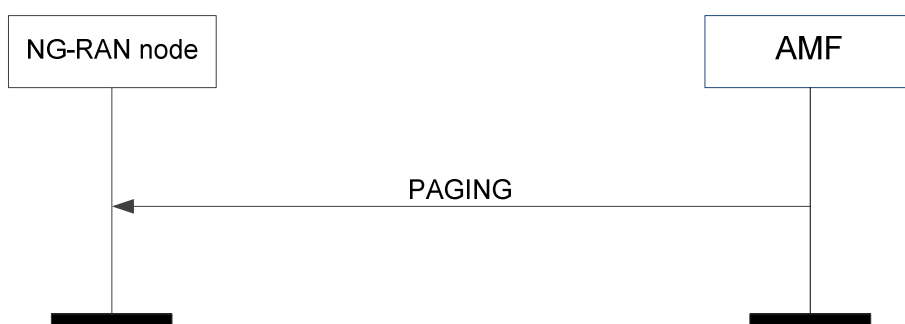


Figure 8.5.1.2-1: Paging

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].

If the *NB-IoT Paging eDRX Information* IE is included in the PAGING message, the NG-RAN node shall, if supported, use it according to TS 36.304 [29]. If the *NB-IoT Paging Time Window* IE is included in the *NB-IoT Paging eDRX Information* IE, the NG-RAN node shall take this information into account to determine the UE's paging occasion according to TS 36.304 [29]. The NG-RAN node should take into account the reception time of the PAGING message on the NG interface to determine when to page the UE.

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

If the *Enhanced Coverage Restriction IE* is included in the PAGING message, the NG-RAN node shall, if supported, use it as defined in TS 23.501 [9].

If the *Paging Assistance Data for CE Capable UE IE* is included in the *Assistance Data for Paging IE* in the PAGING message, it may be used for paging the indicated CE capable UE, according to TS 23.502 [10].

If the *WUS Assistance Information IE* is included in the PAGING message, the NG-RAN node shall, if supported, use it to determine the WUS group for the UE, as specified in TS 36.304 [29].

If the *Paging eDRX Information IE* is included in the PAGING message, the NG-RAN node shall, if supported, use it according to TS 36.304 [29]. If the *Paging Time Window IE* is included in the *Paging eDRX Information IE*, the NG-RAN node shall take this information into account to determine the UE's paging occasion according to TS 36.304 [29]. The NG-RAN node should take into account the reception time of the PAGING message on the NGAP interface to determine when to page the UE.

If the *CE-mode-B Restricted IE* is included in the PAGING message and the *Enhanced Coverage Restriction IE* is not set to "restricted", the NG-RAN node shall, if supported, use it as defined in TS 23.501 [9].

If the *NPN Paging Assistance Information IE* is included in the *Assistance Data for Paging IE*, the NG-RAN node may take it into account when determining the cells where paging will be performed.

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 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].

If the *Source to Target AMF Information Reroute* IE is included in the INITIAL UE MESSAGE message the AMF shall use the IE as defined in TS 23.502 [10].

If the *IAB Node Indication* IE is included in the INITIAL UE MESSAGE message, the AMF shall consider that the message is related to an IAB node.

If the *CE-mode-B Support Indicator* IE is included in the INITIAL UE MESSAGE message and set to "supported", the AMF shall, if supported, use the extended NAS timer settings for the UE as specified in TS 23.501 [9].

If the *LTE-M indication* IE is included in the INITIAL UE MESSAGE message the AMF shall, if supported, use it according to TS 23.501 [10].

If the *EDT Session* IE set to "true" is included in the INITIAL UE MESSAGE message and the NG-RAN node is an ng-eNB, the AMF shall, if supported, consider that the message has been received as a result of an EDT session initiated by the UE.

If PNI-NPN related information within the *NPN Access Information* IE is received in the INITIAL UE MESSAGE message, the AMF shall, if supported, consider that the included information is associated to the cell via which the UE has sent the first NAS message, and to the PLMN Identity which is indicated within the *TAI* IE, and use the included information as specified in TS 23.501 [9].

In case of network sharing for SNPNs, the selected SNPN is indicated within the *User Location Information* IE included in the INITIAL UE MESSAGE message by the *PLMN Identity* IE within the *TAI* IE and the *NID* IE.

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

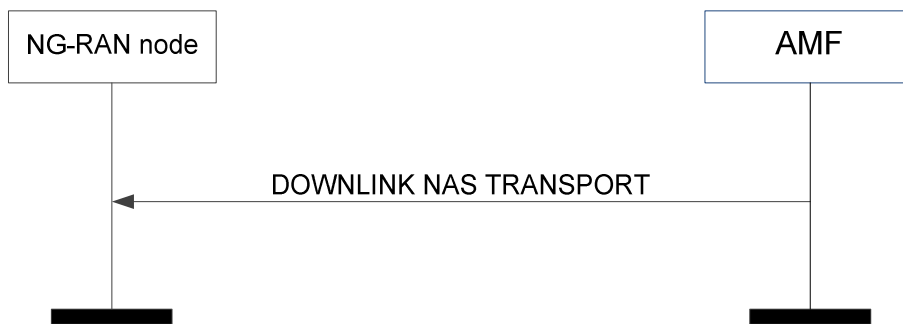


Figure 8.6.2.2-1: Downlink NAS transport

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 overwrite any previously stored mobility restriction 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].

The *UE Aggregate Maximum Bit Rate* IE should be sent to the NG-RAN node if the AMF has not sent it previously. If it 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.

If the *SRVCC Operation Possible* IE is included in the DOWNLINK NAS TRANSPORT message, the NG-RAN node shall, if supported, store the content of the received *SRVCC Operation Possible* IE in the UE context and use it as defined in TS 23.216 [31].

If the *Extended Connected Time* IE is included in the DOWNLINK NAS TRANSPORT message, the NG-RAN node shall, if supported, use it as described in TS 23.501 [9].

If the *Enhanced Coverage Restriction* IE is included in the DOWNLINK NAS TRANSPORT message, the NG-RAN node shall, if supported, store this information in the UE context and use it as defined in TS 23.501 [9].

If the *UE Differentiation Information* IE is included in the DOWNLINK NAS TRANSPORT message, the NG-RAN node shall, if supported, store this information in the UE context for further use according to TS 23.501 [9].

If the *CE-mode-B Restricted* IE is included in the DOWNLINK NAS TRANSPORT message and the *Enhanced Coverage Restriction* IE is not set to "restricted" and the Enhanced Coverage Restricted information stored in the UE context is not set to "restricted", the NG-RAN node shall, if supported, store this information in the UE context and use it as defined in TS 23.501 [9].

If the *UE Radio Capability* IE is included in the DOWNLINK NAS TRANSPORT message, the NG-RAN node shall store this information in the UE context, and use it as defined in TS 38.300 [14].

If the *End Indication* IE is included in the DOWNLINK NAS TRANSPORT message and set to "no further data", the NG-RAN node shall consider that besides the included NAS PDU in this message, there are no further NAS PDUs to be transmitted for this UE.

If the DOWNLINK NAS TRANSPORT message contains the *UE Radio Capability ID* IE, the NG-RAN node shall, if supported, use it as specified in TS 23.501 [9] and TS 23.502 [10].

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.

Interaction with the UE Radio Capability Info Indication procedure:

If the *UE Capability Info Request* IE set to "requested" is included in the DOWNLINK NAS TRANSPORT message, the NG-RAN node shall trigger the UE Radio Capability Info Indication procedure if UE capability related information was successfully retrieved from the UE.

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 *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

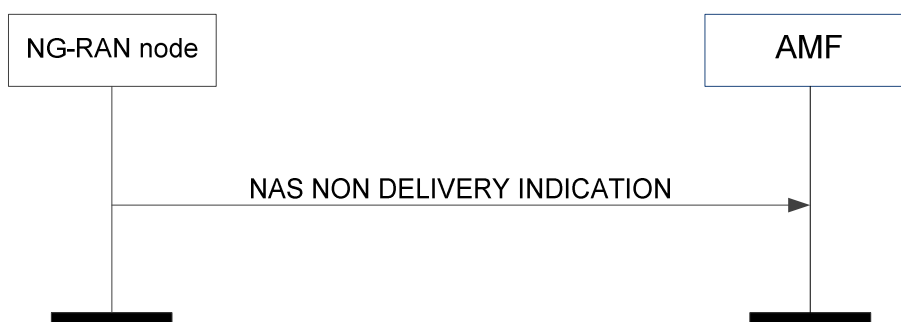


Figure 8.6.4.2-1: NAS non delivery indication

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

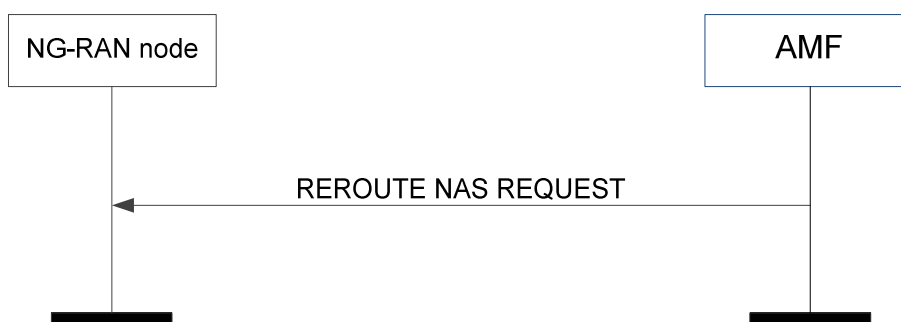


Figure 8.6.5.2-1: Reroute NAS request

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].

If the *Source to Target AMF Information Reroute* 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. If the NG-RAN node and AMF do not agree on retaining the UE contexts 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

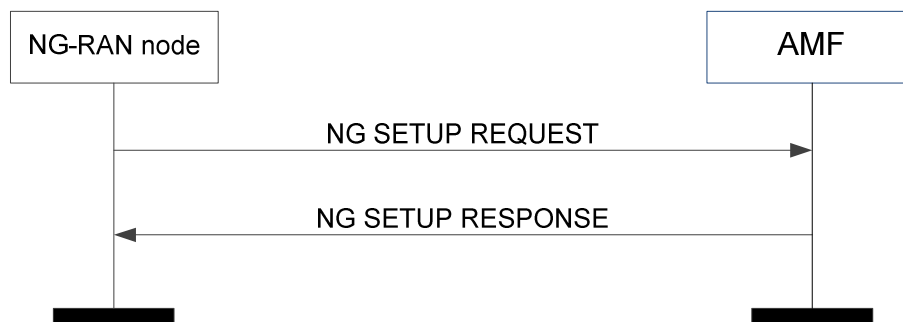


Figure 8.7.1.2-1: NG setup: successful operation

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.

If the *Configured TAC Indication* IE set to "true" is included for a Tracking Area contained in the *Supported TA List* IE in the NG SETUP REQUEST message, the AMF may take it into account to optimise NG-C signalling towards this NG-RAN node.

If the *UE Retention Information* IE set to "ues-retained" is included in the NG SETUP REQUEST message, the AMF may accept the proposal to retain the existing UE related contexts and signalling connections by including the *UE Retention Information* IE set to "ues-retained" in the NG SETUP RESPONSE message.

If the AMF supports IAB, the AMF shall include the *IAB Supported* IE in the NG SETUP RESPONSE message.

The AMF shall include the *Backup AMF Name* IE, if available, in the *Served GUAMI List* IE in the NG SETUP RESPONSE message. The NG-RAN node shall, if supported, consider the AMF as indicated by the *Backup AMF Name* IE when performing AMF reselection, as specified in TS 23.501 [9].

If the *GUAMI Type* IE is included in the NG SETUP RESPONSE message, the NG-RAN node shall store the received value and use it for further AMF selection as defined in TS 23.501 [9].

If the *RAN Node Name* IE is included in the NG SETUP REQUEST message, the AMF may use this IE as a human readable name of the NG-RAN node. If the *Extended RAN Node Name* IE is included in the NG SETUP REQUEST message, the AMF may use this IE as a human readable name of the NG-RAN node and shall ignore the *RAN Node Name* IE if also included.

If the *AMF Name* IE is included in the NG SETUP RESPONSE message, the NG-RAN node may use this IE as a human readable name of the AMF. If the *Extended AMF Name* IE is included in the NG SETUP RESPONSE message, the NG-RAN node may use this IE as a human readable name of the AMF and shall ignore the *AMF Name* IE if also included.

If the *NB-IoT Default Paging DRX* IE is included in the NG SETUP REQUEST message, the AMF shall take it into account for paging.

If the *RAT Information* IE is included in the NG SETUP REQUEST message, the AMF shall handle this information as specified in TS 23.502 [10].

If the *NID* IE within the *NPN Support* IE is included within a *Broadcast PLMN Item* IE in the NG SETUP REQUEST message, the AMF shall consider that the NG-RAN node supports the indicated S-NSSAI(s) for the corresponding tracking area code for the SNPN identified by the *PLMN Identity* IE and the *NID* IE.

If the *NID* IE within the *NPN Support* IE is included within a *PLMN Support Item* IE in the NG SETUP RESPONSE message, the NG-RAN node shall consider that the AMF supports the SNPN identified by the *PLMN Identity* IE and the *NID* IE.

8.7.1.3 Unsuccessful Operation

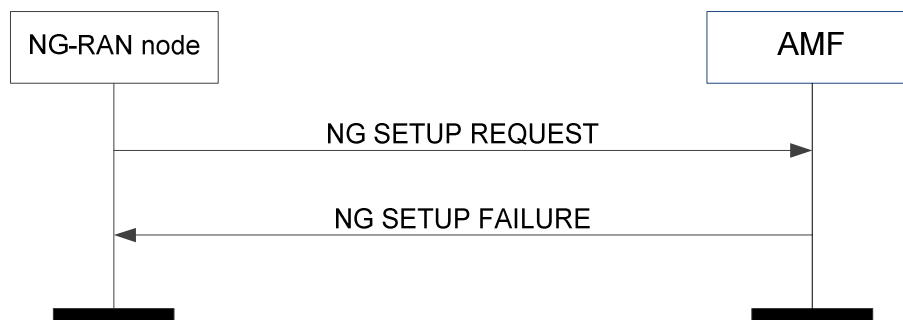


Figure 8.7.1.3-1: NG setup: unsuccessful operation

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

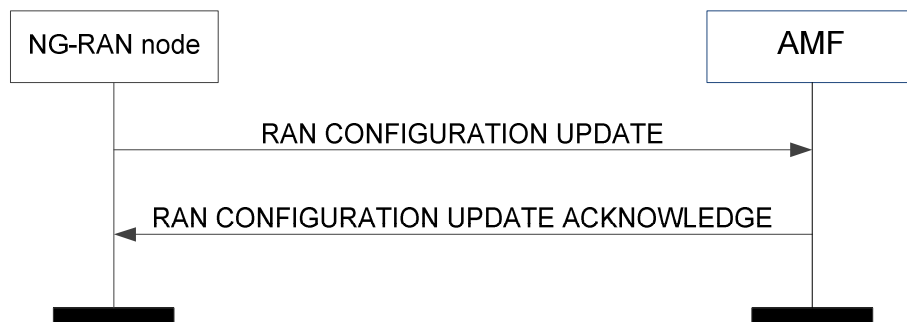


Figure 8.7.2.2-1: RAN configuration update: successful operation

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 an information element is not included in the RAN CONFIGURATION UPDATE message, the AMF shall interpret that the corresponding configuration data is not changed and shall continue to operate the NG-C interface with the existing related configuration data.

If the *Supported TA List* IE is included in the RAN CONFIGURATION UPDATE message, the AMF shall overwrite the whole list of supported TAs and the corresponding list of supported slices for each TA, and use them for subsequent registration area management of the UE.

If the *Configured TAC Indication* IE set to "true" is included for a Tracking Area contained in the *Supported TA List* IE in the RAN CONFIGURATION UPDATE message, the AMF may take it into account to optimise NG-C signalling towards this NG-RAN node.

If the *Global RAN Node ID* IE is included in the RAN CONFIGURATION UPDATE message, the AMF shall associate the TNLA to the NG-C interface instance using the Global RAN Node ID.

If the RAN CONFIGURATION UPDATE message includes *NG-RAN TNL Association to Remove List* IE, and the *Endpoint IP Address* IE and the *Port Number* IE for both TNL endpoints of the TNL association(s) are included in the *NG-RAN TNL Association to Remove List* IE, the AMF shall, if supported, consider that the TNL association(s) indicated by both received TNL endpoints will be removed by the NG-RAN node. If the *Endpoint IP Address* IE, or the *Endpoint IP Address* IE and the *Port Number* IE for one or both of the TNL endpoints is included in the *NG-RAN TNL Association to Remove List* IE in RAN CONFIGURATION UPDATE message, the AMF shall, if supported, consider that the TNL association(s) indicated by the received endpoint IP address(es) will be removed by the NG-RAN node.

If the RAN CONFIGURATION UPDATE message includes the *RAN Node Name* IE, the AMF may store it or update this IE value if already stored, and use it as a human readable name of the NG-RAN node. If the RAN CONFIGURATION UPDATE message includes the *Extended RAN Node Name* IE, the AMF may store it or update this IE value if already stored, and use it as a human readable name of the NG-RAN node and shall ignore the *RAN Node Name* IE if also included.

If the *NB-IoT Default Paging DRX* IE is included in the RAN CONFIGURATION UPDATE message, the AMF shall overwrite any previously stored NB-IoT default paging DRX value for the NG-RAN node.

If the *RAT Information* IE is included in the RAN CONFIGURATION UPDATE message, the AMF shall handle this information as specified in TS 23.502 [10].

If the *NID* IE within the *NPN Support* IE is included within a *Broadcast PLMN Item* IE in the RAN CONFIGURATION UPDATE message, the AMF shall consider that the NG-RAN node supports the indicated S-NSSAI(s) for the corresponding tracking area code for the SNPN identified by the *PLMN Identity* IE and the *NID* IE.

8.7.2.3 Unsuccessful Operation

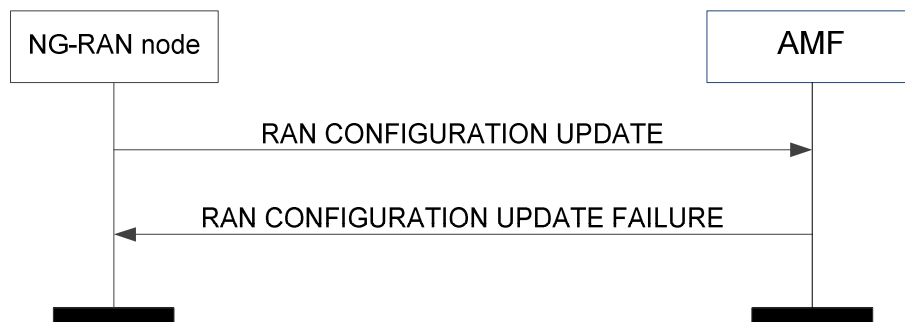


Figure 8.7.2.3-1: RAN configuration update: unsuccessful operation

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

If the *Time to Wait* IE is included in the RAN CONFIGURATION UPDATE FAILURE message, the NG-RAN node shall wait at least for the indicated time before reinitiating the RAN Configuration Update procedure towards the same AMF.

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

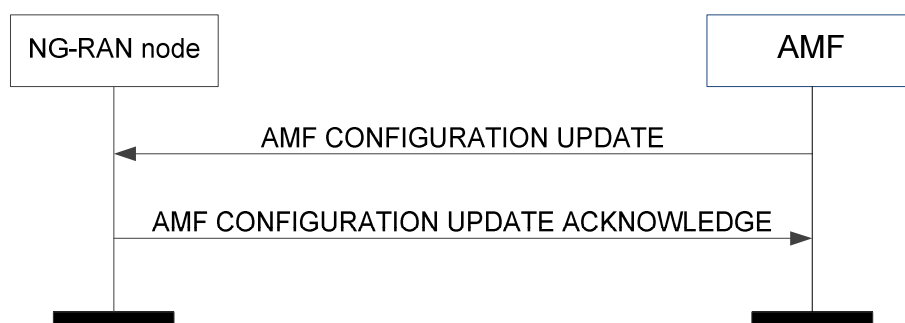


Figure 8.7.3.2-1: AMF configuration update: successful operation

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 an information element is not included in the AMF CONFIGURATION UPDATE message, the NG-RAN node shall interpret that the corresponding configuration data is not changed and shall continue to operate the NG-C interface with the existing related configuration data.

If the *PLMN Support List IE* is included in the AMF CONFIGURATION UPDATE message, the NG-RAN node shall overwrite the whole list of supported PLMN Identities and the corresponding list of AMF slices for each PLMN Identity 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 CONFIGURATION UPDATE message includes *AMF TNL Association to Remove List IE*, and the *Endpoint IP Address* and the *Port Number IE* for both TNL endpoints of the TNL association(s) is included in the *AMF TNL Association to Remove List IE*, the NG-RAN node shall, if supported, initiate removal of the TNL association(s) indicated by both received TNL endpoints towards the AMF. If the *Endpoint IP Address IE*, or the *Endpoint IP Address IE* and the *Port Number IE* for one or both of the TNL endpoints is included in the *AMF TNL Association to Remove List IE*, the NG-RAN node shall, if supported, initiate removal of the TNL association(s) indicated by the received endpoint IP address(es). 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 AMF CONFIGURATION UPDATE message includes the *AMF Name IE*, the NG-RAN node may store it or update this IE value if already stored, and use it as a human readable name of the AMF. If the AMF CONFIGURATION UPDATE message includes the *Extended AMF Name IE*, the NG-RAN node may store it or update this IE value if already stored, and use it as a human readable name of the AMF and shall ignore the *AMF Name IE* if also included.

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 and AMF selection 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].

If the *NID IE* within the *NPN Support IE* is included within a *PLMN Support Item IE* in the AMF CONFIGURATION UPDATE message, the NG-RAN node shall consider that the AMF supports the SNPN identified by the *PLMN Identity IE* and the *NID IE*.

8.7.3.3 Unsuccessful Operation

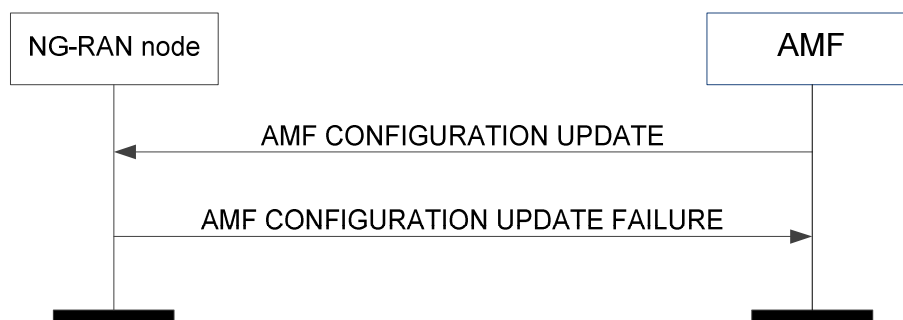


Figure 8.7.3.3-1: AMF configuration update: unsuccessful operation

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

If the *Time to Wait* IE is included in the AMF CONFIGURATION UPDATE FAILURE message, the AMF shall wait at least for the indicated time before reinitiating the AMF Configuration Update procedure towards the same NG-RAN node.

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

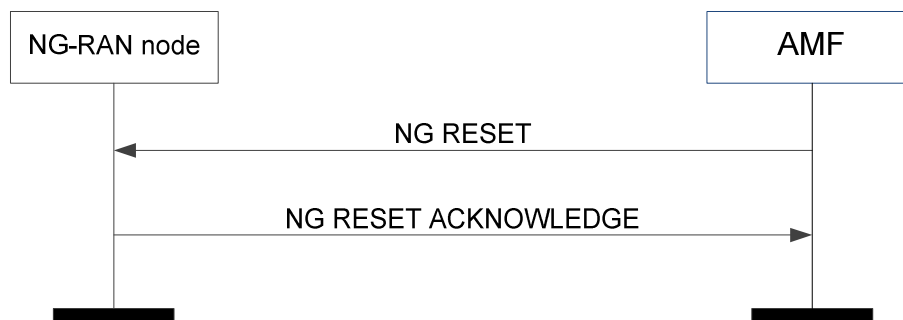


Figure 8.7.4.2.1-1: NG reset initiated by the AMF: successful operation

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* IEs 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 IEs, 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

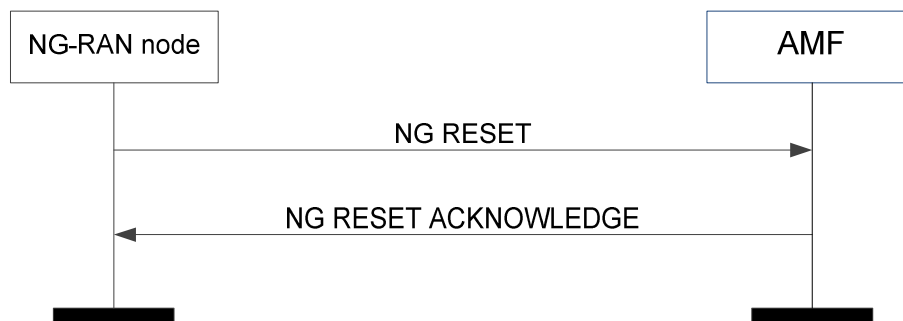


Figure 8.7.4.2.2-1: NG reset initiated by the NG-RAN node: successful operation

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* IEs 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* IEs, 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

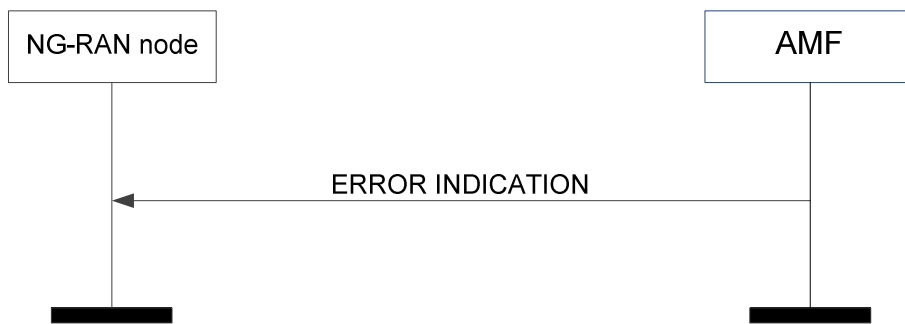


Figure 8.7.5.2-1: Error indication initiated by the AMF

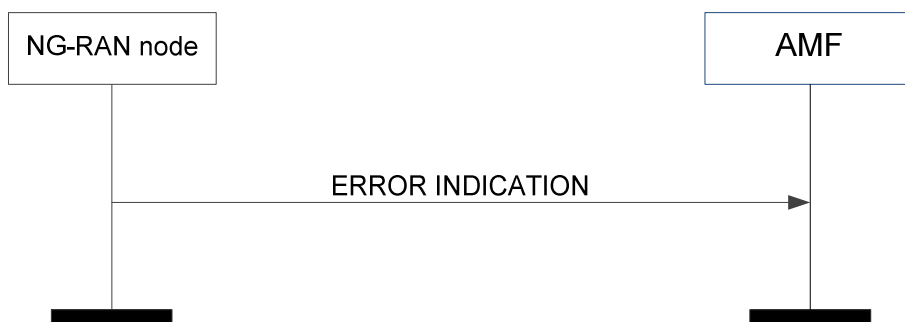


Figure 8.7.5.2-2: Error indication initiated by the NG-RAN node

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 local UE NGAP ID" or "Inconsistent remote 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

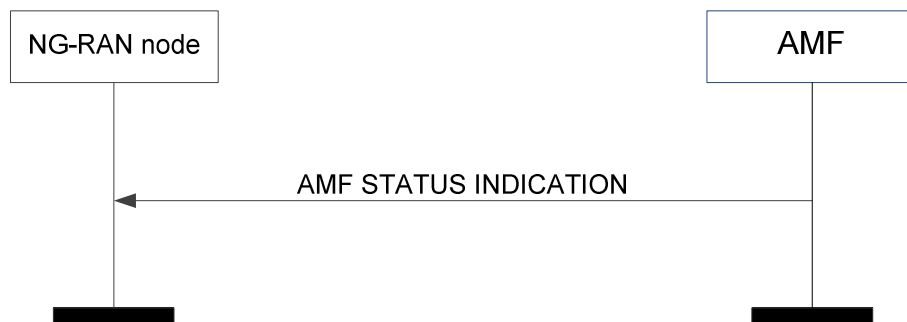


Figure 8.7.6.2-1: AMF status indication

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 as specified in TS 23.501 [9].

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", "mo-ExceptionData" 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

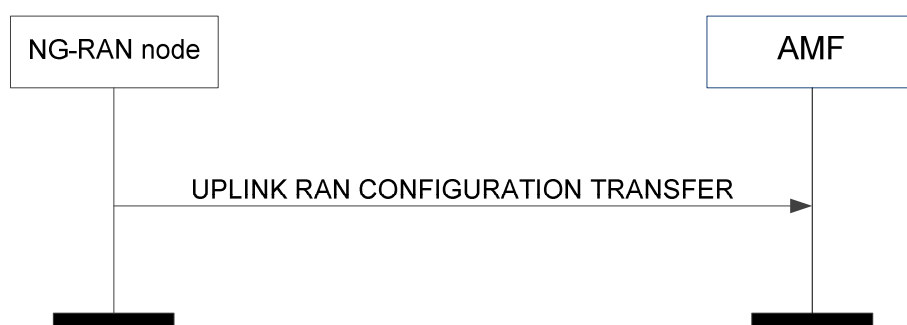


Figure 8.8.1.2-1: Uplink RAN configuration transfer

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.

If the AMF receives the *EN-DC SON Configuration Transfer* IE, it shall transparently transfer the *EN-DC SON Configuration Transfer* IE towards an MME serving the eNB indicated in the *Target eNB-ID* IE which is included in the *EN-DC SON Configuration Transfer* IE.

If the AMF receives the *Inter-system SON Configuration Transfer* IE, it shall transparently transfer the *Inter-system SON Configuration Transfer* IE towards an MME serving the eNB indicated in the *Target eNB-ID* IE which is included in the *Inter-system 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

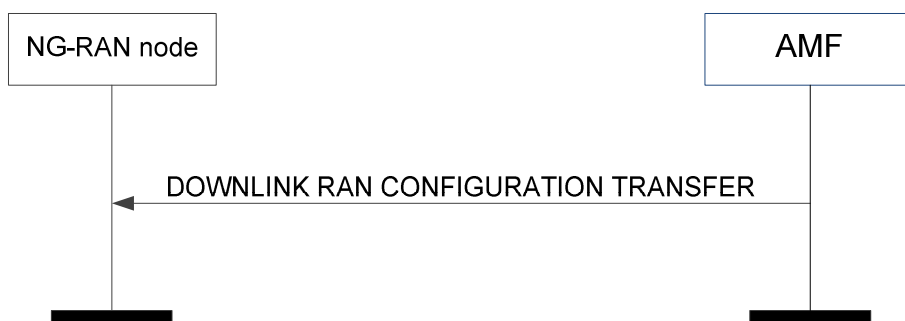


Figure 8.8.2.2-1: Downlink RAN configuration transfer

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 or in the *EN-DC SON Configuration Transfer* IE, the *SON Information* IE containing the *SON Information Request* IE, it may transfer back the requested information either towards the NG-RAN node indicated in the *Source RAN Node ID* IE of the *SON Configuration Transfer* IE or towards an eNB indicated in the *Source eNB-ID* IE of the *EN-DC 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.

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

If the NG-RAN node receives the *SON Information* IE containing the *SON Information Report* IE it may use it as specified in TS 38.300 [8].

If the NG-RAN node receives the *Inter-system SON Information* IE containing the *Inter-system SON Information Report* IE it may use it as specified in TS 38.300 [8].

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

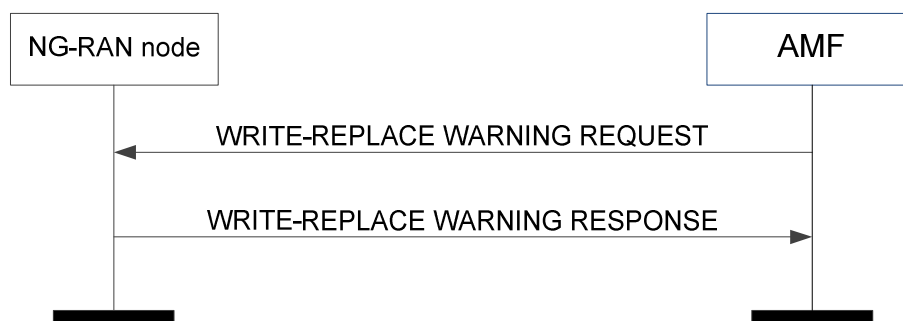


Figure 8.9.1.2-1: Write-Replace Warning procedure: successful operation

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 *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 include this information 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 Broadcasts 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

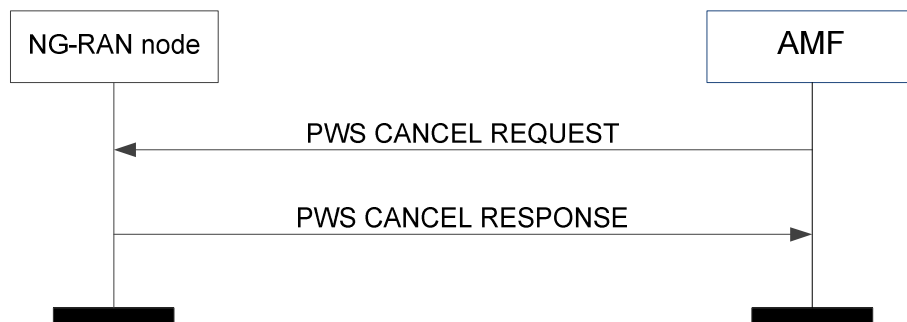


Figure 8.9.2.2-1: PWS Cancel procedure: successful operation

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 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

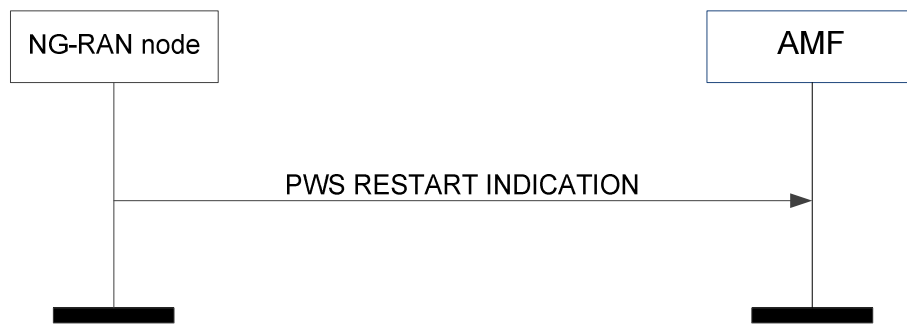


Figure 8.9.3.2-1: PWS restart indication

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

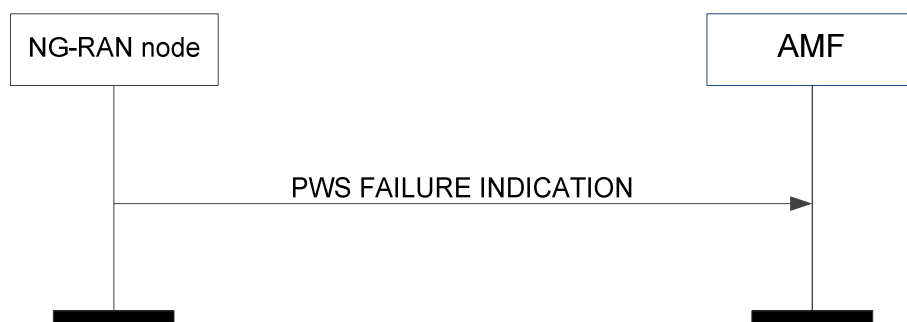


Figure 8.9.4.2-1: PWS failure indication

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 Location Information Transfer and Positioning Information Transfer. The non-UE associated signalling is used to support OTDOA Information Transfer, Assistance Information Transfer, TRP Information Transfer, and Measurement Information Transfer.

8.10.2 Successful Operations

8.10.2.1 DOWNLINK UE ASSOCIATED NRPPa TRANSPORT

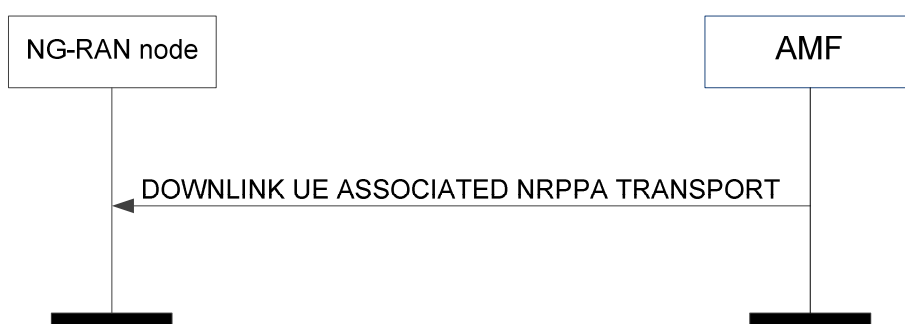


Figure 8.10.2.1-1: Downlink UE-associated NRPPa transport

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

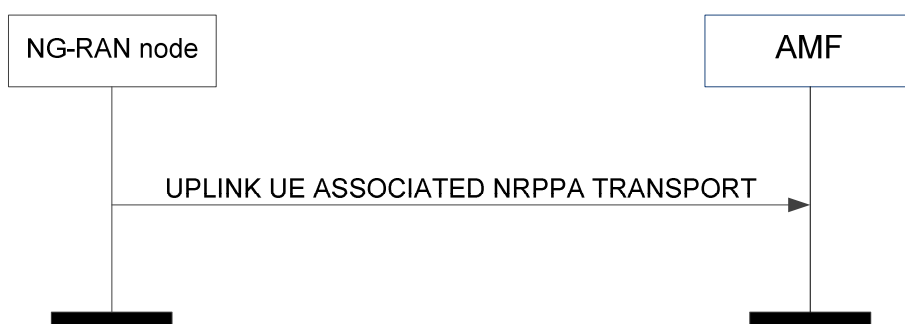


Figure 8.10.2.2-1: Uplink UE-associated NRPPa transport

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

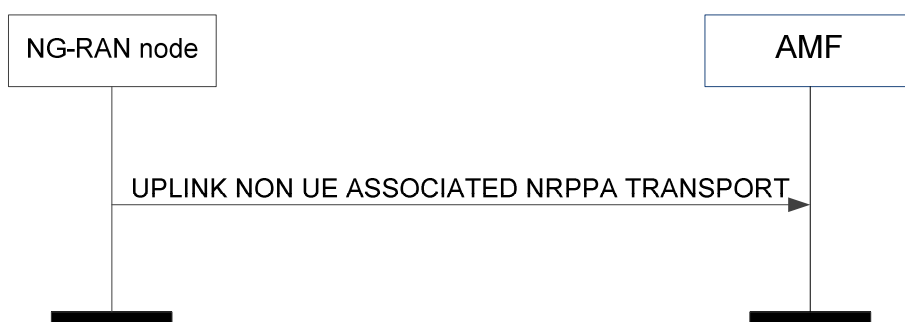


Figure 8.10.2.4-1: Uplink non UE-associated NRPPa transport

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].

If the *Trace Activation IE* is included in the TRACE START message which includes the *MDT Activation IE* set to "Immediate MDT and Trace", the NG-RAN node shall, if supported, initiate the requested trace session and MDT session as described in TS 32.422 [11].

If the *Trace Activation IE* is included in the TRACE START message which includes the *MDT Activation IE* set to "Immediate MDT Only", "Logged MDT only", the NG-RAN node shall, if supported, initiate the requested MDT session as described in TS 32.422 [11] and the NG-RAN node shall ignore the *Interfaces To Trace IE* and the *Trace Depth IE*.

If the *Trace Activation IE* includes the *MDT Location Information IE* within the *MDT Configuration IE*, the NG-RAN node shall, if supported, store this information and take it into account in the requested MDT session.

If the *Trace Activation IE* is included in the TRACE START message which includes the *MDT Activation IE* set to "Immediate MDT Only", "Logged MDT only" and if the *Signalling Based MDT PLMN List IE* is included in the *MDT Configuration IE*, the NG-RAN node may use it to propagate the MDT Configuration as described in TS 37.320 [41].

If the *Trace Activation IE* includes the *Bluetooth Measurement Configuration IE* within the *MDT Configuration IE*, the NG-RAN node shall, if supported, take it into account for MDT Configuration as described in TS 37.320 [41].

If the *Trace Activation IE* includes the *WLAN Measurement Configuration IE* within the *MDT Configuration IE*, the NG-RAN node shall, if supported, take it into account for MDT Configuration as described in TS 37.320 [41].

If the *Trace Activation IE* includes the *Sensor Measurement Configuration IE* within the *MDT Configuration IE*, the NG-RAN node shall, if supported, take it into account for MDT Configuration as described in TS 37.320 [41].

If the *Trace Activation IE* includes the *MDT Configuration IE* and if the NG-RAN node is a gNB at least the *MDT Configuration-NR IE* shall be present, while if the NG-RAN node is an ng-eNB at least the *MDT Configuration-EUTRA IE* shall be present.

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

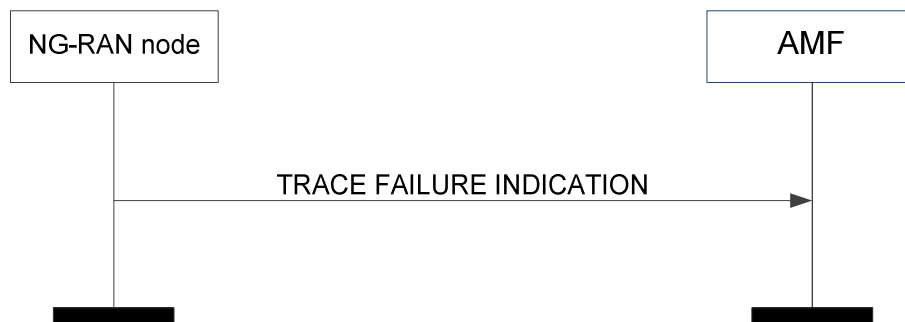


Figure 8.11.2.2-1: Trace failure indication

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

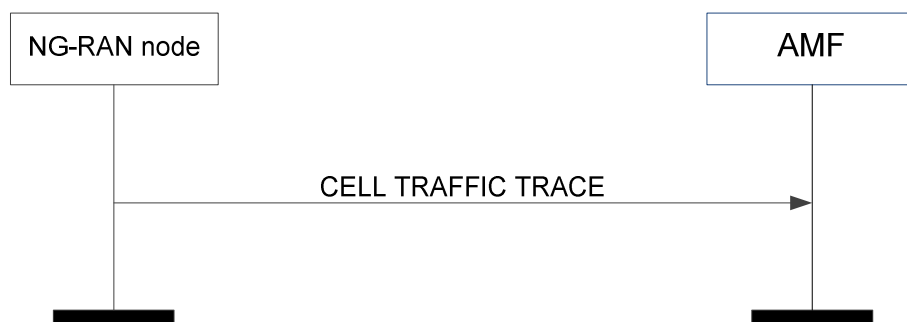


Figure 8.11.4.2-1: Cell traffic trace

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

If the *Privacy Indicator* IE is included in the message, the AMF shall take the information into account for anonymization of MDT data as described in TS 32.422 [11].

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

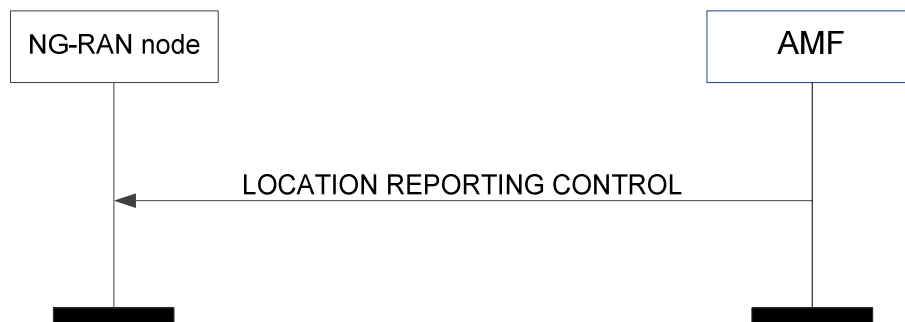


Figure 8.12.1.2-1: Location reporting control

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].

NOTE: The NG-RAN reports the UE presence for all set of Location Reporting Reference IDs for inter-NG-RAN node handover.

If the *Additional Location Information* IE is included in the LOCATION REPORTING CONTROL message and set to "Include PSCell" then, if Dual Connectivity is activated, the NG-RAN node shall include the current PSCell in the report. If a report upon change of serving cell is requested, the NG-RAN node shall provide the report also whenever the UE changes the PSCell, and when Dual Connectivity is activated.

If reporting upon change of serving cell is requested, the NG-RAN node shall send a report immediately and shall send a report whenever the UE's location changes.

8.12.1.3 Abnormal Conditions

Interactions with Location Reporting Failure Indication procedure:

If the NG-RAN node receives a LOCATION REPORTING CONTROL message containing several *Location Reporting Reference ID* IE set to the same value, the NG-RAN node shall send the LOCATION REPORTING FAILURE INDICATION message with an appropriate cause value.

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 request contained in the Location Reporting Control procedure, the Handover Resource Allocation procedure or the Initial Context Setup procedure has failed. The procedure uses UE-associated signalling.

8.12.2.2 Successful Operation

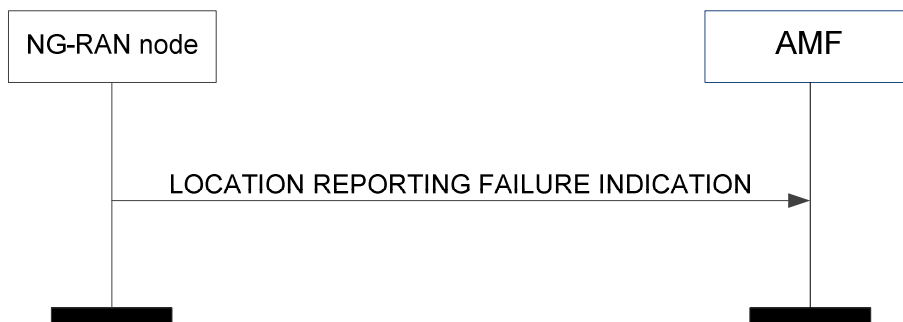


Figure 8.12.2.2-1: Location reporting failure indication

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

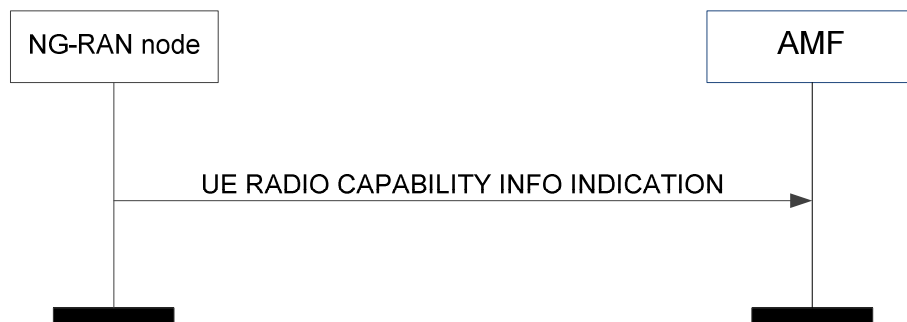


Figure 8.14.1.2-1: UE radio capability info indication

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].

If the UE RADIO CAPABILITY INFO INDICATION message includes the *UE Radio Capability – E-UTRA Format IE*, the AMF shall, if supported, use it as specified 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

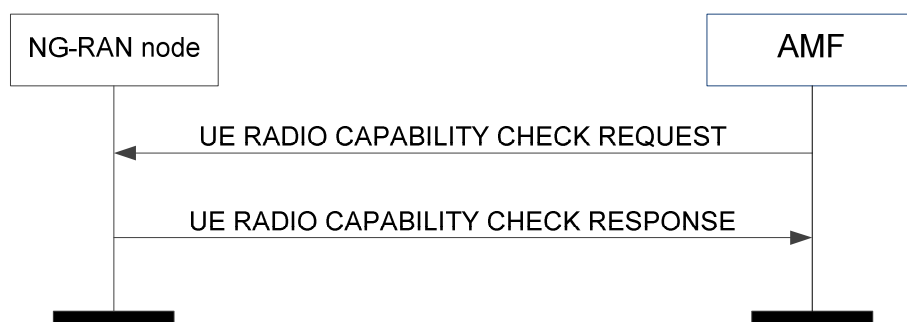


Figure 8.14.2.2-1: UE radio capability check procedure: successful operation

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.

If the UE RADIO CAPABILITY CHECK REQUEST message contains the *UE Radio Capability ID* IE, the NG-RAN node shall, if supported, use it as specified in TS 23.501 [9] and TS 23.502 [10].

8.14.2.3 Unsuccessful Operation

Not applicable.

8.14.2.4 Abnormal Conditions

Void.

8.14.3 UE Radio Capability ID Mapping

8.14.3.1 General

The purpose of the UE Radio Capability ID Mapping procedure is for the NG-RAN node to request from the AMF UE Radio Capability information mapped to the UE Radio Capability ID.

The procedure uses non UE-associated signalling.

8.14.3.2 Successful Operation

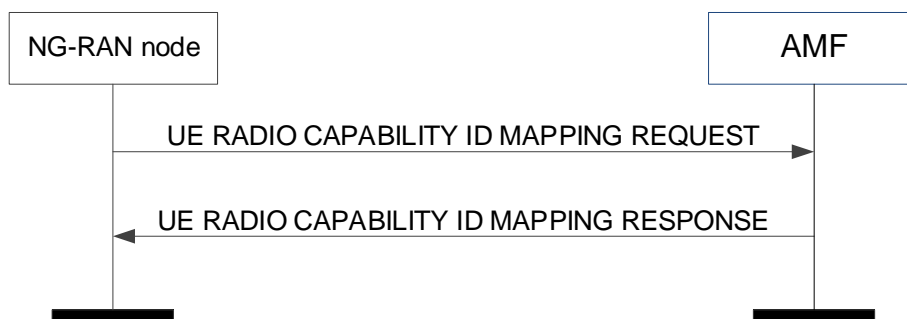


Figure 8.14.3.2-1: UE Radio Capability ID Mapping procedure: successful operation

The NG-RAN node initiates the procedure by sending a UE RADIO CAPABILITY ID MAPPING REQUEST message.

Upon receipt of the UE RADIO CAPABILITY ID MAPPING REQUEST message, the AMF shall provide within the UE RADIO CAPABILITY ID MAPPING RESPONSE message the UE Radio Capability information mapped to the UE Capability ID indicated in the UE RADIO CAPABILITY ID MAPPING REQUEST message.

8.14.3.3 Unsuccessful Operation

Not applicable.

8.14.3.4 Abnormal Conditions

Void.

8.15 Data Usage Reporting Procedures

8.15.1 Secondary RAT Data Usage Report

8.15.1.1 General

The purpose of the Secondary RAT Data Usage Report procedure is to provide information on the used resources of the secondary RAT (e.g. NR resources during MR-DC operation) as specified in TS 23.501 [9].

8.15.1.2 Successful Operation

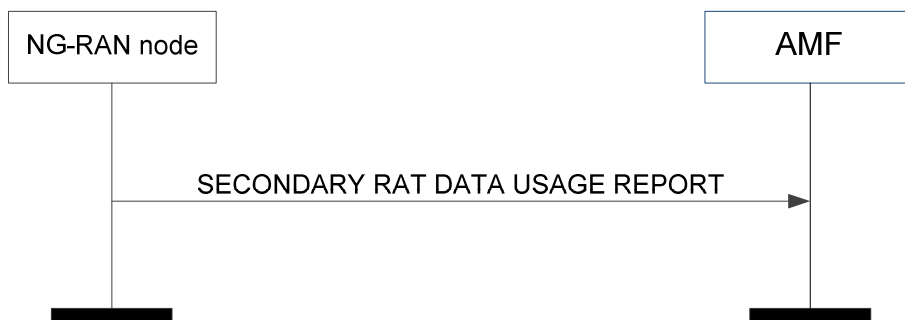


Figure 8.15.1.2-1: Secondary RAT data usage report

The NG-RAN node initiates the procedure by sending the SECONDARY RAT DATA USAGE REPORT message to the AMF.

If the *Handover Flag* IE is included in the SECONDARY RAT DATA USAGE REPORT message, it indicates that for each PDU session the AMF should buffer the *Secondary RAT Data Usage Report Transfer* IE since the secondary RAT data usage report is sent due to handover as defined in TS 23.502 [10].

For each PDU session for which the *Secondary RAT Usage Information List* IE is included in the the *Secondary RAT Data Usage Transfer* IE, the SMF shall handle this information as specified in TS 23.502 [10].

The NG-RAN node shall, if supported, report in the SECONDARY RAT DATA USAGE REPORT message location information of the UE in the *User Location Information* IE.

8.15.1.3 Abnormal Conditions

Void.

8.16 RIM Information Transfer Procedures

8.16.1 Uplink RIM Information Transfer

8.16.1.1 General

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

8.16.1.2 Successful Operation

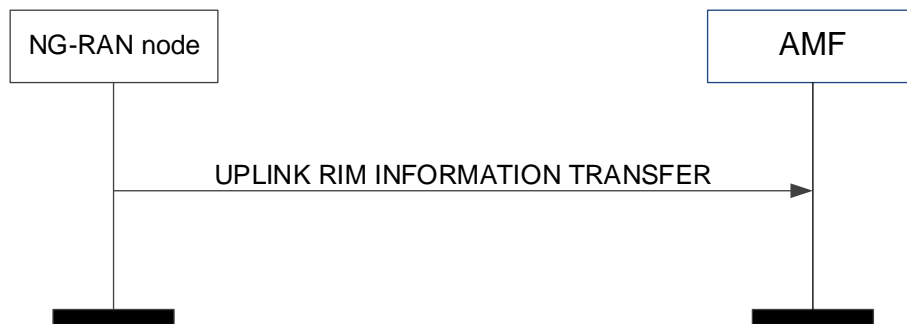


Figure 8.16.1.2-1: Uplink RIM Information Transfer

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

Upon reception of the UPLINK RIM INFORMATION TRANSFER message, the AMF shall transparently transfer it towards the NG-RAN node indicated in the *Target RAN Node ID IE*.

8.16.1.3 Abnormal Conditions

Void.

8.16.2 Downlink RIM Information Transfer

8.16.2.1 General

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

8.16.2.2 Successful Operation

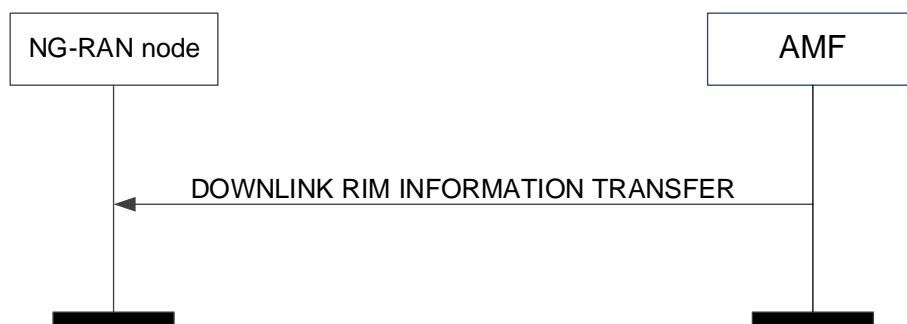


Figure 8.16.2.2-1: Downlink RIM Information Transfer

The AMF initiates the procedure by sending a DOWNLINK RIM INFORMATION TRANSFER message to the NG-RAN node. The NG-RAN node may use the RIM information in the received DOWNLINK RIM INFORMATION TRANSFER message for executing the RIM functionality, as specified in TS 38.300 [8].

8.16.2.3 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 of PDU Sessions> | | | - | |
| >>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 PDU Session Resource Setup Request Transfer IE specified in subclause 9.3.4.1. | - | |
| UE Aggregate Maximum Bit Rate | O | | 9.3.1.58 | | YES | ignore |

| Range bound | Explanation |
|---------------------|---|
| maxnoofPDU Sessions | 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 PDUSessions> | | | - | |
| >>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 PDUSessions> | | | - | |
| >>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 |
|--------------------|---|
| maxnoofPDUSessions | 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 of PDU 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 of PDU 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 PDUSessions> | | | - | |
| >>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 <i>PDU Session Resource Modify Request Transfer</i> IE specified in subclause 9.3.4.3. | - | |
| >>S-NSSAI | O | | 9.3.1.24 | | YES | reject |

| Range bound | Explanation |
|--------------------|---|
| maxnoofPDUSessions | 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 <i>PDU Session Resource Notify Transfer</i> 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 <i>PDU Session Resource Notify Released Transfer</i> 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 ofPDU Sessions> | | | - | |
| >>PDU Session ID | M | | 9.3.1.50 | | - | |
| >>PDU Session Resource Modify Indication Transfer | M | | OCTET STRING | Containing the <i>PDU Session Resource Modify Indication Transfer</i> IE specified in subclause 9.3.4.6. | - | |
| 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. |

9.2.1.9 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 | | 0..1 | | | YES | ignore |
| >PDU Session Resource Modify Confirm Item | | 1..<maxno of PDU Sessions> | | | - | |
| >>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 of PDU Sessions> | | | - | |
| >>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 |
|---------------------|---|
| maxnoofPDU Sessions | 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 9.3.3.21 | | YES | reject |
| UE Aggregate Maximum Bit Rate | C- ifPDU uses Resource Setup | | 9.3.1.58 | | YES | reject |
| Core Network Assistance Information for RRC INACTIVE | 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..<max ofPDU Sessions> | | | - | |
| >>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. | - | |
| 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 |
| Redirection for Voice EPS Fallback | O | | 9.3.1.116 | | YES | ignore |
| Location Reporting Request Type | O | | 9.3.1.65 | | YES | ignore |
| CN Assisted RAN Parameters Tuning | O | | 9.3.1.119 | | YES | ignore |
| SRVCC Operation Possible | O | | 9.3.1.128 | | YES | ignore |
| IAB Authorized | O | | 9.3.1.129 | | YES | ignore |
| Enhanced Coverage Restriction | O | | 9.3.1.140 | | YES | ignore |
| Extended Connected Time | O | | 9.3.3.31 | | YES | ignore |
| UE Differentiation Information | O | | 9.3.1.144 | | YES | ignore |
| NR V2X Services Authorized | O | | 9.3.1.146 | | YES | ignore |

| | | | | | | |
|--|---|--|----------------------------|--|-----|--------|
| LTE V2X Services Authorized | O | | 9.3.1.147 | | YES | ignore |
| NR UE Sidelink Aggregate Maximum Bit Rate | O | | 9.3.1.148 | This IE applies only if the UE is authorized for NR V2X services. | YES | ignore |
| LTE UE Sidelink Aggregate Maximum Bit Rate | O | | 9.3.1.149 | This IE applies only if the UE is authorized for LTE V2X services. | YES | ignore |
| PC5 QoS Parameters | O | | 9.3.1.150 | This IE applies only if the UE is authorized for NR V2X services. | YES | ignore |
| CE-mode-B Restricted | O | | 9.3.1.155 | | YES | ignore |
| UE User Plane Clot Support Indicator | O | | 9.3.1.160 | | YES | ignore |
| RG Level Wireline Access Characteristics | O | | OCTET STRING | Specified in TS 23.316 [34]. Indicates the wireline access technology specific QoS information corresponding to a specific wireline access subscription. | YES | ignore |
| Management Based MDT PLMN List | O | | MDT PLMN List 9.3.1.168 | | YES | ignore |
| UE Radio Capability ID | O | | 9.3.1.142 | | YES | reject |

| 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 ofPDUSessions> | | | - | |
| >>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 |
|--------------------|---|
| maxnoofPDUSessions | 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 ofPDUSessions> | | | - | |
| >>PDU Session ID | M | | 9.3.1.50 | | - | |
| Cause | M | | 9.3.1.2 | | YES | ignore |

| Range bound | Explanation |
|--------------------|---|
| maxnoofPDUSessions | 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 | | - | |
| >>PDU Session Resource Release Response Transfer | O | | OCTET STRING | Containing the <i>PDU Session Resource Release Response Transfer</i> IE specified in subclause 9.3.4.21. | YES | ignore |
| Criticality Diagnostics | O | | 9.3.1.3 | | YES | ignore |
| Paging Assistance Data for CE Capable UE | O | | 9.3.1.141 | | 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 for RRC INACTIVE | 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 | reject |
| RRC Inactive Transition Report Request | O | | 9.3.1.91 | | YES | ignore |
| New GUAMI | O | | GUAMI 9.3.3.3 | | YES | reject |
| CN Assisted RAN Parameters Tuning | O | | 9.3.1.119 | | YES | ignore |
| SRVCC Operation Possible | O | | 9.3.1.128 | | YES | ignore |
| IAB Authorized | O | | 9.3.1.129 | | YES | ignore |
| NR V2X Services Authorized | O | | 9.3.1.146 | | YES | ignore |
| LTE V2X Services Authorized | O | | 9.3.1.147 | | YES | ignore |
| NR UE Sidelink Aggregate Maximum Bit Rate | O | | 9.3.1.148 | This IE applies only if the UE is authorized for NR V2X services. | YES | ignore |
| LTE UE Sidelink Aggregate Maximum Bit Rate | O | | 9.3.1.149 | This IE applies only if the UE is authorized for LTE V2X services. | YES | ignore |
| PC5 QoS Parameters | O | | 9.3.1.150 | This IE applies only if the UE is authorized for NR V2X services. | YES | ignore |
| UE Radio Capability ID | O | | 9.3.1.142 | | YES | reject |

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 | ignore |
| 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 |

9.2.2.11 CONNECTION ESTABLISHMENT INDICATION

This message is sent by the AMF to complete the establishment of the UE-associated logical NG-connection.

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 |
| End Indication | O | | 9.3.3.32 | | YES | ignore |
| S-NSSAI | O | | 9.3.1.24 | | YES | ignore |
| Allowed NSSAI | O | | 9.3.1.31 | Indicates the S-NSSAIs permitted by the network | YES | ignore |
| UE Differentiation Information | O | | 9.3.1.144 | | YES | ignore |
| DL CP Security Information | O | | 9.3.3.49 | | YES | ignore |
| NB-IoT UE Priority | O | | 9.3.1.145 | | YES | ignore |

9.2.2.12 AMF CP RELOCATION INDICATION

This message is sent by the AMF to inform the NG-RAN node that the UE is to be relocated as described in TS. 38.300 [8].

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 |
| S-NSSAI | O | | 9.3.1.24 | | YES | ignore |
| Allowed NSSAI | O | | 9.3.1.31 | Indicates the S-NSSAIs permitted by the network | YES | ignore |

9.2.2.13 RAN CP RELOCATION INDICATION

This message is sent by the NG-RAN node to initiate the establishment of a UE-associated logical NG-connection, following the reception of re-establishment request.

Direction: NG-RAN node → AMF.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|----------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| RAN UE NGAP ID | M | | 9.2.3.4 | | YES | reject |
| 5G-S-TMSI | M | | 9.3.3.20 | | YES | reject |
| E-UTRA CGI | M | | 9.3.1.9 | | YES | ignore |
| TAI | M | | 9.3.3.11 | | YES | ignore |
| UL CP Security Information | M | | 9.3.3.48 | | YES | reject |

9.2.2.14 RETRIEVE UE INFORMATION

The message is sent by the NG-RAN node to request UE 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 | reject |
| 5G-S-TMSI | M | | 9.3.3.20 | | YES | reject |

9.2.2.15 UE INFORMATION TRANSFER

The message is sent by the AMF to transfer UE 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 | reject |
| 5G-S-TMSI | M | | 9.3.3.20 | | YES | reject |
| NB-IoT UE Priority | O | | 9.3.1.145 | | YES | ignore |
| UE Radio Capability | O | | 9.3.1.74 | | YES | ignore |
| S-NSSAI | O | | 9.3.1.24 | | YES | ignore |
| Allowed NSSAI | O | | 9.3.1.31 | Indicates the S-NSSAIs permitted by the network | YES | ignore |
| UE Differentiation Information | O | | 9.3.1.144 | | YES | ignore |

9.2.2.16 UE CONTEXT SUSPEND REQUEST

This message is sent by the NG-RAN node to request the AMF to suspend the UE context and the related PDU session contexts.

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 |
| Information on Recommended Cells and RAN Nodes for Paging | O | | 9.3.1.100 | | YES | ignore |
| Paging Assistance Data for CE Capable UE | O | | 9.3.1.141 | | YES | ignore |
| PDU Session Resource Suspend List | | 0..1 | | | YES | reject |
| >PDU Session Resource Suspend Item | | 1..<maxno of PDU Sessions> | | | - | |
| >>PDU Session ID | M | | 9.3.1.50 | | - | |
| >>UE Context Suspend Request Transfer | M | | Containing the <i>UE Context Suspend Request Transfer</i> IE specified in subclause 9.3.4.26. | | - | |

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

9.2.2.17 UE CONTEXT SUSPEND RESPONSE

This message is sent by the AMF to indicate to the NG-RAN node the UE context and the related PDU session contexts have been suspended.

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 |
| Security Context | O | | 9.3.1.88 | | YES | reject |
| Criticality Diagnostics | O | | 9.3.1.3 | | YES | ignore |

9.2.2.18 UE CONTEXT SUSPEND FAILURE

This message is sent by the AMF to indicate to the NG-RAN node that suspension of the UE context has failed 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 |
| Cause | M | | 9.3.1.2 | | YES | ignore |
| Criticality Diagnostics | O | | 9.3.1.3 | | YES | ignore |

9.2.2.19 UE CONTEXT RESUME REQUEST

This message is sent by the NG-RAN node to request the AMF to resume the UE-associated logical NG-connection and 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 | reject |
| RAN UE NGAP ID | M | | 9.3.3.2 | | YES | reject |
| RRC Resume Cause | M | | RRC Establishment Cause 9.3.1.111 | | YES | ignore |
| PDU Session Resource Resume List | | 0..1 | | | YES | reject |
| >PDU Session Resource Resume Item | | 1..<maxno of PDUSessions> | | | - | |
| >>PDU Session ID | M | | 9.3.1.50 | | - | |
| >>UE Context Resume Request Transfer | M | | OCTET STRING | Containing the <i>UE Context Resume Request Transfer</i> IE specified in subclause 9.3.4.24 | - | |
| PDU Session Resource Failed to Resume List | | 0..1 | | | YES | reject |
| >PDU Session Resource Failed to Resume Item | | 1..<maxno of PDUSessions> | | | - | |
| >>PDU Session ID | M | | 9.3.1.50 | | - | |
| >>Cause | M | | 9.3.1.2 | | - | |
| Suspend Request Indication | O | | 9.3.1.18 | | YES | ignore |

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

9.2.2.20 UE CONTEXT RESUME RESPONSE

This message is sent by the AMF to indicate to the NG-RAN node that the UE context and the related PDU session contexts have been resumed 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 |
| PDU Session Resource Resume List | | 0..1 | | | YES | reject |
| >PDU Session Resource Resume Item | | 1..<maxno ofPDUSes sions> | | | - | |
| >>PDU Session ID | M | | 9.3.1.50 | | - | |
| >>UE Context Resume Response Transfer | M | | OCTET STRING | Containing the <i>UE Context Resume Response Transfer</i> IE specified in subclause 9.3.4.25 | - | |
| PDU Session Resource Failed to Resume List | | 0..1 | | | YES | reject |
| >PDU Session Resource Failed to Resume Item | | 1..<maxno ofPDUSes sions> | | | - | |
| >>PDU Session ID | M | | 9.3.1.50 | | - | |
| >>Cause | M | | 9.3.1.2 | | - | |
| Security Context | O | | 9.3.1.88 | | YES | reject |
| Suspend Response Indication | O | | 9.3.1.19 | | YES | ignore |
| Extended Connected Time | O | | 9.3.3.31 | | YES | ignore |
| 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. |

9.2.2.21 UE CONTEXT RESUME FAILURE

This message is sent by the AMF to indicate to the NG-RAN node that resumption of the UE context and the related PDU session contexts has failed 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 |
| Cause | M | | 9.3.1.2 | | YES | ignore |
| Criticality Diagnostics | O | | 9.3.1.3 | | 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 PDUSessions> | | | - | |
| >>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- iftoEPSUTRA | | 9.3.3.26 | | YES | reject |
| PDU Session Resource Handover List | | 0..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 |
|-------------|---|
| iftoEPSUTRA | This IE shall be present if the <i>Handover Type</i> IE is set to the value "5GStoEPS" or "5GtoUTRA". |

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 |
| Target to Source Failure Transparent Container | O | | 9.3.1.186 | | 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 for RRC INACTIVE | 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 | Refers to either the "Intra N1 mode NAS transparent container" or the "S1 mode to N1 mode NAS transparent container", the details of the IE definition and the encoding are 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 |
| Redirection for Voice EPS Fallback | O | | 9.3.1.116 | | YES | ignore |
| CN Assisted RAN Parameters Tuning | O | | 9.3.1.119 | | YES | ignore |
| SRVCC Operation Possible | O | | 9.3.1.128 | | YES | ignore |
| IAB Authorized | O | | 9.3.1.129 | | YES | reject |
| Enhanced Coverage Restriction | O | | 9.3.1.140 | | YES | ignore |
| UE Differentiation Information | O | | 9.3.1.144 | | YES | ignore |
| NR V2X Services Authorized | O | | 9.3.1.146 | | YES | ignore |

| | | | | | | |
|--|---|--|----------------------------|--|-----|--------|
| LTE V2X Services Authorized | O | | 9.3.1.147 | | YES | ignore |
| NR UE Sidelink Aggregate Maximum Bit Rate | O | | 9.3.1.148 | This IE applies only if the UE is authorized for NR V2X services. | YES | ignore |
| LTE UE Sidelink Aggregate Maximum Bit Rate | O | | 9.3.1.149 | This IE applies only if the UE is authorized for LTE V2X services. | YES | ignore |
| PC5 QoS Parameters | O | | 9.3.1.150 | This IE applies only if the UE is authorized for NR V2X services. | YES | ignore |
| CE-mode-B Restricted | O | | 9.3.1.155 | | YES | ignore |
| UE User Plane Clot Support Indicator | O | | 9.3.1.160 | | YES | ignore |
| Management Based MDT PLMN List | O | | MDT PLMN List 9.3.1.168 | | YES | ignore |
| UE Radio Capability ID | O | | 9.3.1.142 | | YES | reject |

| Range bound | Explanation |
|--------------------|---|
| maxnoofPDUSessions | 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 of PDU Sessions> | | | - | |
| >>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 of PDU Sessions> | | | - | |
| >>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 |
| Target to Source Failure Transparent Container | O | | 9.3.1.186 | | 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 |
| Notify Source NG-RAN Node | O | | ENUMERATED (NotifySource, ...) | | 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 PDUSes sions> | | | - | |
| >>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 PDUSes sions> | | | - | |
| >>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. | - | |
| RRC Resume Cause | O | | RRC Establishment Cause 9.3.1.111 | | YES | ignore |

| Range bound | Explanation |
|--------------------|---|
| maxnoofPDUSessions | 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 PDUSes sions> | | | - | |
| >>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 PDUSes sions> | | | - | |
| >>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 for RRC INACTIVE | 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 |
| Redirection for Voice EPS Fallback | O | | 9.3.1.116 | | YES | ignore |
| CN Assisted RAN Parameters Tuning | O | | 9.3.1.119 | | YES | ignore |
| SRVCC Operation Possible | O | | 9.3.1.128 | | YES | ignore |
| Enhanced Coverage Restriction | O | | 9.3.1.140 | | YES | ignore |
| Extended Connected Time | O | | 9.3.3.31 | | YES | ignore |
| UE Differentiation Information | O | | 9.3.1.144 | | YES | ignore |
| NR V2X Services Authorized | O | | 9.3.1.146 | | YES | ignore |
| LTE V2X Services Authorized | O | | 9.3.1.147 | | YES | ignore |
| NR UE Sidelink Aggregate Maximum Bit Rate | O | | 9.3.1.148 | This IE applies only if the UE is authorized for NR V2X services. | YES | ignore |

| | | | | | | |
|--|---|--|-----------|--|-----|--------|
| LTE UE Sidelink Aggregate Maximum Bit Rate | O | | 9.3.1.149 | This IE applies only if the UE is authorized for LTE V2X services. | YES | ignore |
| PC5 QoS Parameters | O | | 9.3.1.150 | This IE applies only if the UE is authorized for NR V2X services. | YES | ignore |
| CE-mode-B Restricted | O | | 9.3.1.155 | | YES | ignore |
| UE User Plane Clot Support Indicator | O | | 9.3.1.160 | | YES | ignore |
| UE Radio Capability ID | O | | 9.3.1.142 | | YES | reject |

| Range bound | Explanation |
|--------------------|---|
| maxnoofPDUSessions | 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 ofPDUSes sions> | | | - | |
| >>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 |
|--------------------|---|
| maxnoofPDUSessions | 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

This message is sent by the source NG-RAN node to transfer the uplink PDCP-SN and HFN receiver status and the downlink PDCP SN and HFN transmitter status during intra 5GC NG-based 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 | 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

This message is sent by the AMF to the target NG-RAN node to transfer the uplink PDCP-SN and HFN receiver status and the downlink PDCP SN and HFN transmitter status during intra 5GC NG-based handover.

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 |

9.2.3.15 HANDOVER SUCCESS

This message is sent by the AMF to the source NG-RAN node to indicate the successful access of the UE toward the target 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 | ignore |
| AMF UE NGAP ID | M | | 9.3.3.1 | | YES | reject |
| RAN UE NGAP ID | M | | 9.3.3.2 | | YES | reject |

9.2.3.16 UPLINK RAN EARLY STATUS TRANSFER

This message is sent by the source NG-RAN node to transfer the COUNT value(s) of the first forwarded downlink SDU(s) during NG DAPS 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 |
| Early Status Transfer Transparent Container | M | | 9.3.1.190 | | YES | reject |

9.2.3.17 DOWNLINK RAN EARLY STATUS TRANSFER

This message is sent by the AMF to transfer the COUNT value(s) of the first forwarded downlink SDU(s) during NG DAPS Handover.

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 |
| Early Status Transfer Transparent Container | M | | 9.3.1.190 | | 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 → 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 |
| 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 |
| Paging Origin | O | | 9.3.3.22 | | YES | ignore |
| Assistance Data for Paging | O | | 9.3.1.69 | | YES | ignore |
| NB-IoT Paging eDRX Information | O | | 9.3.1.138 | | YES | ignore |
| NB-IoT Paging DRX | O | | 9.3.1.139 | If this IE is present, the <i>Paging DRX</i> IE is ignored. | YES | ignore |
| Enhanced Coverage Restriction | O | | 9.3.1.140 | | YES | ignore |
| WUS Assistance Information | O | | 9.3.1.143 | | YES | ignore |
| Paging eDRX Information | O | | 9.3.1.154 | | YES | ignore |
| CE-mode-B Restricted | O | | 9.3.1.155 | | 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, ...) | | YES | ignore |
| Allowed NSSAI | O | | 9.3.1.31 | | YES | reject |
| Source to Target AMF Information Reroute | O | | 9.3.3.27 | | YES | ignore |
| Selected PLMN Identity | O | | PLMN Identity 9.3.3.5 | Indicates the selected PLMN id for the non-3GPP access. | YES | ignore |
| IAB Node Indication | O | | ENUMERATED (true, ...) | Indication of an IAB node | YES | reject |
| CE-mode-B Support Indicator | O | | 9.3.1.156 | | YES | reject |
| LTE-M Indication | O | | 9.3.1.157 | | YES | ignore |
| EDT Session | O | | ENUMERATED (true, ...) | | YES | ignore |
| Authenticated Indication | O | | ENUMERATED (true, ...) | Indicates the FN-RG has been authenticated by the access network. | YES | ignore |
| NPN Access Information | O | | 9.3.3.46 | | 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 9.3.3.21 | | 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 |
| SRVCC Operation Possible | O | | 9.3.1.128 | | YES | ignore |
| Enhanced Coverage Restriction | O | | 9.3.1.140 | | YES | ignore |
| Extended Connected Time | O | | 9.3.3.31 | | YES | ignore |
| UE Differentiation Information | O | | 9.3.1.144 | | YES | ignore |
| CE-mode-B Restricted | O | | 9.3.1.155 | | YES | ignore |
| UE Radio Capability | O | | 9.3.1.74 | | YES | ignore |
| UE Capability Info Request | O | | 9.3.1.192 | | YES | ignore |
| End Indication | O | | 9.3.3.32 | | YES | ignore |
| UE Radio Capability ID | O | | 9.3.1.142 | | 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 |
| W-AGF Identity Information | O | | OCTET STRING | Containing the <i>WAgfInfo</i> IE specified in TS 29.510 [36]. | YES | reject |
| TNGF Identity Information | O | | OCTET STRING | Containing the <i>TngfInfo</i> IE specified in TS 29.510 [36]. | YES | reject |
| TWIF Identity Information | O | | OCTET STRING | Containing the <i>TwifInfo</i> IE specified in TS 29.510 [36]. | YES | reject |

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 |
| Source to Target AMF Information Reroute | O | | 9.3.3.27 | | YES | ignore |

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 for the per TAC per PLMN or per SNPN. | - | |
| >>>>NPN Support | O | | 9.3.3.44 | If the <i>NID</i> IE is included, it identifies a SNPN together with the <i>PLMN Identity</i> IE. | YES | reject |
| >>>>Extended TAI Slice Support List | O | | Extended Slice Support List 9.3.1.191 | Additional Supported S-NSSAIs per TA. | YES | reject |
| >>Configured TAC Indication | O | | 9.3.3.50 | | YES | ignore |
| >>RAT Information | O | | 9.3.1.125 | RAT information associated with the TAC of the indicated PLMN(s). | YES | reject |
| Default Paging DRX | M | | Paging DRX 9.3.1.90 | | YES | ignore |
| UE Retention Information | O | | 9.3.1.117 | | YES | ignore |
| NB-IoT Default Paging DRX | O | | 9.3.1.137 | | YES | ignore |
| Extended RAN Node Name | O | | 9.3.1.193 | | 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 ofServedGUAMIs> | | | - | |
| >>GUAMI | M | | 9.3.3.3 | | - | |
| >>Backup AMF Name | O | | AMF Name 9.3.3.21 | | - | |
| >>GUAMI Type | O | | ENUMERATED (native, mapped, ...) | | YES | ignore |
| 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 | - | |
| >>NPN Support | O | | 9.3.3.44 | If <i>NID</i> IE is included, it identifies a SNPN together with the <i>PLMN Identity</i> IE. | YES | reject |
| >>Extended Slice Support List | M | | 9.3.1.191 | Additional Supported S-NSSAIs per PLMN | YES | reject |
| Criticality Diagnostics | O | | 9.3.1.3 | | YES | ignore |
| UE Retention Information | O | | 9.3.1.117 | | YES | ignore |
| IAB Supported | O | | ENUMERATED (true, ...) | Indication of support for IAB. | YES | ignore |
| Extended AMF Name | O | | 9.3.3.51 | | 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 for the per TAC per PLMN or per SNPN. | - | |
| >>>>NPN Support | O | | 9.3.3.44 | If the <i>NID</i> IE is included, it identifies a SNPN together with the <i>PLMN Identity</i> IE. | YES | reject |
| >>>>Extended TAI Slice Support List | O | | Extended Slice Support List 9.3.1.191 | Additional Supported S-NSSAIs per TA. | YES | reject |
| >>Configured TAC Indication | O | | 9.3.3.50 | | YES | ignore |
| >>RAT Information | O | | 9.3.1.125 | RAT information associated with the TAC of the indicated PLMN(s). | YES | reject |
| Default Paging DRX | O | | Paging DRX 9.3.1.90 | | YES | ignore |
| Global RAN Node ID | O | | 9.3.1.5 | | YES | ignore |
| NG-RAN TNL Association to Remove List | | 0..1 | | | YES | reject |
| >NG-RAN TNL Association to Remove Item | | 1..<maxno ofTNLAssociations> | | | - | |
| >>TNL Association Transport Layer Address | M | | CP Transport Layer Information 9.3.2.6 | Transport layer address of the NG-RAN node. | - | |
| >>TNL Association Transport Layer Address at AMF | O | | CP Transport Layer Information 9.3.2.6 | Transport layer address of the AMF. | - | |
| NB-IoT Default Paging DRX | O | | 9.3.1.137 | | YES | ignore |
| Extended RAN Node Name | O | | 9.3.1.193 | | YES | ignore |

| Range bound | Explanation |
|------------------------|---|
| maxnoofTACs | Maximum no. of TACs. Value is 256. |
| maxnoofBPLMNs | Maximum no. of Broadcast PLMNs. Value is 12. |
| maxnoofTNLAssociations | Maximum no. of TNL Associations between the NG-RAN node and the AMF. Value is 32. |

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 | | - | |
| >>GUAMI Type | O | | ENUMERATED (native, mapped, ...) | | YES | ignore |
| 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 or per SNPN. | - | |
| >>NPN Support | O | | 9.3.3.44 | If the <i>NID</i> IE is included, it identifies a SNPN together with the <i>PLMN Identity</i> IE. | YES | reject |
| >>Extended Slice Support List | O | | 9.3.1.191 | Additional Supported S-NSSAIs per PLMN | YES | reject |
| 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 | Transport Layer Address of the AMF. | - | |
| >>TNL Association Transport Layer Address NG-RAN | O | | CP Transport Layer Address 9.3.2.6 | Transport Layer Address of the NG-RAN node. | YES | reject |
| 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 | | - | |
| Extended AMF Name | O | | 9.3.3.51 | | 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. |
| maxnoofTNLAssociations | 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..<maxnoofTNLAssociations> | | | - | |
| >>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 |
|------------------------|---|
| maxnoofTNLAssociations | 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 |
| 5G-S-TMSI | O | | 9.3.3.20 | | 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 |
| EN-DC SON Configuration Transfer | O | | OCTET STRING | Contains the <i>EN-DC SON Configuration Transfer</i> IE as defined in TS 36.413 [16]. | YES | ignore |
| Inter-system SON Configuration Transfer | O | | 9.3.3.33 | | 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 |
| EN-DC SON Configuration Transfer | O | | OCTET STRING | Contains the <i>EN-DC SON Configuration Transfer</i> IE as defined in TS 36.413 [16]. | YES | ignore |
| Inter-system SON Configuration Transfer | O | | 9.3.3.33 | | 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 | | OCTET STRING (SIZE(50)) | This IE is not used in the specification. If received, the IE is ignored. | 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 | For File based Reporting. Defined in TS 32.422 [11]. This IE is ignored if the <i>Trace Collection Entity URI</i> IE is present | YES | ignore |
| Privacy Indicator | O | | ENUMERATED (Immediate MDT, Logged MDT, ...) | | YES | ignore |
| Trace Collection Entity URI | O | | URI 9.3.2.14 | For Streaming based Reporting. 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 |
| UE Radio Capability – E-UTRA Format | O | | 9.3.1.74a | | 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 |
| UE Radio Capability ID | O | | 9.3.1.142 | | YES | reject |

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 |

9.2.13.4 UE RADIO CAPABILITY ID MAPPING REQUEST

This message is sent by the NG-RAN node to request the AMF to provide mapping information for the indicated UE Radio Capability ID.

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 |
| UE Radio Capability ID | M | | 9.3.1.142 | | YES | reject |

9.2.13.5 UE RADIO CAPABILITY ID MAPPING RESPONSE

This message is sent by the AMF to provide UE Radio Capability information which is mapped to the UE Radio Capability ID indicated by the NG-RAN node in the UE RADIO CAPABILITY ID MAPPING REQUEST 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 |
| UE Radio Capability ID | M | | 9.3.1.142 | | YES | reject |
| UE Radio Capability | M | | 9.3.1.74 | | YES | ignore |
| Criticality Diagnostics | O | | 9.3.1.3 | | YES | ignore |

9.2.14 Data Usage Reporting Messages

9.2.14.1 SECONDARY RAT DATA USAGE REPORT

This message is sent by the NG-RAN node to report Secondary RAT data usage.

Direction: NG-RAN → AMF

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|--|----------|---------------------------|--|---|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| 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 Secondary RAT Usage List | | 1 | | | YES | ignore |
| >PDU Session Resource Secondary RAT Usage Item | | 1..<maxno ofPDU Sessions> | | | - | |
| >>PDU Session ID | M | | 9.3.1.50 | | - | |
| >>Secondary RAT Data Usage Report Transfer | M | | OCTET STRING | Containing the <i>Secondary RAT Data Usage Report Transfer</i> IE specified in subclause 9.3.4.23 | - | |
| Handover Flag | O | | ENUMERATED (handover_preparation, ...) | | YES | ignore |
| 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. |

9.2.15 RIM Information Transfer Messages

9.2.15.1 UPLINK RIM INFORMATION TRANSFER

This message is sent by the NG-RAN node to the AMF to transfer the RIM Information.

Direction: NG-RAN → AMF

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|--------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.3.1.1 | | YES | ignore |
| RIM Information Transfer | O | | 9.3.3.28 | | YES | ignore |

9.2.15.2 DOWNLINK RIM INFORMATION TRANSFER

This message is sent by the AMF to the NG-RAN node to transfer the RIM Information.

Direction: AMF → NG-RAN

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|--------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.3.1.1 | | YES | ignore |
| RIM Information Transfer | O | | 9.3.3.28 | | 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 | | | | |

| | | | |
|--|----------|--|--|
| <p>>>Radio Network Layer Cause</p> | <p>M</p> | <p>ENUMERATED (Unspecified, TXnRELOCOverall 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, TNGRELOCoverall expiry, TNGRELOCprep 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(s) 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, ..., N26 interface not available, Release due to pre-emption, Multiple Location Reporting Reference ID Instances, RSN not available for the UP, NPN access denied, CAG only access denied)</p> | |
|--|----------|--|--|

| | | | | |
|-------------------------|---|--|---|--|
| >Transport Layer | | | | |
| >>Transport Layer Cause | M | | ENUMERATED (Transport resource unavailable, Unspecified, ...) | |
| >NAS | | | | |
| >>NAS Cause | M | | ENUMERATED (Normal release, Authentication failure, Deregister, Unspecified, ...) | |
| >Protocol | | | | |
| >>Protocol Cause | M | | ENUMERATED (Transfer syntax error, Abstract syntax error (reject), Abstract syntax error (ignore and notify), Message not compatible with receiver state, Semantic error, Abstract syntax error (falsely constructed message), Unspecified, ...) | |
| >Miscellaneous | | | | |
| >>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/from 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(s) not supported | Slice(s) 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. |
| N26 interface not available | The action failed due to a temporary failure of the N26 interface. |
| Release due to pre-emption | Release is initiated due to pre-emption. |
| Multiple Location Reporting Reference ID Instances | The action failed because multiple areas of interest are set with the same Location Reporting Reference ID. |
| RSN not available for the UP | The redundant user plane resources indicated by RSN are not available. |
| NPN access denied | Access was denied for NPN reasons. |
| CAG only access denied | Access was denied because the cell is a non-CAG cell and UE is only allowed to access CAG cells. |

| 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' is not applicable. |
| >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 or by UE in sidelink within a period of time, divided by the duration of the period. It is used, for example, to indicate the maximum or guaranteed bit rate for a GBR 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 |
|---------------------------|----------|-------|-----------------------|-----------------------|
| CHOICE <i>NG-RAN node</i> | M | | | |
| > <i>gNB</i> | | | | |
| >>Global <i>gNB ID</i> | M | | 9.3.1.6 | |
| > <i>ng-eNB</i> | | | | |
| >>Global <i>ng-eNB ID</i> | M | | 9.3.1.8 | |
| > <i>N3IWF</i> | | | | |
| >>Global <i>N3IWF ID</i> | M | | 9.3.1.57 | |
| > <i>TNGF</i> | | | | |
| >>Global <i>TNGF ID</i> | M | | 9.3.1.161 | |
| > <i>TWIF</i> | | | | |
| >>Global <i>TWIF ID</i> | M | | 9.3.1.163 | |
| > <i>W-AGF</i> | | | | |
| >>Global <i>W-AGF ID</i> | M | | 9.3.1.162 | |

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> | | | | |
| >> <i>gNB ID</i> | M | | BIT STRING (SIZE(22..32)) | Equal to the leftmost bits of the <i>NR Cell Identity</i> IE contained in the <i>NR CGI</i> IE of each cell served by the 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 | Criticality | Assigned Criticality |
|-------------------------------------|----------|-------|---|--|-------------|----------------------|
| 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]. | - | |
| Alternative QoS Parameters Set List | O | | 9.3.1.151 | Indicates alternative sets of QoS parameters for the QoS flow. | YES | ignore |

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 | Criticality | Assigned Criticality |
|-----------------------------------|----------|-------|--------------------------------|---|-------------|----------------------|
| 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 and is ignored otherwise. | - | |
| 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 is 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 is ignored otherwise. | - | |
| QoS Monitoring Request | O | | ENUMERATED (UL, DL, Both, ...) | Indicates to measure UL, or DL, or both UL/DL delays for the associated QoS flow. | YES | ignore |

9.3.1.13 QoS Flow List with Cause

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 | | 1..<maxnoofQoSFlows> | | |
| >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 | Criticality | Assigned Criticality |
|------------------------------------|----------|-------|---|--|-------------|----------------------|
| 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, minimumWithout VendorSpecificExtension, mediumWithout VendorSpecificExtension, maximumWithout VendorSpecificExtension, ...) | Defined in TS 32.422 [11]. | - | |
| Trace Collection Entity IP Address | M | | Transport Layer Address 9.3.2.4 | For File based Reporting. Defined in TS 32.422 [11]. This IE is ignored if the <i>Trace Collection Entity URI</i> IE is present. | - | |
| MDT Configuration | O | | 9.3.1.167 | | YES | ignore |
| Trace Collection Entity URI | O | | URI 9.3.2.14 | For Streaming based Reporting. Defined in TS 32.422 [11]. | YES | ignore |

9.3.1.15 Core Network Assistance Information for RRC INACTIVE

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 | | 1 | | |
| >TAI List for RRC Inactive Item | | 1..<maxnoofTAIforInactive> | | |
| >>TAI | M | | 9.3.3.11 | |
| Expected UE Behaviour | O | | 9.3.1.93 | |
| Paging eDRX Information | O | | 9.3.1.154 | |

| Range bound | Explanation |
|----------------------|--|
| maxnoofTAforInactive | 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 | Criticality | Assigned Criticality |
|---|----------|-------|------------------------------------|--|-------------|----------------------|
| CHOICE <i>User Location Information</i> | M | | | | - | |
| > <i>E-UTRA user location information</i> | | | | | | |
| >>E-UTRA CGI | M | | 9.3.1.9 | | - | |
| >>TAI | M | | 9.3.3.11 | | - | |
| >>Age of Location | O | | Time Stamp 9.3.1.75 | Indicates the UTC time when the location information was generated. | - | |
| >>PSCell Information | O | | NG-RAN CGI 9.3.1.73 | | YES | ignore |
| > <i>NR user location information</i> | | | | | | |
| >>NR CGI | M | | 9.3.1.7 | | - | |
| >>TAI | M | | 9.3.3.11 | | - | |
| >>Age of Location | O | | Time Stamp 9.3.1.75 | Indicates the UTC time when the location information was generated. | - | |
| >>PSCell Information | O | | NG-RAN CGI 9.3.1.73 | | YES | ignore |
| >>NID | O | | 9.3.3.42 | | YES | reject |
| > <i>N3IWF user location information</i> | | | | | | |
| >>IP Address | M | | Transport Layer Address 9.3.2.4 | UE's local IP address used to reach the N3IWF | - | |
| >>Port Number | O | | OCTET STRING (SIZE(2)) | UDP or TCP source port number if NAT is detected. | - | |
| > <i>TNGF user location information</i> | | | | | YES | ignore |
| >>TNAP ID | M | | OCTET STRING | TNAP Identifier used to identify the TNAP. Details in TS 29.571 [35]. | - | |
| >>IP Address | M | | Transport Layer Address 9.3.2.4 | UE's local IP address used to reach the TNGF. | - | |
| >>Port Number | O | | OCTET STRING (SIZE(2)) | UDP or TCP source port number if NAT is detected. | - | |
| > <i>TWIF user location information</i> | | | | | YES | ignore |
| >>TWAP ID | M | | OCTET STRING | TWAP Identifier used to identify the TWAP. Details in TS 29.571 [35]. | - | |
| >>IP Address | M | | Transport Layer Address 9.3.2.4 | Non-5G-Capable over WLAN device's local IP address used to reach the TWIF. | - | |
| >>Port Number | O | | OCTET STRING (SIZE(2)) | UDP or TCP source port number if NAT is detected. | - | |

| | | | | | | |
|-----------------------------------|---|--|-----------|--|-----|--------|
| >W-AGF user location information | | | | Indicates the location information via wireline access as specified in TS 23.316 [34]. | YES | ignore |
| >>W-AGF user location information | M | | 9.3.1.164 | | - | |

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> | | |
| >S-NSSAI | 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 | Criticality | Assigned Criticality |
|---------------------------------|-------------|-------|--|---|-------------|----------------------|
| 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]. This IE is ignored if the <i>Extended Packet Delay Budget</i> IE is present. | - | |
| 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 is ignored otherwise. | - | |
| Extended Packet Delay Budget | O | | 9.3.1.135 | Packet Delay Budget is specified in TS 23.501 [9]. | YES | ignore |
| CN Packet Delay Budget Downlink | O | | Extended Packet Delay Budget 9.3.1.135 | Core Network Packet Delay Budget is specified in TS 23.501 [9]. This IE may be present in case of GBR QoS flows and is ignored otherwise. | YES | ignore |
| CN Packet Delay Budget Uplink | O | | Extended Packet Delay Budget 9.3.1.135 | Core Network Packet Delay Budget is specified in TS 23.501 [9]. This IE may be present in case of GBR QoS flows and is ignored otherwise. | YES | ignore |

| 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 (see TS 23.501 [9]). Usage: The QoS flow shall not pre-empt other QoS flows or, the QoS flow may pre-empt other QoS flows. Note: 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 (see TS 23.501 [9]). 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. Note: 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] or the <i>Source RNC to Target RNC Transparent Container</i> IE as defined in TS 25.413 [28]. |

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], or the <i>Target RNC to Source RNC Transparent Container</i> IE as defined in TS 25.413 [28]. |

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, ..., 5GStoUTRA) | Intra5GS: NG-RAN node to NG-RAN node 5GStoEPS: NG-RAN node to eNB EPSto5GS: eNB to NG-RAN node 5GStoUTRA: NG-RAN node to UTRA |

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 as defined in TS 23.003 [23].

| 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 | |
| > <i>Target RNC-ID</i> | | | | |
| >>LAI | M | | 9.3.3.30 | |
| >>RNC-ID | M | | 9.3.1.123 | This IE is ignored if the <i>Extended RNC-ID</i> IE is included in the <i>Target ID</i> IE. |
| >>Extended RNC-ID | O | | 9.3.1.124 | The <i>Extended RNC-ID</i> IE is used if the RNC identity has a value larger than 4095. |

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 | Criticality | Assigned Criticality |
|--|--|-------|--|--|-------------|----------------------|
| 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 Uplink | C- if Integrity Protection Required or Preferred | | Maximum Integrity Protected Data Rate 9.3.1.103 | Indicates the maximum aggregate rate for integrity protected DRBs supported by the UE in UL. If the <i>Maximum Integrity Protected Data Rate Downlink</i> IE is absent, this IE applies to both UL and DL. | - | |
| Maximum Integrity Protected Data Rate Downlink | O | | Maximum Integrity Protected Data Rate 9.3.1.103 | Indicates the maximum aggregate rate for integrity protected DRBs supported by the UE in the DL. | YES | ignore |

| Condition | Explanation |
|---|---|
| if Integrity Protection Required or Preferred | This IE shall be present if the <i>Integrity Protection Indication</i> IE within the <i>Security Indication</i> IE is 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 | Criticality | Assigned Criticality |
|---------------------------------|----------|-------|---|---|-------------|----------------------|
| 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 | 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. | - | |
| CN Packet Delay Budget Downlink | O | | Extended Packet Delay Budget 9.3.1.135 | Core Network Packet Delay Budget is specified in TS 23.501 [9]. This IE may be present in case of GBR QoS flows and is ignored otherwise. | YES | ignore |
| CN Packet Delay Budget Uplink | O | | Extended Packet Delay Budget 9.3.1.135 | Core Network Packet Delay Budget is specified in TS 23.501 [9]. This IE may be present in case of GBR QoS flows and is ignored otherwise. | YES | ignore |

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 | Criticality | Assigned Criticality |
|--|----------|---------------------------|------------------------|---|-------------|----------------------|
| 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 | | 0..1 | | For intra-system handovers in NG-RAN. | - | |
| >PDU Session Resource Information Item | | 1..<maxno ofPDU Sessions> | | | - | |
| >>PDU Session ID | M | | 9.3.1.50 | | - | |
| >>QoS Flow Information List | | 1 | | | - | |
| >>>QoS Flow Information Item | | 1..<maxno ofQoSFlows> | | | - | |
| >>>>QoS Flow Identifier | M | | 9.3.1.51 | | - | |
| >>>>DL Forwarding | O | | 9.3.1.33 | | - | |
| >>>>UL Forwarding | O | | 9.3.1.118 | | YES | reject |
| >>DRBs to QoS Flows Mapping List | O | | 9.3.1.34 | | - | |
| E-RAB Information List | | 0..1 | | For inter-system handovers to 5G. | - | |
| >E-RAB Information Item | | 1..<maxno ofE-RABs> | | | - | |
| >>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 | | - | |
| SgNB UE X2AP ID | O | | 9.3.1.127 | Allocated at the Source en-gNB | - | |
| UE History Information from UE | O | | 9.3.1.166 | | YES | ignore |

| Range bound | Explanation |
|---------------------|---|
| maxnoofPDU Sessions | Maximum no. of PDU sessions allowed towards one UE. Value is 256. |
| maxnoofQoSFlows | 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 | Criticality | Assigned Criticality |
|---------------------------------|----------|-------------------|-----------------------|---|-------------|----------------------|
| 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. | - | |
| DAPS Response Information List | | 0..1 | | | YES | reject |
| >DAPS Response Information Item | | 1..<maxno ofDRBs> | | | - | |
| >>DRB ID | M | | 9.3.1.53 | | - | |
| >>DAPS Response Information | M | | 9.3.1.189 | Indicates the response to a requested DAPS Handover | - | |

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

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 | Criticality | Assigned Criticality |
|---------------------------------------|----------|--------------------------------|-----------------------|---|-------------|----------------------|
| DRBs to QoS Flows Mapping Item | | <i>1..<maxno ofDRBs></i> | | | - | |
| >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 | - | |
| >DAPS Request Information | O | | 9.3.1.188 | | YES | ignore |

| 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. |

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 Void

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> | | | | |
| >> <i>N3IWF ID</i> | 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 | Criticality | Assigned Criticality |
|---|--|-------------------------------|---|-----------------------|-------------|----------------------|
| 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 | | <i>0..1</i> | | | - | |
| >Area of Interest Item | | <i>1..<maxno ofAol></i> | | | - | |
| >>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- ifEventTy peisStop UEPresin Aol | | Location Reporting Reference ID 9.3.1.76 | | - | |
| Additional Location Information | O | | ENUMERATED (Include PSCell, ...) | | YES | ignore |

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

| Condition | Explanation |
|-------------------------------|--|
| ifEventTypesisStopUEPresinAol | 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 | | 9.3.1.73 | |
| 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]. |
| UE Radio Capability for Paging of NB-IoT | O | | OCTET STRING | Includes the RRC <i>UERadioPagingInformation-NB</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 | Criticality | Assigned Criticality |
|--|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Assistance Data for Recommended Cells | O | | 9.3.1.70 | | - | |
| Paging Attempt Information | O | | 9.3.1.72 | | - | |
| NPN Paging Assistance Information | O | | 9.3.1.183 | | YES | ignore |
| Paging Assistance Data for CE Capable UE | O | | 9.3.1.141 | | YES | ignore |

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, ...) | Paging attempt count (see 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 <i>NG-RAN CGI</i> | M | | | |
| > <i>NR</i> | | | | |
| >> <i>NR CGI</i> | M | | 9.3.1.7 | |
| > <i>E-UTRA</i> | | | | |
| >> <i>E-UTRA CGI</i> | 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 either the RRC <i>UERadioAccessCapabilityInformation</i> message as defined in TS 38.331 [18], or the <i>UERadioAccessCapabilityInformation-NB</i> message as defined in 10.6.2 of TS 36.331 [21]. |

9.3.1.74a UE Radio Capability – E-UTRA Format

This IE contains UE Radio Capability information encoded as specified in TS 36.331 [21] in order to support Mode of operation A as specified in TS 23.501 [9].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------------------|----------|-------|-----------------------|--|
| UE Radio Capability – E-UTRA Format | M | | OCTET STRING | Includes the RRC <i>UERadioAccessCapabilityInformation</i> message as defined in TS 36.331 [21]. |

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]. |

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, and applies to GBR QoS flows only.

| 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, and applies to delay critical GBR QoS flows only.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------|----------|-------|--|-----------------------|
| Maximum Data Burst Volume | M | | INTEGER (0..4095, ..., 4096.. 2000000) | 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 NG-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. 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 | Criticality | Assigned Criticality |
|---------------------------------------|----------|-----------------------------|---|--|-------------|----------------------|
| Serving PLMN | M | | PLMN Identity 9.3.3.5 | | - | |
| Equivalent PLMNs | | 0..<maxno ofEPLMNs > | | 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..<maxno ofEPLMNs PlusOne> | | 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), nR- unlicensed (2)} (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. Bits 3-7 reserved for future use. | - | |
| >Extended RAT Restriction Information | O | | 9.3.1.126 | If this IE is included, the <i>RAT Restriction Information</i> IE is ignored. | YES | ignore |
| Forbidden Area Information | | 0..<maxno ofEPLMNs PlusOne> | | This IE contains Forbidden Area information as specified in TS 23.501 [9]. | - | |
| >PLMN Identity | M | | 9.3.3.5 | | - | |
| > Forbidden TACs | | 1..<maxno ofForbTACs> | | | - | |
| >>TAC | M | | 9.3.3.10 | The TAC of the forbidden TAI. | - | |
| Service Area Information | | 0..<maxno ofEPLMNs PlusOne> | | This IE contains Service Area Restriction information as specified in TS 23.501 [9]. | - | |
| >PLMN Identity | M | | 9.3.3.5 | | - | |
| > Allowed TACs | | 0..<maxno ofAllowed Areas> | | | - | |

| | | | | | | |
|--|---|-----------------------------|--|---|-----|--------|
| >>TAC | M | | 9.3.3.10 | The TAC of the allowed TAI. | - | |
| >Not Allowed TACs | | 0..<maxno of Allowed Areas> | | | - | |
| >>TAC | M | | 9.3.3.10 | The TAC of the not-allowed TAI. | - | |
| Last E-UTRAN PLMN Identity | O | | PLMN Identity 9.3.3.5 | Indicates the E-UTRAN PLMN ID from where the UE formerly handed over to 5GS and which is preferred in case of subsequent mobility to EPS. | YES | ignore |
| Core Network Type Restriction for Serving PLMN | O | | ENUMERATED (EPCForbidden, ...) | Indicates whether the UE is restricted to connect to EPC for the Serving PLMN as specified in TS 23.501 [9]. | YES | ignore |
| Core Network Type Restriction for Equivalent PLMNs | | 0..<maxno of EPLMNs > | | | YES | ignore |
| >PLMN Identity | M | | 9.3.3.5 | Includes any of the Equivalent PLMNs listed in the <i>Mobility Restriction List</i> IE for which CN Type restriction applies as specified in TS 23.501 [9]. | - | |
| >Core Network Type Restriction | M | | ENUMERATED (EPCForbidden, 5GCForbidden, ...) | Indicates whether the UE is restricted to connect to EPC or to 5GC for this PLMN. | | |
| NPN Mobility Information | O | | 9.3.1.184 | | YES | reject |

| 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, ...) | Indicates the current RRC state of the UE. |

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 e.g. determining the optimum RRC connection time or helping 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 | | $1..<maxnoofCellsinUEHistoryInfo>$ | | 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 | Criticality | Assigned Criticality |
|-----------------------------------|----------|-------------------------------------|---|---|-------------|----------------------|
| Associated QoS Flow Item | | <i>1..<maxno of QoSFlows></i> | | | - | |
| >QoS Flow Identifier | M | | 9.3.1.51 | | - | |
| >QoS Flow Mapping Indication | O | | ENUMERATED (ul, dl, ...) | | - | |
| >Current QoS Parameters Set Index | O | | Alternative QoS Parameters Set Index 9.3.1.152 | Index to the currently fulfilled alternative QoS parameters set | YES | ignore |

| 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 for either UL or DL. |

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 | | 1..<maxnoofSlicItems> | | |
| >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 | Criticality | Assigned Criticality |
|---|----------|----------------------|--|---|-------------|----------------------|
| DRBs Subject to Status Transfer List | | 1 | | | - | |
| >DRBs Subject to Status Transfer Item | | 1..<maximum of DRBs> | | | - | |
| >>DRB ID | M | | 9.3.1.53 | | - | |
| >>CHOICE UL DRB Status | 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 ($N + \text{First Missing SDU Number}$) modulo ($1 + \text{the maximum value of the PDCP-SN}$). 0: PDCP SDU has not been received. 1: PDCP SDU has been received correctly. | - | |
| >>>>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 ($N + \text{First Missing SDU Number}$) modulo ($1 + \text{the maximum value of the PDCP-SN}$). 0: PDCP SDU has not been received. 1: PDCP SDU has been received correctly. | - | |
| >>CHOICE DL DRB Status | 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. | - | |
| >>Old Associated QoS Flow List - UL End Marker Expected | O | | Associated QoS Flow List 9.3.1.99 | Indicates that the source NG-RAN node has initiated QoS flow re-mapping and has not yet received SDAP end markers, as described in TS 38.300 [8]. | YES | reject |

| 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], or the reason for RRC Connection Resume as received from the UE in the *ResumeCause* defined in TS 38.331 [18] and TS 36.331 [21], or the reason for RRC Connection Establishment as received from the UE in the *EstablishmentCause-NB* defined in 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, ..., notAvailable, mo-ExceptionData) | The <i>notAvailable</i> value is used in case the UE is re-establishing an RRC connection but there is fallback to RRC connection establishment as described in [18], or the <i>ResumeCause</i> received from the UE does not map to any other value of the <i>RRC Establishment Cause</i> IE. |

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, ...) | |

9.3.1.114 Secondary RAT Usage Information

This IE provides information on the secondary resources used with MR-DC.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------------------|----------|----------------------|---|-----------------------|
| PDU Session Usage Report | | 0..1 | | |
| >RAT Type | M | | ENUMERATED (nR, e-UTRA, ..., nR-unlicensed, eUTRA-unlicensed) | |
| >PDU Session Timed Report List | M | | Volume Timed Report List 9.3.1.115 | |
| QoS Flows Usage Report List | | 0..1 | | |
| >QoS Flow Usage Report Item | | 1..<maxnoofQoSFlows> | | |
| >>QoS Flow Indicator | M | | 9.3.1.51 | |
| >>RAT Type | M | | ENUMERATED (nR, e-UTRA, ..., nR-unlicensed, eUTRA-unlicensed) | |
| >>QoS Flows Timed Report List | M | | Volume Timed Report List 9.3.1.115 | |

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

9.3.1.115 Volume Timed Report List

This IE provides information on the data usage.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------------|----------|-------------------------|---------------------------------|--|
| Volume Timed Report Item | | 1..<maxnoofTimePeriods> | | |
| >Start Timestamp | M | | OCTET STRING (SIZE(4)) | UTC time encoded in the same format as the first four octets of the 64-bit timestamp format as defined in section 6 of IETF RFC 5905 [14]. It indicates the start time of the collecting period of the included Usage Count UL IE and Usage Count DL IE. |
| >End Timestamp | M | | OCTET STRING (SIZE(4)) | UTC time encoded in the same format as the first four octets of the 64-bit timestamp format as defined in section 6 of IETF RFC 5905 [14]. It indicates the end time of the collecting period of the included Usage Count UL IE and Usage Count DL IE. |
| >Usage Count UL | M | | INTEGER (0..2 ⁶⁴ -1) | The unit is: octets. |
| >Usage Count DL | M | | INTEGER (0..2 ⁶⁴ -1) | The unit is: octets. |

| Range bound | Explanation |
|--------------------|--|
| maxnoofTimePeriods | Maximum no. of time reporting periods. Value is 2. |

9.3.1.116 Redirection for Voice EPS Fallback

This IE is used to indicate that the AMF and the UE support the redirection for voice for EPS Fallback.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------------------------|----------|-------|---|-----------------------|
| Redirection for Voice EPS Fallback | M | | ENUMERATED (possible, not-possible, ...) | |

9.3.1.117 UE Retention Information

This IE allows the NG-RAN node and the AMF to indicate whether prior UE related contexts and related UE-associated logical NG-connections and RRC connections are intended to be retained.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------|----------|-------|-----------------------------------|-----------------------|
| UE Retention Information | M | | ENUMERATED (ues-retained, ...) | |

9.3.1.118 UL Forwarding

This IE indicates that the QoS flow is proposed for forwarding of uplink packets.

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

9.3.1.119 CN Assisted RAN Parameters Tuning

This IE provides information for assisting in parameters tuning of the NG-RAN node.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------|----------|-------|-----------------------|---|
| Expected UE Behaviour | O | | 9.3.1.93 | This IE may be present in case the <i>Core Network Assistance Information for RRC INACTIVE</i> IE is not included and is ignored otherwise. |

9.3.1.120 Common Network Instance

This IE provides the common network instance to be used by the NG-RAN node when selecting a particular transport network resource as described in TS 23.501 [9] in a format common with 5GC.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------|----------|-------|-----------------------|-----------------------|
| Common Network Instance | M | | OCTET STRING | |

9.3.1.121 Data Forwarding Response E-RAB List

This IE is used at inter-system HO to provide DL data forwarding address information, if direct data forwarding is applied.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|--------------------------------|---|-----------------------|
| Data Forwarding Response E-RAB List | | <i>1..<maxnoofERABs></i> | | |
| >E-RAB ID | M | | 9.3.2.3 | |
| >DL Forwarding UP TNL Information | M | | UP Transport Layer Information 9.3.2.2 | |

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

9.3.1.122 gNB Set ID

The gNB Set ID IE is used to identify a group of gNBs which transmit the same RIM-RS.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|--------------------------|-----------------------|
| gNB Set ID | M | | BIT STRING (SIZE(22)) | |

9.3.1.123 RNC-ID

The RNC-ID is used to identify an RNC.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------|-----------------------|
| RNC-ID | M | | INTEGER (0..4095) | |

9.3.1.124 Extended RNC-ID

This IE is used to identify an RNC.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------|----------|-------|--------------------------|---|
| Extended RNC-ID | M | | INTEGER (4096..65535) | This IE is used if the RNC identity has a value larger than 4095. |

9.3.1.125 RAT Information

This IE provides RAT related information associated with a TAC, used as described in TS 23.501 [9].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------|----------|-------|---|-----------------------|
| RAT Information | M | | ENUMERATED (unlicensed, NB-IoT, ...) | |

9.3.1.126 Extended RAT Restriction Information

This IE provides RAT restrictions as specified in TS 23.501 [9].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------|----------|-------|---|---|
| Primary RAT Restriction | M | | BIT STRING { e-UTRA (0), nR (1), nR-unlicensed (2)} (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. Bits 3-7 reserved for future use. The Primary RAT is the RAT used in the access cell, or target cell. |
| Secondary RAT Restriction | M | | BIT STRING { e-UTRA (0), nR (1), e-UTRA-unlicensed (2), nR-unlicensed (3)} (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. Bits 4-7 reserved for future use. A Secondary RAT is a RAT used in any cell serving the UE excluding the PCell. |

9.3.1.127 SgNB UE X2AP ID

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

The usage of this IE is defined in TS 37.340 [32].

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

9.3.1.128 SRVCC Operation Possible

This IE indicates that both UE and AMF are SRVCC-capable. NG-RAN behaviour on receipt of this IE is specified in TS 23.216 [31].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------|----------|-------|--|---|
| SRVCC Operation Possible | M | | ENUMERATED (Possible, not Possible, ...) | The value "Possible" indicates that UE and AMF are SRVCC capable. |

9.3.1.129 IAB Authorized

This IE provides information about the authorization status of the IAB node.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------|----------|-------|--|--|
| IAB Authorized | M | | ENUMERATED (authorized, not authorized, ...) | Indicates the IAB node authorization status. |

9.3.1.130 TSC Traffic Characteristics

This IE provides the traffic characteristics of TSC QoS flows.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------------------|----------|-------|---|-----------------------|
| TSC Assistance Information Downlink | O | | TSC Assistance Information 9.3.1.131 | |
| TSC Assistance Information Uplink | O | | TSC Assistance Information 9.3.1.131 | |

9.3.1.131 TSC Assistance Information

This IE provides the TSC assistance information for a TSC QoS flow in the uplink or downlink (see TS 23.501 [9]).

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------|----------|-------|-----------------------|-----------------------|
| Periodicity | M | | 9.3.1.132 | |
| Burst Arrival Time | O | | 9.3.1.133 | |

9.3.1.132 Periodicity

This IE indicates the Periodicity of the TSC QoS flow as defined in TS 23.501 [9].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------------|---|
| Periodicity | M | | INTEGER (0..640000, ...) | Periodicity expressed in units of 1 us. |

9.3.1.133 Burst Arrival Time

This IE indicates the Burst Arrival Time of the TSC QoS flow as defined in TS 23.501 [9].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------|----------|-------|-----------------------|---|
| Burst Arrival Time | M | | OCTET STRING | Encoded in the same format as the <i>ReferenceTime</i> IE as defined in TS 38.331 [18]. The value is truncated to 1 us granularity. |

9.3.1.134 Redundant QoS Flow Indicator

This IE provides the redundant QoS flow indicator for a QoS flow as specified in TS 23.051 [9].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------------------|----------|-------|-----------------------------|--|
| Redundant QoS Flow Indicator | M | | ENUMERATED (true, false) | This IE indicates whether this QoS flow is requested for the redundant transmission. Value "true" indicates that redundant transmission is requested for this QoS flow. Value "false" indicates that redundant transmission is requested to be stopped if started. |

9.3.1.135 Extended 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 |
|------------------------------|----------|-------|----------------------------|---|
| Extended Packet Delay Budget | M | | INTEGER (0..65535, ...) | Upper bound value for the delay that a packet may experience expressed in unit of 0.01ms. |

9.3.1.136 Redundant PDU Session Information

This IE defines Redundancy information to be applied to a PDU session.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------------|-----------------------|
| RSN | M | | ENUMERATED (v1, v2, ...) | |

9.3.1.137 NB-IoT Default Paging DRX

This IE indicates the NB-IoT Default Paging DRX as defined in TS 36.304 [29].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------|----------|-------|--|-------------------------------|
| NB-IoT Default Paging DRX | M | | ENUMERATED (128, 256, 512, 1024, ...) | Unit: [number of radioframes] |

9.3.1.138 NB-IoT Paging eDRX Information

This IE indicates the NB-IoT Paging eDRX parameters as defined in TS 36.304 [29].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------|----------|-------|--|---|
| NB-IoT Paging eDRX Cycle | M | | ENUMERATED (hf2, hf4, hf6, hf8, hf10, hf12, hf14, hf16, hf32, hf64, hf128, hf256, hf512, hf1024, ...) | T_{eDRX} defined in TS 36.304 [29]. Unit: [number of hyperframes]. |
| NB-IoT Paging Time Window | O | | ENUMERATED (s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, ...) | Unit: [2.56 seconds] |

9.3.1.139 NB-IoT Paging DRX

This IE indicates the NB-IoT UE specific Paging DRX as defined in TS 36.304 [29].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------|----------|-------|---|-------------------------------|
| NB-IoT Paging DRX | M | | ENUMERATED (32, 64, 128, 256, 512, 1024, ...) | Unit: [number of radioframes] |

9.3.1.140 Enhanced Coverage Restriction

This IE provides information on the restriction information of using Coverage Enhancement.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------------|----------|-------|------------------------------|--|
| Enhanced Coverage Restriction | O | | ENUMERATED (restricted, ...) | Indicates whether the UE is restricted to use coverage enhancement. Value "restricted" indicates that the UE is not allowed to use coverage enhancement. |

9.3.1.141 Paging Assistance Data for CE Capable UE

This IE provides Assistance Data for paging CE capable UE.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------------|----------|-------|-----------------------|---|
| Global Cell ID | M | | E-UTRA CGI 9.3.1.9 | |
| Coverage Enhancement Level | M | | OCTET STRING | Includes either the <i>UEPagingCoverageInformation</i> message as defined in 10.2.2 of TS 36.331 [21], or the <i>UEPagingCoverageInformation-NB</i> message as defined in 10.6.2 of TS 36.331 [21]. |

9.3.1.142 UE Radio Capability ID

This IE contains the UE Radio Capability ID.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------------|----------|-------|-----------------------|-------------------------|
| UE Radio Capability ID | M | | OCTET STRING | Defined in 23.003 [23]. |

9.3.1.143 WUS Assistance Information

This IE provides WUS Assistance Information to be used by the NG-RAN node for determining the WUS group for the UE.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------------|----------|-------|--|-----------------------|
| Paging Probability Information | M | | ENUMERATED (p00, p05, p10, p15, p20, p25, p30, p35, p40, p45, p50, p55, p60, p65, p70, p75, p80, p85, p90, p95, p100, ...) | Unit: percentage |

9.3.1.144 UE Differentiation Information

This IE is generated by the AMF based on the UE subscription information, it provides the Expected UE Behavior Information.

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

9.3.1.145 NB-IoT UE Priority

This IE provides the NB-IoT UE Priority and to be used by the NG-RAN to prioritise between UEs accessing via NB-IoT.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------|----------|-------|-----------------------|--|
| NB-IoT UE Priority | M | | INTEGER (0..255, ...) | Lower value indicates higher priority. |

9.3.1.146 NR V2X Services Authorized

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

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

9.3.1.147 LTE V2X Services Authorized

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

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

9.3.1.148 NR UE Sidelink Aggregate Maximum Bit Rate

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

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|-------|-----------------------|---|
| NR UE Sidelink Aggregate Maximum Bit Rate | M | | Bit Rate 9.3.1.4 | Value 0 is not valid, and considered as a logical error by the receiving NG-RAN node. |

9.3.1.149 LTE UE Sidelink Aggregate Maximum Bit Rate

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

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|-------|-----------------------|---|
| LTE UE Sidelink Aggregate Maximum Bit Rate | M | | Bit Rate 9.3.1.4 | Value 0 is not valid, and considered as a logical error by the receiving NG-RAN node. |

9.3.1.150 PC5 QoS Parameters

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

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------------------|----------|-------------------------|--|---|
| PC5 QoS Flow List | | 1 | | |
| >PC5 QoS Flow Item | | 1..<maxnoofPC5QoSFlows> | | |
| >>PQI | M | | INTEGER (0..255, ...) | PQI is a special 5QI as specified in TS 23.501 [9]. |
| >>PC5 Flow Bit Rates | | 0..1 | | Only applies for GBR QoS Flows. |
| >>>Guaranteed Flow Bit Rate | M | | Bit Rate 9.3.1.4 | Guaranteed Bit Rate for the PC5 QoS flow. Details in TS 23.501 [9]. |
| >>>Maximum Flow Bit Rate | M | | Bit Rate 9.3.1.4 | Maximum Bit Rate for the PC5 QoS flow. Details in TS 23.501 [9]. |
| >>Range | O | | ENUMERATED (m50, m80, m180, m200, m350, m400, m500, m700, m1000, ...) | Only applies for groupcast. |
| PC5 Link Aggregate Bit Rates | O | | Bit Rate 9.3.1.4 | Only applies for non-GBR QoS Flows. |

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

9.3.1.151 Alternative QoS Parameters Set List

This IE contains alternative sets of QoS parameters which the NG-RAN node can indicate to be fulfilled when notification control is enabled and it cannot fulfil the requested list of QoS parameters.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|-------------------------|-----------------------|-----------------------|
| Alternative QoS Parameters Set Item | | 1..<maxnoofQoSParaSets> | | |
| >Alternative QoS Parameters Set Index | M | | 9.3.1.152 | |
| >Guaranteed Flow Bit Rate Downlink | O | | Bit Rate 9.3.1.4 | |
| >Guaranteed Flow Bit Rate Uplink | O | | Bit Rate 9.3.1.4 | |
| >Packet Delay Budget | O | | 9.3.1.80 | |
| >Packet Error Rate | O | | 9.3.1.81 | |

| Range bound | Explanation |
|--------------------|--|
| maxnoofQoSParaSets | Maximum no. of alternative sets of QoS Parameters allowed for the QoS profile. Value is 8. |

9.3.1.152 Alternative QoS Parameters Set Index

This IE indicates the QoS parameters set which can currently be fulfilled.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------------------|----------|-------|-----------------------|---|
| Alternative QoS Parameters Set Index | M | | INTEGER (1..8, ...) | Indicates the index of the item within the the <i>Alternative QoS Parameters Set List</i> IE corresponding to the currently fulfilled alternative QoS parameters set. |

9.3.1.153 Alternative QoS Parameters Set Notify Index

This IE indicates the QoS parameters set which can currently be fulfilled.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|-------|-----------------------|---|
| Alternative QoS Parameters Set Notify Index | M | | INTEGER (0..8, ...) | Indicates the index of the item within the the <i>Alternative QoS Parameters Set List</i> IE corresponding to the currently fulfilled alternative QoS parameters set. Value 0 indicates that NG-RAN cannot even fulfil the lowest alternative parameters set. |

9.3.1.154 Paging eDRX Information

This IE indicates the Paging eDRX parameters as defined in TS 36.304 [29].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------|----------|-------|---|---|
| Paging eDRX Cycle | M | | ENUMERATED (hfhalf, hf1, hf2, hf4, hf6, hf8, hf10, hf12, hf14, hf16, hf32, hf64, hf128, hf256, ...) | TeDRX defined in TS 36.304 [29]. Unit: [number of hyperframes]. |
| Paging Time Window | O | | ENUMERATED (s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, ...) | Unit: [1.28 second]. |

9.3.1.155 CE-mode-B Restricted

This IE provides information on the restriction information of using Coverage Enhancement Mode B.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------|----------|-------|--|---|
| CE-mode-B Restricted | M | | ENUMERATED (restricted, not-restricted, ...) | Indicates whether the UE is restricted to use coverage enhancement. Value "restricted" indicates that the UE is not allowed to use coverage enhancement mode B. Value "not-restricted" indicates that the UE is allowed to use coverage enhancement mode B. |

9.3.1.156 CE-mode-B Support Indicator

This IE indicates whether CE-mode-B as specified in TS 36.306[42] is supported for the UE.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------------|----------|-------|-----------------------------|-----------------------|
| CE-mode-B Support Indicator | M | | ENUMERATED (supported, ...) | |

9.3.1.157 LTE-M Indication

This IE is provided by the NG-RAN node to inform that the UE indicates category M1 or M2 in its UE Radio Capability.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------|----------|-------|-------------------------|-----------------------|
| LTE-M Indication | M | | ENUMERATED (LTE-M, ...) | |

9.3.1.158 Suspend Request Indication

This IE indicates that the NG-RAN node requests immediate transition to RRC idle with suspend, as specified in TS 23.502 [10].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------------|----------|-------|-------------------------------------|-----------------------|
| Suspend Request Indication | M | | ENUMERATED (suspend-requested, ...) | |

9.3.1.159 Suspend Response Indication

This IE is used by the AMF to inform the NG-RAN node to suspend the UE and send it to RRC_IDLE, as specified in TS 23.502 [10].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------------|----------|-------|-------------------------------------|-----------------------|
| Suspend Response Indication | M | | ENUMERATED (suspend-indicated, ...) | |

9.3.1.160 UE User Plane CIoT Support Indicator

This IE indicates whether User Plane CIoT 5GS Optimisation as specified in TS 23.501 [9] is supported for the UE.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------------------|----------|-------|-----------------------------|-----------------------|
| UE User Plane CloT Support Indicator | M | | ENUMERATED (supported, ...) | |

9.3.1.161 Global TNGF ID

This IE is used to globally identify a TNGF.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------|----------|-------|----------------------------|-----------------------|
| PLMN Identity | M | | 9.3.3.5 | |
| CHOICE <i>TNGF ID</i> | M | | | |
| > <i>TNGF ID</i> | | | | |
| >>TNGF ID | M | | BIT STRING (SIZE(32, ...)) | |

9.3.1.162 Global W-AGF ID

This IE is used to globally identify a W-AGF.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------------|----------|-------|----------------------------|-----------------------|
| PLMN Identity | M | | 9.3.3.5 | |
| CHOICE <i>W-AGF ID</i> | M | | | |
| > <i>W-AGF ID</i> | | | | |
| >>W-AGF ID | M | | BIT STRING (SIZE(16, ...)) | |

9.3.1.163 Global TWIF ID

This IE is used to globally identify a TWIF.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------|----------|-------|----------------------------|-----------------------|
| PLMN Identity | M | | 9.3.3.5 | |
| CHOICE <i>TWIF ID</i> | M | | | |
| > <i>TWIF ID</i> | | | | |
| >>TWIF ID | M | | BIT STRING (SIZE(32, ...)) | |

9.3.1.164 W-AGF User Location Information

This IE indicates the location information via wireline access as specified in TS 23.316 [34].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|-------|----------------------------|--|
| CHOICE <i>W-AGF User Location Information</i> | M | | | |
| > <i>Global Line ID</i> | | | | |
| >>Global Line ID | M | | OCTET STRING | Encoded as defined in TS 23.003 [23]. |
| >>Line Type | O | | ENUMERATED (DSL, PON, ...) | |
| > <i>HFC Node ID</i> | | | | |
| >>HFC Node ID | M | | OCTET STRING | Indicates the identifier of the HFC node as specified in [37]. Encoded as defined in TS 23.003 [23]. |

9.3.1.165 Global eNB ID

This IE is used to globally identify an eNB (see TS 36.401 [38]).

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------------|----------|-------|-----------------------|--|
| PLMN Identity | M | | 9.2.3.8 | |
| CHOICE <i>eNB ID</i> | M | | | |
| > <i>Macro eNB ID</i> | | | | |
| >>Macro eNB ID | M | | BIT STRING (SIZE(20)) | Equal to the 20 leftmost bits of the <i>Cell Identity</i> IE contained in the <i>E-UTRAN CGI</i> IE (see TS 36.423 [40] subclause 9.3.1.9) of each cell served by the eNB. |
| > <i>Home eNB ID</i> | | | | |
| >>Home eNB ID | M | | BIT STRING (SIZE(28)) | Equal to the <i>Cell Identity</i> IE contained in the <i>E-UTRAN CGI</i> IE (see TS 36.423 [40] subclause 9.3.1.9) of the cell served by the eNB. |
| > <i>Short Macro eNB ID</i> | | | | |
| >>Short Macro eNB ID | M | | BIT STRING (SIZE(18)) | Equal to the 18 leftmost bits of the <i>Cell Identity</i> IE (see TS 36.423 [40] subclause 9.3.1.9) of each cell served by the eNB. |
| > <i>Long Macro eNB ID</i> | | | | |
| >>Long Macro eNB ID | M | | BIT STRING (SIZE(21)) | Equal to the 21 leftmost bits of the <i>Cell Identity</i> IE (see TS 36.423 [40] subclause 9.3.1.9) of each cell served by the eNB. |

9.3.1.166 UE History Information from UE

This IE contains information about mobility history report for a UE.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|-------|-----------------------|---|
| CHOICE <i>UE History Information from UE</i> | M | | | |
| > <i>NR</i> | | | | |
| >>NR Mobility History Report | M | | OCTET STRING | VisitedCellInfoList contained in the <i>UEInformationResponse</i> message (TS 38.331 [18]). |

9.3.1.167 MDT Configuration

This IE defines the MDT configuration parameters.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------|----------|-------|-----------------------|-----------------------|
| MDT Configuration-NR | O | | 9.3.1.169 | |
| MDT Configuration-EUTRA | O | | 9.3.1.170 | |

9.3.1.168 MDT PLMN List

The purpose of the *MDT PLMN List* IE is to provide the list of PLMN allowed for MDT.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------|----------|--------------------------|-----------------------|-----------------------|
| MDT PLMN List | | 1..<maxnoofM DTPLMNs> | | |
| >PLMN Identity | M | | 9.3.3.5 | |

| Range bound | Explanation |
|-----------------|---|
| maxnoofMDTPLMNs | Maximum no. of PLMNs in the MDT PLMN list. Value is 16. |

9.3.1.169 MDT Configuration-NR

This IE defines the MDT configuration parameters of NR.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------------------|----------|--------------------------|--|---|
| MDT Activation | M | | ENUMERATED (Immediate MDT only, Logged MDT only, Immediate MDT and Trace, ...) | |
| CHOICE <i>Area Scope of MDT</i> | M | | | |
| > <i>Cell based</i> | | | | |
| >> Cell ID List for MDT | | 1..<maxnoofCellIDforMDT> | | |
| >>>NR CGI | M | | 9.3.1.7 | |
| > <i>TA based</i> | | | | |
| >> TA List for MDT | | 1..<maxnoofTAforMDT> | | |
| >>>TAC | M | | 9.3.3.10 | The TAI is derived using the current serving PLMN. |
| > <i>PLMN wide</i> | | | NULL | |
| > <i>TAI based</i> | | | | |
| >> TAI List for MDT | | 1..<maxnoofTAforMDT> | | |
| >>>TAI | M | | | |
| CHOICE <i>MDT Mode</i> | M | | | |
| > <i>Immediate MDT</i> | | | | |
| >>Measurements to Activate | M | | BITSTRING (SIZE(8)) | Each position in the bitmap indicates a MDT measurement, as defined in TS 37.320 [41]. First Bit = M1, Second Bit= M2, Third Bit = M4, Fourth Bit = M5, Fifth Bit = M6, Sixth Bit = M7, Seventh Bit = logging of M1 from event triggered measurement reports according to existing RRM configuration, other bits reserved for future use. Value "1" indicates "activate" and value "0" indicates "do not activate". |
| >>M1 Configuration | C-ifM1 | | 9.3.1.171 | |
| >>M4 Configuration | C-ifM4 | | 9.3.1.172 | |
| >>M5 Configuration | C-ifM5 | | 9.3.1.173 | |
| >>M6 Configuration | C-ifM6 | | 9.3.1.174 | |
| >>M7 Configuration | C-ifM7 | | 9.3.1.175 | |
| >>Bluetooth Measurement Configuration | O | | 9.3.1.177 | |
| >>WLAN Measurement Configuration | O | | 9.3.1.178 | |
| >>MDT Location Information | O | | 9.3.1.176 | |
| >>Sensor Measurement Configuration | O | | 9.3.1.179 | |
| > <i>Logged MDT</i> | | | | |
| >>Logging interval | M | | ENUMERATED (320ms, 640ms, 1280ms, 2560ms, 5120ms, 10240ms, 20480ms, 30720ms, 40960ms, 61440ms, infinity, ...) | This IE is defined in TS 38.331 [18]. |
| >>Logging duration | M | | ENUMERATED (10, 20, 40, 60, 90,120, ...) | This IE is defined in TS 38.331 [18]. Unit: [minute]. |
| >>CHOICE <i>Report Type</i> | M | | | |
| >>> <i>Periodical</i> | | | NULL | |

| | | | | |
|--|---|--|----------------------------|--|
| >>>Event Triggered | | | | |
| >>>>Event Trigger Logged MDT Configuration | M | | 9.3.1.180 | |
| >>Bluetooth Measurement Configuration | O | | 9.3.1.177 | |
| >>WLAN Measurement Configuration | O | | 9.3.1.178 | |
| >>Sensor Measurement Configuration | O | | 9.3.1.179 | |
| >>Area Scope of Neighbour Cells | O | | 9.3.1.182 | |
| Signalling Based MDT PLMN List | O | | MDT PLMN List 9.3.1.168 | |

| Range bound | Explanation |
|---------------------|--|
| maxnoofCellIDforMDT | Maximum no. of Cell ID subject for MDT scope. Value is 32. |
| maxnoofTAforMDT | Maximum no. of TA subject for MDT scope. Value is 8. |

| Condition | Explanation |
|-----------|---|
| C-ifM1 | This IE shall be present if the <i>Measurements to Activate</i> IE has the first bit set to "1". |
| C-ifM4 | This IE shall be present if the <i>Measurements to Activate</i> IE has the third bit set to "1". |
| C-ifM5 | This IE shall be present if the <i>Measurements to Activate</i> IE has the fourth bit set to "1". |
| C-ifM6 | This IE shall be present if the <i>Measurements to Activate</i> IE has the fifth bit set to "1". |
| C-ifM7 | This IE shall be present if the <i>Measurements to Activate</i> IE has the sixth bit set to "1". |

9.3.1.170 MDT Configuration-EUTRA

This IE defines the MDT configuration parameters of EUTRA.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------------|----------|--------------------------|---|--|
| MDT Activation | M | | ENUMERATED (Immediate MDT only, Logged MDT only, Immediate MDT and Trace, ...) | |
| CHOICE <i>Area Scope of MDT</i> | M | | | |
| > <i>Cell based</i> | | | | |
| >>Cell ID List for MDT | | 1..<maxnoofCellIDforMDT> | | |
| >>>E-UTRA CGI | M | | 9.3.1.9 | |
| > <i>TA based</i> | | | | |
| >>TA List for MDT | | 1..<maxnoofTAforMDT> | | |
| >>>TAC | M | | 9.3.3.10 | The TAI is derived using the current serving PLMN. |
| > <i>PLMN wide</i> | | | NULL | |
| > <i>TAI based</i> | | | | |
| >>TAI List for MDT | | 1..<maxnoofTAforMDT> | | |
| >>>TAI | M | | 9.3.3.11 | |
| MDT Mode | M | | OCTET STRING | <i>MDTMode</i> IE defined in TS 36.413 [16]. |
| Signalling Based MDT PLMN List | O | | MDT PLMN List 9.3.1.168 | |

| Range bound | Explanation |
|---------------------|--|
| maxnoofCellIDforMDT | Maximum no. of Cell ID subject for MDT scope. Value is 32. |
| maxnoofTAforMDT | Maximum no. of TA subject for MDT scope. Value is 8. |

9.3.1.171 M1 Configuration

This IE defines the parameters for M1 measurement collection.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------------|-----------------|-------|--|---------------------------------------|
| M1 Reporting Trigger | M | | ENUMERATED (periodic, A2event-triggered, A2event-triggered periodic, ...) | |
| M1 Threshold Event A2 | C-ifM1A2trigger | | | |
| >CHOICE <i>Threshold Type</i> | M | | | |
| >>RSRP | | | | |
| >>>Threshold RSRP | M | | INTEGER (0..127) | This IE is defined in TS 38.331 [18]. |
| >>RSRQ | | | | |
| >>>Threshold RSRQ | M | | INTEGER (0..127) | This IE is defined in TS 38.331 [18]. |
| >>SINR | | | | |
| >>>Threshold SINR | M | | INTEGER (0..127) | This IE is defined in TS 38.331 [18]. |
| M1 Periodic Reporting | C-ifperiodicMDT | | | |
| >Report Interval | M | | ENUMERATED (ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, min1, min6, min12, min30, min60) | This IE is defined in TS 38.331 [18]. |
| >Report Amount | M | | ENUMERATED (1, 2, 4, 8, 16, 32, 64, infinity) | Number of reports. |

| Condition | Explanation |
|-----------------|--|
| C-ifM1A2trigger | This IE shall be present if the <i>M1 Reporting Trigger</i> IE is set to "A2event-triggered" or to "A2event-triggered periodic". |
| C-ifperiodicMDT | This IE shall be present if the <i>M1 Reporting Trigger</i> IE is set to "periodic", or to "A2event-triggered periodic". |

9.3.1.172 M4 Configuration

This IE defines the parameters for M4 measurement collection.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------|----------|-------|---|-----------------------|
| M4 Collection Period | M | | ENUMERATED (ms1024, ms2048, ms5120, ms10240, min1, ...) | |
| M4 Links to Log | M | | ENUMERATED (uplink, downlink, both-uplink-and-downlink, ...) | |

9.3.1.173 M5 Configuration

This IE defines the parameters for M5 measurement collection.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------|----------|-------|---|-----------------------|
| M5 Collection Period | M | | ENUMERATED (ms1024, ms2048, ms5120, ms10240, min1, ...) | |
| M5 Links to Log | M | | ENUMERATED (uplink, downlink, both-uplink-and-downlink, ...) | |

9.3.1.174 M6 Configuration

This IE defines the parameters for M6 measurement collection.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------|----------|-------|--|-----------------------|
| M6 Report Interval | M | | ENUMERATED (ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960, min1, min6, min12, min30, ...) | |
| M6 Links to Log | M | | ENUMERATED (uplink, downlink, both-uplink-and-downlink, ...) | |

9.3.1.175 M7 Configuration

This IE defines the parameters for M7 measurement collection.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------|----------|-------|---|-----------------------|
| M7 Collection Period | M | | INTEGER (1..60, ...) | Unit: minutes |
| M7 Links to Log | M | | ENUMERATED (uplink, downlink, both-uplink-and-downlink, ...) | |

9.3.1.176 MDT Location Information

This IE defines the MDT Location Information.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------|----------|-------|-----------------------|---|
| MDT Location Information | M | | BITSTRING (SIZE(8)) | Each position in the bitmap represents requested location information as defined in TS 37.320 [41]. First Bit = GNSS Other bits are reserved for future use and are ignored if received. Value "1" indicates "activate" and value "0" indicates "do not activate". |

9.3.1.177 Bluetooth Measurement Configuration

This IE defines the parameters for Bluetooth measurement collection.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|---------------------------|------------------------------|--|
| Bluetooth Measurement Configuration | M | | ENUMERATED (Setup, ...) | |
| Bluetooth Measurement Configuration Name List | | 0..1 | | |
| >Bluetooth Measurement Configuration Name Item | | 1..<maxnoofBluetoothName> | | |
| >>Bluetooth Measurement Configuration Name | M | | OCTET STRING (SIZE (1..248)) | |
| BT RSSI | O | | ENUMERATED (true, ...) | In case of Immediate MDT, it corresponds to M8 measurement as defined in TS 37.320 [41]. |

| Range bound | Explanation |
|----------------------|--|
| maxnoofBluetoothName | Maximum no. of Bluetooth local name used for Bluetooth measurement collection. Value is 4. |

9.3.1.178 WLAN Measurement Configuration

This IE defines the parameters for WLAN measurement collection.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|----------------------|-----------------------------|--|
| WLAN Measurement Configuration | M | | ENUMERATED (Setup, ...) | |
| WLAN Measurement Configuration Name List | | 0..1 | | |
| >WLAN Measurement Configuration Name Item | | 1..<maxnoofWLANName> | | |
| >>WLAN Measurement Configuration Name | M | | OCTET STRING (SIZE (1..32)) | |
| WLAN RSSI | O | | ENUMERATED (true, ...) | In case of Immediate MDT, it corresponds to M8 as defined in TS 37.320 [41]. |
| WLAN RTT | O | | ENUMERATED (true, ...) | In case of Immediate MDT, it corresponds to M9 as defined in TS 37.320 [41]. |

| Range bound | Explanation |
|-----------------|--|
| maxnoofWLANName | Maximum no. of WLAN SSID used for WLAN measurement collection. Value is 4. |

9.3.1.179 Sensor Measurement Configuration

This IE defines the parameters for Sensor measurement collection.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|------------------------|-------------------------|-----------------------|
| Sensor Measurement Configuration | M | | ENUMERATED (Setup, ...) | |
| Sensor Measurement Configuration Name List | | 0..1 | | |
| >Sensor Measurement Configuration Name Item | | 1..<maxnoofSensorName> | | |
| >>CHOICE <i>Sensor Name</i> | M | | | |
| >>> <i>Uncompensated Barometric</i> | | | | |
| >>>>Uncompensated Barometric Configuration | M | | ENUMERATED (true, ...) | |
| >>> <i>UE speed</i> | | | | |
| >>>>UE Speed Configuration | M | | ENUMERATED (true, ...) | |
| >>> <i>UE orientation</i> | | | | |
| >>>>UE orientation Configuration | M | | ENUMERATED (true, ...) | |

| Range bound | Explanation |
|-------------------|---|
| maxnoofSensorName | Maximum no. of Sensor local name used for Sensor measurement collection. Value is 3 |

9.3.1.180 Event Trigger Logged MDT Configuration

This IE defines the event trigger logged MDT configuration.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------------------------|----------|-------|--|---|
| CHOICE <i>Event trigger type</i> | M | | | |
| > <i>Out-of-coverage</i> | | | | |
| >>Out-of-Coverage Configuration | M | | ENUMERATED (true, ...) | |
| > <i>L1 Event</i> | | | | |
| >>CHOICE <i>L1 Event Threshold</i> | M | | | |
| >>> <i>RSRP</i> | | | | |
| >>>>Threshold RSRP | M | | INTEGER (0..127) | This IE is defined in TS 38.331 [18]. |
| >>> <i>RSRQ</i> | | | | |
| >>>>Threshold RSRQ | M | | INTEGER (0..127) | This IE is defined in TS 38.331 [18]. |
| >>Hysteresis | M | | INTEGER (0..30) | This parameter is used within the entry and leave condition of an event triggered reporting condition. |
| >>Time to Trigger | M | | ENUMERATED (ms0, ms40, ms64, ms80, ms100, ms128, ms160, ms256, ms320, ms480, ms512, ms640, ms1024, ms1280, ms2560, ms5120) | Time during which specific criteria for the event needs to be met in order to trigger a measurement report. |

9.3.1.181 NR Frequency Info

This defines the carrier frequency and bands used in a cell for a given direction (UL or DL) in FDD or for both UL and DL directions in TDD.

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
|-------------------------------|----------|--------------------------|--------------------------|--|
| NR ARFCN | M | | INTEGER (0.. maxNRARFCN) | RF Reference Frequency as defined in TS 38.104 [39], section 5.4.2.1. The frequency provided in this IE identifies the absolute frequency position of the reference resource block (Common RB 0) of the carrier. Its lowest subcarrier is also known as Point A. |
| NR Frequency Band List | | 1 | | |
| >NR Frequency Band Item | | 1..<maxnoofNR CellBands> | | |
| >>NR Frequency Band | M | | INTEGER (1.. 1024, ...) | Primary NR Operating Band as defined in TS 38.104 [39], section 5.4.2.3. The value 1 corresponds to n1, value 2 corresponds to NR operating band n2, etc. |

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

9.3.1.182 Area Scope of Neighbour Cells

This IE defines the area scope of neighbour cells for logged MDT.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|-----------------------------|------------------------|-----------------------|
| Area Scope of Neighbour Cells Item | M | 1..<maxnoofFreqforMDT> | | |
| >NR Frequency Info | M | | 9.3.1.181 | |
| >PCI List for MDT | | 0.. <maxnoofNeighPCIforMDT> | | |
| >>NR PCI | M | | INTEGER (0..1007, ...) | NR Physical Cell ID |

| Range bound | Explanation |
|-----------------------|---|
| maxnoofFreqforMDT | Maximum no. of Frequency Information subject for MDT scope. Value is 8. |
| maxnoofNeighPCIforMDT | Maximum no. of Neighbour cells subject for MDT scope. Value is 32. |

9.3.1.183 NPN Paging Assistance Information

This IE contains NPN Paging Assistance Information.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|-------|----------------------------------|-----------------------|
| CHOICE <i>NPN Paging Assistance Information</i> | M | | | |
| > <i>PNI-NPN Paging Assistance</i> | | | | |
| >> <i>PNI-NPN Paging Assistance</i> | M | | Allowed PNI-NPN List 9.3.3.45 | |

9.3.1.184 NPN Mobility Information

This IE indicates the access restrictions related to an NPN.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|-------|-----------------------|-----------------------|
| CHOICE <i>NPN Mobility Information</i> | M | | | |
| > <i>SNPN Mobility Information</i> | | | | |
| >> <i>Serving NID</i> | M | | NID 9.3.3.42 | |
| > <i>PNI-NPN Mobility Information</i> | | | | |
| >> <i>Allowed PNI-NPN List</i> | M | | 9.3.3.45 | |

9.3.1.185 Cell CAG Information

This IE provides information about support of closed access groups for a designated cell.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------|-----------------------|
| NG-RAN CGI | M | | 9.3.1.73 | |
| Cell CAG List | M | | 9.3.3.47 | |

9.3.1.186 Target to Source Failure Transparent Container

This IE is used to transparently pass radio related information from the handover target to the handover source through the core network in case of failure of the preparation at the target; 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 Failure 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 the <i>Target NG-RAN Node to Source NG-RAN Node Failure Transparent Container</i> IE. |

9.3.1.187 Target NG-RAN Node to Source NG-RAN Node Failure Transparent Container

This IE is produced by the target NG-RAN node and is transmitted to the source NG-RAN node in case of preparation failure.

This IE is transparent to the 5GC.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------|----------|-------|-----------------------|-----------------------|
| Cell CAG Information | O | | 9.3.1.185 | |

9.3.1.188 DAPS Request Information

The *DAPS Indicator* IE indicates that the source NG-RAN node requests a DAPS Handover for the concerned DRB.

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

9.3.1.189 DAPS Response Information

The *DAPS Response Indicator* IE indicates the per DRB response to a requested DAPS Handover.

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

9.3.1.190 Early Status Transfer Transparent Container

The *Early Status Transfer Transparent Container* IE is an information element that is produced by the source NG-RAN node and is transmitted to the target NG-RAN node. This IE is used for the NG DAPS handover case.

This IE is transparent to the 5GC.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|------------------|--|--|
| CHOICE <i>Procedure Stage</i> | M | | | |
| > <i>First DL COUNT</i> | | | | |
| >>DRBs Subject To Early Status Transfer List | | 1 | | |
| >>>DRBs Subject To Early Status Transfer Item | | 1..<maxnoofDRBs> | | |
| >>>>DRB ID | M | | 9.3.1.53 | |
| >>>>CHOICE <i>First DL COUNT</i> | M | | | |
| >>>>>12 bits | | | | |
| >>>>>>FIRST DL COUNT Value | M | | COUNT Value for PDCP SN Length 12 9.3.1.109 | PDCP-SN and Hyper frame number of the first DL SDU that the source NG-RAN node forwards to the target NG-RAN node in case of 12 bit long PDCP-SN |
| >>>>>>18 bits | | | | |
| >>>>>>>FIRST DL COUNT Value | M | | COUNT Value for PDCP SN Length 18 9.3.1.110 | PDCP-SN and Hyper frame number of the first DL SDU that the source NG-RAN node forwards to the target NG-RAN node in case of 18 bit long PDCP-SN |

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

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

9.3.1.191 Extended Slice Support List

This IE indicates a list of supported slices.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------|----------|---------------------------|-----------------------|-----------------------|
| Slice Support Item | | 1..<maxnoofExtSliceltems> | | |
| >S-NSSAI | M | | 9.3.1.24 | |

| Range bound | Explanation |
|----------------------|---|
| maxnoofExtSliceltems | Maximum no. of signalled slice support items. Value is 65535. |

9.3.1.192 UE Capability Info Request

This IE indicates the request to provide to the AMF the UE radio capability related information when retrieved from the UE.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------------|----------|-------|-----------------------------|-----------------------|
| UE Capability Info Request | M | | ENUMERATED (requested, ...) | |

9.3.1.193 Extended RAN Node Name

This IE provides extended human readable name of the NG-RAN node.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------|----------|-------|-----------------------------------|-----------------------|
| RAN Node Name Visible | O | | VisibleString (SIZE(1..150, ...)) | |
| RAN Node Name UTF8 | O | | UTF8String (SIZE(1..150, ...)) | |

9.3.2 Transport Network Layer Related IEs

9.3.2.1 QoS Flow per TNL Information List

This IE is used to provide a list of additional UP transport layer information for a split PDU session, along with the associated QoS flows.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------------------|----------|---------------------------------------|-----------------------|-----------------------|
| QoS Flow per TNL Information Item | | 1..<maxnoofMultiConnectivityMinusOne> | | |
| >QoS Flow per TNL Information | M | | 9.3.2.8 | |

| Range bound | Explanation |
|----------------------------------|--|
| maxnoofMultiConnectivityMinusOne | Maximum no. of connectivity allowed for a UE minus one. Value is 3. The current version of the specification supports 1. |

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 – UPF 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 | Criticality | Assigned Criticality |
|--|----------|-------|------------------------------------|-----------------------|-------------|----------------------|
| CHOICE <i>CP Transport Layer Information</i> | | | | | | |
| > <i>Endpoint-IP-address</i> | | | | | - | |
| >>Endpoint IP Address | M | | Transport Layer Address 9.3.2.4 | | - | |
| > <i>Endpoint-IP-address-and-port</i> | | | | | YES | reject |
| >>Endpoint IP Address | M | | Transport Layer Address 9.3.2.4 | | - | |
| >>Port Number | M | | OCTET STRING (SIZE(2)) | | - | |

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 | | <i>1..<maxnoofTNLAssociations></i> | | |
| >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 | |

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. |

9.3.2.11 UP Transport Layer Information Pair List

This IE is used to provide a list of uplink UP transport layer information and associated downlink UP transport layer information for a split PDU session.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|--|--|-----------------------|
| UP Transport Layer Information Pair Item | | <i>1..<maxnoofMultiConnectivityMinusOne></i> | | |
| >UL NG-U UP TNL Information | M | | UP Transport Layer Information 9.3.2.2 | |
| >DL NG-U UP TNL Information | M | | UP Transport Layer Information 9.3.2.2 | |

| Range bound | Explanation |
|----------------------------------|--|
| maxnoofMultiConnectivityMinusOne | Maximum no. of connectivity allowed for a UE minus one. Value is 3. The current version of the specification supports 1. |

9.3.2.12 UP Transport Layer Information List

This IE is used to provide a list of additional UP transport layer information for a split PDU session.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|--|--|-----------------------|
| UP Transport Layer Information Item | | <i>1..<maxnoofMultiConnectivityMinusOne></i> | | |
| >NG-U UP TNL Information | M | | UP Transport Layer Information 9.3.2.2 | |

| Range bound | Explanation |
|----------------------------------|--|
| maxnoofMultiConnectivityMinusOne | Maximum no. of connectivity allowed for a UE minus one. Value is 3. The current version of the specification supports 1. |

9.3.2.13 QoS Flow List with Data Forwarding

This IE is used to provide a list of QoS flows with indication if forwarding is accepted.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---|----------|-----------------------|---|---|-------------|----------------------|
| QoS Flow Item with Data Forwarding | | 1..<maxno ofQoSFlows> | | | - | |
| >QoS Flow Identifier | M | | 9.3.1.51 | | - | |
| >Data Forwarding Accepted | O | | 9.3.1.62 | | - | |
| >Current QoS Parameters Set Index | O | | Alternative QoS Parameters Set Index 9.3.1.152 | Index to the currently fulfilled alternative QoS parameters set | YES | ignore |

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

9.3.2.14 URI

This IE is an URI.

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

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, as described in TS 38.401 [2].

| 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 | The content is defined in TS 24.501 [26]. |

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 | Criticality | Assigned Criticality |
|---------------------------|----------|-------|---|-----------------------|-------------|----------------------|
| CHOICE SON Information | M | | | | - | |
| >SON Information Request | | | | | - | |
| >>SON Information Request | M | | ENUMERATED (Xn TNL Configuration Info, ...) | | - | |
| >SON Information Reply | | | | | - | |
| >>SON Information Reply | M | | 9.3.3.8 | | - | |
| >SON Information Report | | | | | YES | ignore |
| >>SON Information Report | M | | 9.3.3.35 | | | |

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 | Criticality | Assigned Criticality |
|--|----------|-------------------------|---------------------------------|--|-------------|----------------------|
| Xn Transport Layer Addresses | | 1..<maxno ofXnTLAs > | | | - | |
| >Transport Layer Address | M | | 9.3.2.4 | Transport Layer Addresses for Xn SCTP endpoint. | - | |
| Xn Extended Transport Layer Addresses | | 0..<maxno ofXnExtTLAs> | | | - | |
| >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 | | 0..<maxno ofXnGTP-TLAs> | | | - | |
| >>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). | - | |
| >Xn SCTP Transport Layer Addresses | | 0..<maxno ofXnTLAs > | | | YES | ignore |
| >>Transport Layer Address SCTP | <u>M</u> | | Transport Layer Address 9.3.2.4 | Transport Layer Addresses for Xn SCTP endpoint. | - | |

| 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) | Values ordered in decreasing order of priority, i.e. with 1 as the highest priority and 256 as the lowest priority |

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 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>1 1 0 value is incremented in 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..<maxnoofNGConnectionsToReset></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 or from NG-RAN to 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 | Refers to the <i>N1 mode to S1 mode NAS transparent container</i> IE, the details of the IE definition and the encoding are specified in TS 24.501 [26]. |

9.3.3.27 Source to Target AMF Information Reroute

This IE is used to transparently pass information provided by NSSF from the source AMF to the target AMF through the NG-RAN node; it is produced by the source core network node and is transmitted to the target core network node.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------------|----------|-------|--------------------------|--|
| Configured NSSAI | O | | OCTET STRING (SIZE(128)) | The maximum number of S-NSSAI in Configured NSSAI is 16. This IE contains optional mapping S-NSSAI. When present, this IE shall be transmitted transparent from the source Core network node to the target Core network node. The octets of the OCTET STRING are encoded according to description in TS 29.531 [30]. |
| Rejected NSSAI in PLMN | O | | OCTET STRING (SIZE(32)) | This IE contain the rejected NSSAI(s) in the PLMN. When present, this IE shall be transmitted transparent from the source Core network node to the target Core network node. The octets of the OCTET STRING are encoded according to description in TS 29.531 [30]. |
| Rejected NSSAI in TA | O | | OCTET STRING (SIZE(32)) | This IE contain the rejected NSSAI(s) in the TA. When present, this IE shall be transmitted transparent from the source Core network node to the target Core network node. The octets of the OCTET STRING are encoded according to description in TS 29.531 [30]. |

9.3.3.28 RIM Information Transfer

This IE contains information used by the RIM functionality, and additionally includes the NG-RAN node identifier of the destination of the RIM 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 | |
| RIM Information | M | | 9.3.3.29 | |

9.3.3.29 RIM Information

This IE contains the RIM information.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------|----------|-------|--|------------------------|
| Target gNB Set ID | M | | gNB Set ID 9.3.1.122 | The victim gNB Set ID. |
| RIM-RS Detection | M | | ENUMERATED (RS detected, RS disappeared, ...) | |

9.3.3.30 LAI

This IE is used to uniquely identify a Location Area.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------|----------|-------|------------------------------|----------------------------|
| LAI | | | | |
| >PLMN Identity | M | | 9.3.3.5 | |
| >LAC | M | | OCTET STRING (SIZE(2)) | 0000 and FFFE not allowed. |

9.3.3.31 Extended Connected Time

This IE indicates the minimum time the RAN should keep the UE in RRC_CONNECTED state regardless of inactivity, as defined in TS 23.501 [9].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------|----------|-------|-----------------------|---|
| Extended Connected Time | M | | INTEGER (0..255) | Minimum time the RAN should keep the UE in RRC_CONNECTED state. Unit is second. |

9.3.3.32 End Indication

This IE indicates that there are no further NAS PDUs to be transmitted for this UE.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------|----------|-------|---|-----------------------|
| End Indication | M | | ENUMERATED (no further data, further data exists, ...) | |

9.3.3.33 Inter-system SON Configuration Transfer

This IE contains the configuration information, used by e.g., SON functionality, transmitted between an NG-RAN node and an eNB and additionally includes the node identifier of the destination of this configuration information and the node identifier of the source of this information.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------------|----------|-------|-----------------------|-----------------------|
| CHOICE <i>Transfer Type</i> | M | | | |
| > <i>from E-UTRAN to NG-RAN</i> | | | | |
| >>Source eNB-ID | | 1 | | |
| >>>Global eNB ID | M | | 9.3.1.165 | |
| >>>Selected EPS TAI | M | | EPS TAI 9.3.3.17 | |
| >>Target NG-RAN node ID | | 1 | | |
| >>>Global RAN Node ID | M | | 9.3.1.5 | |
| >>>Selected TAI | M | | TAI 9.3.3.11 | |
| > <i>from NG-RAN to E-UTRAN</i> | | | | |
| >>Source NG-RAN Node ID | | 1 | | |
| >>>Global RAN Node ID | M | | 9.3.1.5 | |
| >>>Selected TAI | M | | TAI 9.3.3.11 | |
| >>Target eNB-ID | | 1 | | |
| >>>Global eNB ID | M | | 9.3.1.165 | |
| >>>Selected EPS TAI | M | | EPS TAI 9.3.3.17 | |
| Inter-system SON Information | M | | 9.3.3.34 | |

9.3.3.34 Inter-system SON Information

This IE identifies the nature of the configuration information transferred.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|-------|-----------------------|-----------------------|
| CHOICE <i>Inter-system SON Information</i> | M | | | |
| > <i>Inter-system SON Information Report</i> | | | | |
| >>Inter-system SON Information Report | M | | 9.3.3.36 | |

9.3.3.35 SON Information Report

This IE contains the configuration information to be transferred.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|-------|-----------------------|-----------------------|
| CHOICE <i>SON Information Report</i> | M | | | |
| > <i>Failure Indication Information</i> | | | | |
| >>Failure Indication | M | | 9.3.3.37 | |
| > <i>HO Report Information</i> | | | | |
| >>HO Report | M | | 9.3.3.39 | |

9.3.3.36 Inter-system SON Information Report

This IE contains the configuration information to be transferred.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|-------|-----------------------|-----------------------|
| CHOICE <i>SON Information Report</i> | M | | | |
| > <i>HO Report Information</i> | | | | |
| >>Inter-system HO Report | M | | 9.3.3.40 | |
| > <i>Failure Indication Information</i> | | | | |
| >>Inter-system Failure Indication | M | | 9.3.3.38 | |

9.3.3.37 Failure Indication

This IE contains the failure indication to be transferred.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------|----------|-------|-----------------------|-----------------------|
| UE RLF Report Container | O | | 9.3.3.41 | |

9.3.3.38 Inter-system Failure Indication

This IE contains the failure indication to be transferred.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------|----------|-------|-----------------------|--|
| UE RLF Report Container | O | | 9.3.3.41 | Only contains the LTE RLF report in this version of the specification. |

9.3.3.39 HO Report

This IE contains the HO report to be transferred.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------|---|-------|--|--|
| Handover Report Type | M | | ENUMERATED (HO too early, HO to wrong cell, Inter-system ping-pong, ...) | |
| Handover Cause | M | | Cause 9.2.3.1 | Indicates handover cause employed for handover from source cell |
| Source Cell CGI | M | | NG-RAN CGI 9.3.1.73 | NG-RAN CGI of the source cell for handover procedure |
| Target Cell CGI | M | | NG-RAN CGI 9.3.1.73 | NG-RAN CGI of the target cell for handover procedure. If the Handover Report Type is set to "Inter-system ping-pong", it contains the target cell of the inter system handover from the other system to NG-RAN node cell |
| Re-establishment Cell CGI | C- ifHandoverReport Type HoToWrongCell | | NG-RAN CGI 9.3.1.73 | NG-RAN CGI of the cell where UE attempted re-establishment or where the UE successfully re-connected after the failure |
| Source Cell C-RNTI | O | | BIT STRING (SIZE (16)) | C-RNTI allocated at the source NG-RAN node |
| Target Cell in E-UTRAN | C- ifHandoverReport Type Intersystempingpong | | E-UTRA CGI 9.3.1.9 | E-UTRA CGI of the E-UTRAN target cell for handover procedure |
| Mobility Information | O | | BIT STRING (SIZE (32)) | Information provided in the HANDOVER REQUEST message from the source NG-RAN node |
| UE RLF Report Container | O | | 9.3.3.41 | The UE RLF Report Container IE received in the FAILURE INDICATION message. |

| Condition | Explanation |
|---|---|
| ifHandoverReportTypeHoToWrongCell | This IE shall be present if the <i>Handover Report Type</i> IE is set to the value "HO to wrong cell" |
| ifHandoverReportTypeIntersystempingpong | This IE shall be present if the <i>Handover Report Type</i> IE is set to the value "Inter-system ping-pong" |

9.3.3.40 Inter-system HO Report

This IE contains the inter-system HO report to be transferred.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|----------------------------|----------------------------------|--|
| CHOICE <i>Handover Report Type</i> | M | | | |
| > <i>Too early Inter-system HO</i> | | | | |
| >>Source Cell ID | M | | E-UTRA CGI 9.3.1.9 | CGI of the source cell for the HO. |
| >>Failure Cell ID | M | | NG-RAN CGI 9.3.1.73 | CGI of the target cell for the HO. |
| >>UE RLF Report Container | O | | 9.3.3.41 | |
| > <i>Inter-system Unnecessary HO</i> | | | | |
| >>Source Cell CGI | M | | NG-RAN CGI 9.3.1.73 | Source NR cell in NG-RAN |
| >>Target Cell CGI | M | | E-UTRA CGI 9.3.1.9 | Target cell in E-UTRAN |
| >>Early IRAT HO | M | | ENUMERATED (true, false, ...) | Is set to "true" if the measurement period expired due to an inter-RAT handover towards NR executed within the configured measurement duration and otherwise set to "false" |
| >>>Candidate Cell List | | 1 | | |
| >>>>Candidate Cell Item | | 1..<maxnoofCandidateCells> | | |
| >>>>>CHOICE <i>Candidate Cell Type</i> | M | | | |
| >>>>>>Candidate CGI | | | | |
| >>>>>>>Candidate Cell ID | M | | NR CGI 9.3.1.7 | This IE contains an NR CGI. |
| >>>>>>>>Candidate PCI | | | | |
| >>>>>>>>Candidate PCI | M | | INTEGER (0..1007, ...) | This IE includes the NR Physical Cell Identifier of detected cells not included in the <i>Candidate Cell List</i> IE and for which an NR CGI could not be derived. |
| >>>>>>>>>Candidate NR ARFCN | M | | INTEGER (0..maxNARFCN) | RF Reference Frequency as defined in TS 38.104 [39], section 5.4.2.1. The frequency provided in this IE identifies the absolute frequency position of the reference resource block (Common RB 0) of the carrier. Its lowest subcarrier is also known as Point A. |

| Range bound | Explanation |
|-----------------------|--|
| maxnoofCandidateCells | Maximum no. of candidate cells. Value is 32 |
| maxNARFCN | Maximum value of NR carrier frequency, defined in TS 38.331 [18] |

9.3.3.41 UE RLF Report Container

This IE contains the RLF Report to be transferred.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------------|----------|-------|-----------------------|--|
| CHOICE <i>RLF type</i> | M | | | |
| > <i>NR</i> | | | | |
| >>NR UE RLF Report Container | M | | OCTET STRING | nr-RLF-Report-r16 IE contained in the UEInformationResponse message defined in TS 38.331 [18]. |
| > <i>LTE</i> | | | | |
| >>LTE UE RLF Report Container | M | | OCTET STRING | RLF-Report-r9 IE contained in the UEInformationResponse message defined in TS 36.331 [21] |

9.3.3.42 NID

This IE is used to identify (together with a PLMN identifier) a Stand-alone Non-Public Network.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------|----------------------------|
| NID | M | | BIT STRING (SIZE(44)) | Defined in TS 23.003 [23]. |

9.3.3.43 CAG ID

This IE is used to identify (together with a PLMN identifier) a Public Network Integrated NPN.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------|----------------------------|
| CAG ID | M | | BIT STRING (SIZE(32)) | Defined in TS 23.003 [23]. |

9.3.3.44 NPN Support

For SNPN, this IE identifies a supported SNPN together with the associated PLMN ID.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------|----------|-------|-----------------------|-----------------------|
| CHOICE <i>NPN Support</i> | M | | | |
| > <i>SNPN</i> | | | | |
| >>NID | M | | 9.3.3.43 | |

9.3.3.45 Allowed PNI-NPN List

This IE contains information on allowed UE mobility in PNI-NPN including allowed PNI-NPNs and whether the UE is allowed to access non-CAG cells for each PLMN.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------------------|----------|---|--|---|
| Allowed PNI-NPN Item | | <i>1..<maxnoofEPLMNs+1></i> | | |
| >PLMN Identity | M | | 9.3.3.5 | |
| >PNI-NPN Restricted | M | | ENUMERATED (restricted, not-restricted, ...) | If set to "restricted", indicates that the UE is not allowed to access non-CAG cells for this PLMN. |
| >Allowed CAG List per PLMN | | <i>1..<maxnoofAllowedCAGsperPLMN></i> | | |
| >>CAG ID | M | | 9.3.3.43 | |

| Range bound | Explanation |
|---------------------------|---|
| maxnoofEPLMNs+1 | Maximum no. of equivalent PLMNs plus one serving PLMN. Value is 16. |
| maxnoofAllowedCAGsperPLMN | Maximum number of CAGs per PLMN in UE's Allowed PNI-NPN list. Value is 256. |

9.3.3.46 NPN Access Information

This IE contains information to perform access control for NPN.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------------------|----------|-------|-----------------------|-----------------------|
| <i>CHOICE NPN Access Information</i> | M | | | |
| > <i>PNI-NPN Access Information</i> | | | | |
| >>Cell CAG List | M | | 9.3.3.47 | |

9.3.3.47 Cell CAG List

This IE indicates the list of CAG IDs supported by a cell.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------|----------|--------------------------------------|-----------------------|-----------------------|
| Cell CAG List | | <i>1..<maxnoofCAGsperCell></i> | | |
| >CAG ID | M | | 9.3.3.43 | |

| Range bound | Explanation |
|--------------------|---|
| maxnoofCAGsperCell | Maximum no. of CAGs per cell. Value is 64. Max is 12 in this release. |

9.3.3.48 UL CP Security Information

This IE contains NAS level security information to enable UE authentication by the AMF as described in TS 33.401 [27].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------|----------------------------|
| UL NAS MAC | M | | BIT STRING (SIZE(16)) | Defined in TS 33.401 [27]. |
| UL NAS Count | M | | BIT STRING (SIZE(5)) | Defined in TS 33.401 [27]. |

9.3.3.49 DL CP Security Information

This IE contains NAS level security information to be forwarded to the UE as described in TS 33.401 [27].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------|----------------------------|
| DL NAS MAC | M | | BIT STRING (SIZE(16)) | Defined in TS 33.401 [27]. |

9.3.3.50 Configured TAC Indication

This IE indicates that in all NR cells served by the gNB, the TAC with which this IE is associated, is only configured but not broadcast.

NOTE: This IE is defined in accordance to the possibility foreseen in TS 38.331 [18] to not broadcast the TAC if the NR cell only supports PSCell/SCell functionality.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------|----------|-------|------------------------|-----------------------|
| Configured TAC Indication | M | | ENUMERATED (true, ...) | |

9.3.3.51 Extended AMF Name

This IE provides extended human readable name of the AMF.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------|----------|-------|-----------------------------------|-----------------------|
| AMF Name Visible | O | | VisibleString (SIZE(1..150, ...)) | |
| AMF Name UTF8 | O | | UTF8String (SIZE(1..150, ...)) | |

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 and is ignored otherwise. | 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 List 9.3.2.12 | UPF endpoint of the additional NG-U transport bearer(s), for delivery of UL PDUs for split PDU session. | YES | reject |
| Data Forwarding Not Possible | O | | 9.3.1.63 | This IE may be present in case of HANDOVER REQUEST message and is 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 | This IE is ignored if the <i>Common Network Instance</i> IE is included. | 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 | | - | |
| >>TSC Traffic Characteristics | O | | 9.3.1.130 | This IE may be present in case of GBR QoS flows and is ignored otherwise. | YES | ignore |
| >>Redundant QoS Flow Indicator | O | | 9.3.1.134 | This IE indicates whether this QoS flow is requested for the redundant transmission. | YES | ignore |
| Common Network Instance | O | | 9.3.1.120 | | YES | ignore |
| Direct Forwarding Path Availability | O | | 9.3.1.64 | This IE may be present in case of inter-system handover and is ignored otherwise. | YES | ignore |
| Redundant 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 for the redundant transmission. | YES | ignore |

| | | | | | | |
|---|---|--|--|---|-----|--------|
| Additional Redundant UL NG-U UP TNL Information | O | | UP Transport Layer Information List 9.3.2.12 | UPF endpoint of the additional NG-U transport bearer(s), for delivery of redundant UL PDUs for split PDU session. | YES | ignore |
| Redundant Common Network Instance | O | | Common Network Instance 9.3.1.120 | | YES | ignore |
| Redundant PDU Session Information | O | | 9.3.1.136 | | YES | ignore |

| 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 | Criticality | Assigned Criticality |
|--|----------|-------|---|--|-------------|----------------------|
| DL QoS Flow per TNL Information | M | | QoS Flow per TNL Information 9.3.2.8 | NG-RAN node endpoint of the NG-U transport bearer for delivery of DL PDUs, together with associated QoS flows. | - | |
| Additional DL QoS Flow per TNL Information | O | | QoS Flow per TNL Information List 9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of DL PDUs for split PDU session, together with associated QoS flows. | - | |
| Security Result | O | | 9.3.1.59 | | - | |
| QoS Flow Failed to Setup List | O | | QoS Flow List with Cause 9.3.1.13 | | - | |
| Redundant DL QoS Flow per TNL Information | O | | QoS Flow per TNL Information 9.3.2.8 | | YES | ignore |
| Additional Redundant DL QoS Flow per TNL Information | O | | QoS Flow per TNL Information List 9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of redundant DL PDUs for split PDU session, together with associated QoS flows. | YES | ignore |
| Used RSN Information | O | | Redundant PDU Session Information 9.3.1.136 | | YES | ignore |
| Global RAN Node ID of Secondary NG-RAN Node | O | | Global RAN Node ID 9.3.1.5 | | YES | ignore |

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 ofMultiConnectivity> | | | - | |
| >>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. | - | |
| >>Redundant 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 for the redundant transmission. | YES | ignore |
| >>Redundant DL NG-U UP TNL Information | O | | UP Transport Layer Information 9.3.2.2 | Identifies the NG-U transport bearer at the NG-RAN node for the redundant transmission. | YES | ignore |
| Network Instance | O | | 9.3.1.113 | This IE is ignored if the <i>Common Network Instance</i> IE is included. | 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 | | - | |
| >>TSC Traffic Characteristics | O | | 9.3.1.130 | This IE may be present in case of GBR QoS flows and is ignored otherwise. | YES | ignore |
| >>Redundant QoS Flow Indicator | O | | 9.3.1.134 | This IE indicates whether this QoS flow is requested for the redundant transmission. | YES | ignore |
| QoS Flow to Release List | O | | QoS Flow List with Cause 9.3.1.13 | | YES | reject |
| Additional UL NG-U UP TNL Information | O | | UP Transport Layer Information List 9.3.2.12 | UPF endpoint of the additional NG-U transport bearer(s) proposed for delivery of UL PDUs for split PDU session. | YES | reject |
| Common Network Instance | O | | 9.3.1.120 | | YES | ignore |

| | | | | | | |
|---|---|--|--|---|-----|--------|
| Additional Redundant UL NG-U UP TNL Information | O | | UP Transport Layer Information List 9.3.2.12 | UPF endpoint of the additional NG-U transport bearer(s) proposed for delivery of redundant UL PDUs for split PDU session. | YES | ignore |
| Redundant Common Network Instance | O | | Common Network Instance 9.3.1.120 | | YES | ignore |

| Range bound | Explanation |
|--------------------------|---|
| maxnoofQoSFlows | Maximum no. of QoS flows allowed within one PDU session. Value is 64. |
| maxnoofMultiConnectivity | 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 | Criticality | Assigned Criticality |
|--|----------|-----------------------|---|---|-------------|----------------------|
| 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 | | 0..1 | | | - | |
| >QoS Flow Add or Modify Response Item | | 1..<maxno ofQoSFlows> | | | - | |
| >>QoS Flow Identifier | M | | 9.3.1.51 | | - | |
| >>Current QoS Parameters Set Index | O | | Alternative QoS Parameters Set Index 9.3.1.152 | Index to the currently fulfilled alternative QoS parameters set | YES | Ignore |
| Additional DL QoS Flow per TNL Information | O | | QoS Flow per TNL Information List 9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of DL PDUs for split PDU session, together with associated QoS flows. | - | |
| QoS Flow Failed to Add or Modify List | O | | QoS Flow List with Cause 9.3.1.13 | | - | |
| Additional NG-U UP TNL Information | O | | UP Transport Layer Information Pair List 9.3.2.11 | NG-RAN node endpoint of the NG-U transport bearer corresponding to the modified UPF endpoint received in the <i>PDU Session Resource Modify Request Transfer</i> IE in case of PDU session split. | YES | ignore |
| Redundant 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 for the redundant transmission. | YES | ignore |
| Redundant 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 for the redundant transmission. | YES | ignore |
| Additional Redundant DL QoS Flow per TNL Information | O | | QoS Flow per TNL Information List 9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of redundant DL PDUs for split PDU session, together with associated QoS flows. | YES | ignore |

| | | | | | | |
|--|---|--|--|---|-----|--------|
| Additional Redundant NG-U UP TNL Information | O | | UP Transport Layer Information Pair List 9.3.2.11 | NG-RAN node endpoint of the NG-U transport bearer for delivery of redundant DL PDUs corresponding to the modified UPF endpoint received in the <i>PDU Session Resource Modify Request Transfer</i> IE in case of PDU session split. | YES | ignore |
|--|---|--|--|---|-----|--------|

| 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 | Criticality | Assigned Criticality |
|------------------------------------|----------|------------------------------------|--|--|-------------|----------------------|
| QoS Flow Notify List | | <i>0..1</i> | | | - | |
| >QoS Flow Notify Item | | <i>1..<maxno ofQoSFlows></i> | | | - | |
| >>QoS Flow Identifier | M | | 9.3.1.51 | | - | |
| >>Notification Cause | M | | ENUMERATED (fulfilled, not fulfilled, ...) | | - | |
| >>Current QoS Parameters Set Index | O | | Alternative QoS Parameters Set Notify Index 9.3.1.153 | Index to the currently fulfilled alternative QoS parameters set. Value 0 indicates that NG-RAN cannot even fulfil the lowest alternative parameters set. | YES | ignore |
| QoS Flow Released List | O | | QoS Flow List with Cause 9.3.1.13 | | - | |
| Secondary RAT Usage Information | O | | 9.3.1.114 | | YES | ignore |

| 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 | Criticality | Assigned Criticality |
|--|----------|-------|---|--|-------------|----------------------|
| DL QoS Flow per TNL Information | M | | QoS Flow per TNL Information 9.3.2.8 | NG-RAN node endpoint of the NG-U transport bearer for delivery of DL PDUs, together with associated QoS flows. | - | |
| Additional DL QoS Flow per TNL Information | O | | QoS Flow per TNL Information List 9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of DL PDUs for split PDU session, together with associated QoS flows | - | |
| Secondary RAT Usage Information | O | | 9.3.1.114 | | YES | ignore |
| Security Result | O | | 9.3.1.59 | Current UP security status | YES | ignore |
| Redundant DL QoS Flow per TNL Information | O | | QoS Flow per TNL Information 9.3.2.8 | NG-RAN node endpoint of the NG-U transport bearer for delivery of DL PDUs for the redundant transmission, together with associated QoS flows. | YES | ignore |
| Additional Redundant DL QoS Flow per TNL Information | O | | QoS Flow per TNL Information List 9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of Redundant DL PDUs for split PDU session, together with associated QoS flows. | YES | ignore |
| Global RAN Node ID of Secondary NG-RAN Node | O | | Global RAN Node ID 9.3.1.5 | | YES | ignore |

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 | Criticality | Assigned Criticality |
|--|----------|-----------------------|--|---|-------------|----------------------|
| QoS Flow Modify Confirm List | | 1 | | | - | |
| >QoS Flow Modify Confirm Item | | 1..<maxno ofQoSFlows> | | | - | |
| >>QoS Flow Identifier | M | | 9.3.1.51 | | - | |
| UL NG-U UP TNL Information | M | | UP Transport Layer Information 9.3.2.2 | UPF endpoint of the NG-U transport bearer corresponding to the <i>DL NG-U UP TNL Information</i> IE received in the <i>PDU Session Resource Modify Indication Transfer</i> IE. | - | |
| Additional NG-U UP TNL Information | O | | UP Transport Layer Information Pair List 9.3.2.11 | NG-RAN node endpoint of the NG-U transport bearer indicated in the <i>PDU Session Resource Modify Indication Transfer</i> IE and the corresponding UPF endpoint for split PDU session. | - | |
| QoS Flow Failed to Modify List | O | | QoS Flow List with Cause 9.3.1.13 | | - | |
| Redundant UL NG-U UP TNL Information | O | | UP Transport Layer Information 9.3.2.2 | UPF endpoint of the NG-U transport bearer identified by the above redundant DL NG-U UP TNL Information IE for the redundant transmission. | YES | ignore |
| Additional Redundant NG-U UP TNL Information | O | | UP Transport Layer Information Pair List 9.3.2.11 | NG-RAN node endpoint of the NG-U transport bearer for the redundant transmission indicated in the <i>PDU Session Resource Modify Indication Transfer</i> IE and the corresponding UPF endpoint for split PDU session. | YES | ignore |

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

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 | Criticality | Assigned Criticality |
|--|----------|-----------------------|--|--|-------------|----------------------|
| 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 flows associated with the <i>DL NG-U UP TNL Information</i> IE. | - | |
| >QoS Flow Accepted Item | | 1..<maxno ofQoSFlows> | | | - | |
| >>QoS Flow Identifier | M | | 9.3.1.51 | | - | |
| >>Current QoS Parameters Set Index | O | | Alternative QoS Parameters Set Index 9.3.1.152 | Index to the currently fulfilled alternative QoS parameters set. | YES | ignore |
| Additional DL QoS Flow per TNL Information | O | | QoS Flow per TNL Information List 9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of DL PDUs for split PDU session, together with associated QoS flows. | YES | ignore |
| Redundant 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 redundant DL PDUs. | YES | ignore |
| Redundant DL NG-U TNL Information Reused | O | | ENUMERATED (true, ...) | Indicates that Redundant DL NG-U TNL Information has been reused. | YES | ignore |
| Additional Redundant DL QoS Flow per TNL Information | O | | QoS Flow per TNL Information List 9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of Redundant DL PDUs for split PDU session, together with associated QoS flows. | YES | ignore |
| Used RSN Information | O | | Redundant PDU Session Information 9.3.1.136 | | YES | ignore |
| Global RAN Node ID of Secondary NG-RAN Node | O | | Global RAN Node ID 9.3.1.5 | | YES | ignore |

| 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 | Criticality | Assigned Criticality |
|--|----------|-------|--|--|-------------|----------------------|
| UL NG-U UP TNL Information | O | | UP Transport Layer Information 9.3.2.2 | UPF endpoint of the NG-U transport bearer corresponding to the <i>DL NG-U UP TNL Information</i> IE received in the <i>Path Switch Request Transfer</i> IE. | - | |
| Security Indication | O | | 9.3.1.27 | | - | |
| Additional NG-U UP TNL Information | O | | UP Transport Layer Information Pair List 9.3.2.11 | NG-RAN node endpoint of the NG-U transport bearer indicated in the <i>Path Switch Request Transfer</i> IE and the corresponding UPF endpoint for split PDU session. | YES | ignore |
| Redundant 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 for the redundant transmission. | YES | ignore |
| Additional Redundant NG-U UP TNL Information | O | | UP Transport Layer Information Pair List 9.3.2.11 | NG-RAN node endpoint of the NG-U transport bearer for the redundant transmission indicated in the <i>Path Switch Request Transfer</i> IE and the corresponding UPF endpoint for split PDU session. | YES | ignore |

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 | Criticality | Assigned Criticality |
|---|----------|-----------------------|--|--|-------------|----------------------|
| 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 flows associated with the <i>DL Forwarding UP TNL Information</i> IE. | - | |
| >QoS Flow to be Forwarded Item | | 1..<maxno ofQoSFlows> | | | - | |
| >>QoS Flow Identifier | M | | 9.3.1.51 | | - | |
| Data Forwarding Response DRB List | O | | 9.3.1.77 | | - | |
| Additional DL Forwarding UP TNL Information | O | | QoS Flow per TNL Information List 9.3.2.1 | NG-RAN node endpoint to deliver forwarded DL PDUs for split PDU session, together with associated QoS flows to be forwarded. | YES | ignore |
| UL Forwarding UP TNL Information | O | | UP Transport Layer Information 9.3.2.2 | To deliver forwarded UL PDUs | YES | reject |
| Additional UL Forwarding UP TNL Information | O | | UP Transport Layer Information List 9.3.2.12 | NG-RAN node endpoint to deliver forwarded UL PDUs for split PDU session. | YES | reject |
| Data Forwarding Response E-RAB List | O | | 9.3.1.121 | | YES | ignore |

| 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 | Criticality | Assigned Criticality |
|---|----------|--|--|---|-------------|----------------------|
| 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 | M | | QoS Flow List with Data Forwarding 9.3.2.13 | QoS flows associated with the <i>DL NG-U UP TNL Information</i> IE. | - | |
| QoS Flow Failed to Setup List | O | | QoS Flow List with Cause 9.3.1.13 | | - | |
| Data Forwarding Response DRB List | O | | 9.3.1.77 | | - | |
| Additional DL UP TNL Information for HO List | | 0..1 | | | YES | ignore |
| >Additional DL UP TNL Information for HO Item | | 1..<maxno ofMultiConnectivityMinusOne> | | Additional DL UP TNL Information for split PDU session, in the same order as the UPF endpoint of the additional NG-U transport bearer(s) received in the <i>Handover Request Transfer</i> IE of the Handover Request message. | - | |
| >>Additional DL NG-U UP TNL Information | M | | UP Transport Layer Information 9.3.2.2 | NG-RAN node endpoint of the additional NG-U transport bearer for delivery of DL PDUs. | - | |
| >>>Additional QoS Flow Setup Response List | M | | QoS Flow List with Data Forwarding 9.3.2.13 | QoS flows associated with the <i>Additional DL NG-U UP TNL Information</i> IE. | - | |
| >>>Additional DL Forwarding UP TNL Information | O | | UP Transport Layer Information 9.3.2.2 | NG-RAN node endpoint to deliver forwarded DL PDUs. | - | |
| >>>Additional Redundant DL NG-U UP TNL Information | O | | UP Transport Layer Information 9.3.2.2 | NG-RAN node endpoint of the additional NG-U transport bearer for delivery of redundant DL PDUs. | YES | ignore |
| UL Forwarding UP TNL Information | O | | UP Transport Layer Information 9.3.2.2 | To deliver forwarded UL PDUs | YES | reject |
| Additional UL Forwarding UP TNL Information | O | | UP Transport Layer Information List 9.3.2.12 | NG-RAN node endpoint to deliver forwarded UL PDUs for split PDU session. | YES | reject |

| | | | | | | |
|---|---|--|--|--|-----|--------|
| Data Forwarding Response E-RAB List | O | | 9.3.1.121 | | YES | ignore |
| Redundant 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 for the redundant transmission. | YES | ignore |
| Used RSN Information | O | | Redundant PDU Session Information 9.3.1.136 | | YES | ignore |
| Global RAN Node ID of Secondary NG-RAN Node | O | | Global RAN Node ID 9.3.1.5 | | YES | ignore |

| Range bound | Explanation |
|----------------------------------|--|
| maxnoofQoSFlows | Maximum no. of QoS flows allowed within one PDU session. Value is 64. |
| maxnoofMultiConnectivityMinusOne | Maximum no. of connectivity allowed for a UE minus one. Value is 3. The current version of the specification supports 1. |

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 | Criticality | Assigned Criticality |
|---------------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Cause | M | | 9.3.1.2 | | - | |
| Secondary RAT Usage Information | O | | 9.3.1.114 | | YES | ignore |

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 | Criticality | Assigned Criticality |
|---------------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Secondary RAT Usage Information | O | | 9.3.1.114 | | YES | ignore |

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 | |

9.3.4.23 Secondary RAT Data Usage Report Transfer

This IE is transparent to the AMF.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------------|----------|-------|-----------------------|-----------------------|
| Secondary RAT Usage Information | O | | 9.3.1.114 | |

9.3.4.24 UE Context Resume Request Transfer

This IE is transparent to the AMF.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------------|----------|-------|--------------------------------------|-----------------------|
| QoS Flow Failed to Resume List | O | | QoS Flow List with Cause 9.3.1.13 | |

9.3.4.25 UE Context Resume Response Transfer

This IE is transparent to the AMF.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------------|----------|-------|--------------------------------------|-----------------------|
| QoS Flow Failed to Resume List | O | | QoS Flow List with Cause 9.3.1.13 | |

9.3.4.26 UE Context Suspend Request Transfer

This IE is transparent to the AMF.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------|----------|-------|---------------------------|-----------------------|
| Suspend Indicator | O | | ENUMERATED (true, ...) | |

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,
    AMFCPRelocationIndication,
    AMFStatusIndication,
    CellTrafficTrace,
    ConnectionEstablishmentIndication,
    DeactivateTrace,
    DownlinkNASTransport,
    DownlinkNonUEAssociatedNRPPaTransport,
    DownlinkRANConfigurationTransfer,
    DownlinkRANEarlyStatusTransfer,
    DownlinkRANStatusTransfer,
    DownlinkUEAssociatedNRPPaTransport,
    ErrorIndication,
    HandoverCancel,
    HandoverCancelAcknowledge,
    HandoverCommand,
    HandoverFailure,
    HandoverNotify,
    HandoverPreparationFailure,
    HandoverRequest,
    HandoverRequestAcknowledge,
    HandoverRequired,
```

HandoverSuccess,
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,
RANCPRelocationIndication,
RerouteNASRequest,
RetrieveUEInformation,
RRCInactiveTransitionReport,
SecondaryRATDataUsageReport,
TraceFailureIndication,
TraceStart,
UEContextModificationFailure,
UEContextModificationRequest,
UEContextModificationResponse,
UEContextReleaseCommand,
UEContextReleaseComplete,
UEContextReleaseRequest,
UEContextResumeRequest,
UEContextResumeResponse,
UEContextResumeFailure,
UEContextSuspendRequest,

UEContextSuspendResponse,
UEContextSuspendFailure,
UEInformationTransfer,
UERadioCapabilityCheckRequest,
UERadioCapabilityCheckResponse,
UERadioCapabilityIDMappingRequest,
UERadioCapabilityIDMappingResponse,
UERadioCapabilityInfoIndication,
UETNLABindingReleaseRequest,
UplinkNASTransport,
UplinkNonUEAssociatedNRPPaTransport,
UplinkRANConfigurationTransfer,
UplinkRANEarlyStatusTransfer,
UplinkRANStatusTransfer,
UplinkUEAssociatedNRPPaTransport,
WriteReplaceWarningRequest,
WriteReplaceWarningResponse,
UplinkRIMInformationTransfer,
DownlinkRIMInformationTransfer

FROM NGAP-PDU-Contents

id-AMFConfigurationUpdate,
id-AMFCPRelocationIndication,
id-AMFStatusIndication,
id-CellTrafficTrace,
id-ConnectionEstablishmentIndication,
id-DeactivateTrace,
id-DownlinkNASTransport,
id-DownlinkNonUEAssociatedNRPPaTransport,
id-DownlinkRANConfigurationTransfer,
id-DownlinkRANEarlyStatusTransfer,
id-DownlinkRANStatusTransfer,
id-DownlinkUEAssociatedNRPPaTransport,
id-ErrorIndication,
id-HandoverCancel,
id-HandoverNotification,
id-HandoverPreparation,
id-HandoverResourceAllocation,
id-HandoverSuccess,
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-RANCPRelocationIndication,
id-RerouteNASRequest,
id-RetrieveUEInformation,
id-RRCInactiveTransitionReport,
id-SecondaryRATDataUsageReport,
id-TraceFailureIndication,
id-TraceStart,
id-UEContextModification,
id-UEContextRelease,
id-UEContextReleaseRequest,
id-UEContextResume,
id-UEContextSuspend,
id-UEInformationTransfer,
id-UERadioCapabilityCheck,
id-UERadioCapabilityIDMapping,
id-UERadioCapabilityInfoIndication,
id-UETNLABindingRelease,
id-UplinkNASTransport,
id-UplinkNonUEAssociatedNRPPaTransport,
id-UplinkRANConfigurationTransfer,
id-UplinkRANEarlyStatusTransfer,
id-UplinkRANStatusTransfer,
id-UplinkUEAssociatedNRPPaTransport,
id-WriteReplaceWarning,
id-UplinkRIMInformationTransfer,
id-DownlinkRIMInformationTransfer

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
uEContextResume
uEContextSuspend
uERadioCapabilityCheck
uERadioCapabilityIDMapping
writeReplaceWarning,
...
}

NGAP-ELEMENTARY-PROCEDURES-CLASS-2 NGAP-ELEMENTARY-PROCEDURE ::= {
  aMFPCRelocationIndication
  aMFStatusIndication
  cellTrafficTrace
  connectionEstablishmentIndication
  deactivateTrace
  downlinkNASTransport
  downlinkNonUEAssociatedNRPPaTransport
  downlinkRANConfigurationTransfer
  downlinkRANEarlyStatusTransfer
  downlinkRANStatusTransfer
  downlinkRIMInformationTransfer
  downlinkUEAssociatedNRPPaTransport
  errorIndication
  handoverNotification
  handoverSuccess
  initialUEMessage
  locationReport
  locationReportingControl
  locationReportingFailureIndication
  nASNonDeliveryIndication
  overloadStart
  overloadStop
  paging
  pDUSessionResourceNotify
  privateMessage
  pWSFailureIndication
  pWSRestartIndication
  rANCPRelocationIndication
  rerouteNASRequest
  retrieveUEInformation
  rRCInactiveTransitionReport
  secondaryRATDataUsageReport
  traceFailureIndication
  traceStart

```

```

    uEContextReleaseRequest
    uEInformationTransfer
    uERadioCapabilityInfoIndication
    uETNLABindingRelease
    uplinkNASTransport
    uplinkNonUEAssociatedNRPPaTransport
    uplinkRANConfigurationTransfer
    uplinkRANEarlyStatusTransfer
    uplinkRANStatusTransfer
    uplinkRIMInformationTransfer
    uplinkUEAssociatedNRPPaTransport,
    ...
}

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

AMFConfigurationUpdate NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      AMFConfigurationUpdate
    SUCCESSFUL OUTCOME      AMFConfigurationUpdateAcknowledge
    UNSUCCESSFUL OUTCOME    AMFConfigurationUpdateFailure
    PROCEDURE CODE          id-AMFConfigurationUpdate
    CRITICALITY              reject
}

AMFCPRelocationIndication NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      AMFCPRelocationIndication
    PROCEDURE CODE          id-AMFCPRelocationIndication
    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
}

connectionEstablishmentIndication NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ConnectionEstablishmentIndication
    PROCEDURE CODE          id-ConnectionEstablishmentIndication
    CRITICALITY              reject
}

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
}

downlinkRANEarlyStatusTransfer NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      DownlinkRANEarlyStatusTransfer
  PROCEDURE CODE          id-DownlinkRANEarlyStatusTransfer
  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
}

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

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      PDUSessionResourceModifyRequest
SUCCESSFUL OUTCOME      PDUSessionResourceModifyResponse
PROCEDURE CODE          id-PDUSessionResourceModify
CRITICALITY             reject
}

pDUSessionResourceModifyIndication NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      PDUSessionResourceModifyIndication
  SUCCESSFUL OUTCOME      PDUSessionResourceModifyConfirm
  PROCEDURE CODE          id-PDUSessionResourceModifyIndication
  CRITICALITY             reject
}

pDUSessionResourceNotify NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      PDUSessionResourceNotify
  PROCEDURE CODE          id-PDUSessionResourceNotify
  CRITICALITY             ignore
}

pDUSessionResourceRelease NGAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      PDUSessionResourceReleaseCommand
  SUCCESSFUL OUTCOME      PDUSessionResourceReleaseResponse
  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
}

rANCPRelocationIndication NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE  RANCPRelocationIndication
    PROCEDURE CODE      id-RANCPRelocationIndication
    CRITICALITY         reject
}

rerouteNASRequest NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE  RerouteNASRequest
    PROCEDURE CODE      id-RerouteNASRequest
    CRITICALITY         reject
}

retrieveUEInformation NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE  RetrieveUEInformation
    PROCEDURE CODE      id-RetrieveUEInformation
    CRITICALITY         reject
}

rRCInactiveTransitionReport NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE  RRCInactiveTransitionReport
    PROCEDURE CODE      id-RRCInactiveTransitionReport
    CRITICALITY         ignore
}

secondaryRATDataUsageReport NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE  SecondaryRATDataUsageReport
    PROCEDURE CODE      id-SecondaryRATDataUsageReport
    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
}

ueContextResume NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UEContextResumeRequest
    SUCCESSFUL OUTCOME      UEContextResumeResponse
    UNSUCCESSFUL OUTCOME    UEContextResumeFailure
    PROCEDURE CODE          id-UEContextResume
    CRITICALITY              reject
}

ueContextSuspend NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UEContextSuspendRequest
    SUCCESSFUL OUTCOME      UEContextSuspendResponse
    UNSUCCESSFUL OUTCOME    UEContextSuspendFailure
    PROCEDURE CODE          id-UEContextSuspend
    CRITICALITY              reject
}

ueInformationTransfer NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UEInformationTransfer
    PROCEDURE CODE          id-UEInformationTransfer
    CRITICALITY              reject
}

ueRadioCapabilityCheck NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UERadioCapabilityCheckRequest
    SUCCESSFUL OUTCOME      UERadioCapabilityCheckResponse
    PROCEDURE CODE          id-UERadioCapabilityCheck
    CRITICALITY              reject
}

ueRadioCapabilityIDMapping NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UERadioCapabilityIDMappingRequest
    SUCCESSFUL OUTCOME      UERadioCapabilityIDMappingResponse
}
```

```
    PROCEDURE CODE      id-UERadioCapabilityIDMapping
    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
}

uplinkRANEarlyStatusTransfer NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE  UplinkRANEarlyStatusTransfer
    PROCEDURE CODE      id-UplinkRANEarlyStatusTransfer
    CRITICALITY         reject
}

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
}

uplinkRIMInformationTransfer NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UplinkRIMInformationTransfer
    PROCEDURE CODE         id-UplinkRIMInformationTransfer
    CRITICALITY             ignore
}

downlinkRIMInformationTransfer NGAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      DownlinkRIMInformationTransfer
    PROCEDURE CODE         id-DownlinkRIMInformationTransfer
    CRITICALITY             ignore
}

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,
AuthenticatedIndication,
BroadcastCancelledAreaList,
BroadcastCompletedAreaList,
CancelAllWarningMessages,
Cause,
CellIDListForRestart,
CEmodeBRestricted,
CEmodeBSupport-Indicator,
CNAssistedRANTuning,
ConcurrentWarningMessageInd,
CoreNetworkAssistanceInformationForInactive,
CPTransportLayerInformation,
CriticalityDiagnostics,
DataCodingScheme,
DL-CP-SecurityInformation,
DirectForwardingPathAvailability,
EarlyStatusTransfer-TransparentContainer,
EDT-Session,
EmergencyAreaIDListForRestart,
EmergencyFallbackIndicator,
EN-DCSONConfigurationTransfer,
EndIndication,
Enhanced-CoverageRestriction,
EUTRA-CGI,
Extended-AMFName,
Extended-ConnectedTime,
Extended-RANNodeName,
FiveG-S-TMSI,
GlobalRANNodeID,
GUAMI,
HandoverFlag,
HandoverType,
IAB-Authorized,
IAB-Supported,
IABNodeIndication,
IMSVoiceSupportIndicator,
IndexToRFSP,
InfoOnRecommendedCellsAndRANNodesForPaging,
IntersystemSONConfigurationTransfer,
LAI,
LTEM-Indication,
LocationReportingRequestType,
LTEUESidelinkAggregateMaximumBitrate,
LTEV2XServicesAuthorized,
MaskedIMEISV,
MessageIdentifier,
MDTPLMNList,
MobilityRestrictionList,
NAS-PDU,
NASSecurityParametersFromNGRAN,
NB-IoT-DefaultPagingDRX,
NB-IoT-PagingDRX,
NB-IoT-Paging-eDRXInfo,

NB-IoT-UEPriority,
NewSecurityContextInd,
NGRAN-CGI,
NGRAN-TNLAssociationToRemoveList,
NGRANTraceID,
NotifySourceNGRANNode,
NPN-AccessInformation,
NR-CGI,
NRPPa-PDU,
NumberOfBroadcastsRequested,
NRUESidelinkAggregateMaximumBitrate,
NRV2XServicesAuthorized,
OverloadResponse,
OverloadStartNSSAList,
PagingAssisDataforCEcapabUE,
PagingDRX,
PagingOrigin,
PagingPriority,
PagingDRXInformation,
PDUSessionAggregateMaximumBitRate,
PDUSessionResourceAdmittedList,
PDUSessionResourceFailedToModifyListModCfm,
PDUSessionResourceFailedToModifyListModRes,
PDUSessionResourceFailedToResumeListRESReq,
PDUSessionResourceFailedToResumeListRESRes,
PDUSessionResourceFailedToSetupListCxtFail,
PDUSessionResourceFailedToSetupListCxtRes,
PDUSessionResourceFailedToSetupListHOAck,
PDUSessionResourceFailedToSetupListPSReq,
PDUSessionResourceFailedToSetupListSUSReq,
PDUSessionResourceHandoverList,
PDUSessionResourceListCxtRelCpl,
PDUSessionResourceListCxtRelReq,
PDUSessionResourceListHORqd,
PDUSessionResourceModifyListModCfm,
PDUSessionResourceModifyListModInd,
PDUSessionResourceModifyListModReq,
PDUSessionResourceModifyListModRes,
PDUSessionResourceNotifyList,
PDUSessionResourceReleasedListNot,
PDUSessionResourceReleasedListPSAck,
PDUSessionResourceReleasedListPSFail,
PDUSessionResourceReleasedListRelRes,
PDUSessionResourceResumeListRESReq,
PDUSessionResourceResumeListRESRes,
PDUSessionResourceSecondaryRATUsageList,
PDUSessionResourceSetupListCxtReq,
PDUSessionResourceSetupListCxtRes,
PDUSessionResourceSetupListHOReq,
PDUSessionResourceSetupListSUSReq,
PDUSessionResourceSetupListSUSRes,
PDUSessionResourceSuspendListSUSReq,
PDUSessionResourceSwitchedList,
PDUSessionResourceToBeSwitchedDLLList,

PDUSessionResourceToReleaseListHOCmd,
PDUSessionResourceToReleaseListRelCmd,
PLMNIdentity,
PLMNSupportList,
PrivacyIndicator,
PWSFailedCellIDList,
PC5QoSParameters,
RANNodeName,
RANPagingPriority,
RANStatusTransfer-TransparentContainer,
RAN-UE-NGAP-ID,
RedirectionVoiceFallback,
RelativeAMFCapacity,
RepetitionPeriod,
ResetType,
RGLLevelWirelineAccessCharacteristics,
RoutingID,
RRCEstablishmentCause,
RRCInactiveTransitionReportRequest,
RRCState,
SecurityContext,
SecurityKey,
SerialNumber,
ServedGUAMIList,
SliceSupportList,
S-NSSAI,
SONConfigurationTransfer,
SourceToTarget-TransparentContainer,
SourceToTarget-AMFInformationReroute,
SRVCCOperationPossible,
SupportedTAList,
Suspend-Request-Indication,
Suspend-Response-Indication,
TAI,
TAIListForPaging,
TAIListForRestart,
TargetID,
TargetToSource-TransparentContainer,
TargetToSource-Failure-TransparentContainer,
TimeToWait,
TNLAssociationList,
TraceActivation,
TrafficLoadReductionIndication,
TransportLayerAddress,
UEAggregateMaximumBitRate,
UE-associatedLogicalNG-connectionList,
UECapabilityInfoRequest,
UEContextRequest,
UE-DifferentiationInfo,
UE-NGAP-IDs,
UEPagingIdentity,
UEPresenceInAreaOfInterestList,
UERadioCapability,
UERadioCapabilityForPaging,

UERadioCapabilityID,
UERetentionInformation,
UESecurityCapabilities,
UE-UP-CIoT-Support,
UL-CP-SecurityInformation,
UnavailableGUAMIList,
URI-address,
UserLocationInformation,
WarningAreaCoordinates,
WarningAreaList,
WarningMessageContents,
WarningSecurityInfo,
WarningType,
WUS-Assistance-Information,
RIMInformationTransfer

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-AuthenticatedIndication,
id-BroadcastCancelledAreaList,
id-BroadcastCompletedAreaList,
id-CancelAllWarningMessages,
id-Cause,
id-CellIDListForRestart,
id-CEmodeBrestricted,
id-CEmodeBSupport-Indicator,
id-CNAssistedRANTuning,
id-ConcurrentWarningMessageInd,
id-CoreNetworkAssistanceInformationForInactive,
id-CriticalityDiagnostics,

id-DataCodingScheme,
id-DefaultPagingDRX,
id-DirectForwardingPathAvailability,
id-DL-CP-SecurityInformation,
id-EarlyStatusTransfer-TransparentContainer,
id-EDT-Session,
id-EmergencyAreaIDListForRestart,
id-EmergencyFallbackIndicator,
id-ENDC-SONConfigurationTransferDL,
id-ENDC-SONConfigurationTransferUL,
id-EndIndication,
id-Enhanced-CoverageRestriction,
id-EUTRA-CGI,
id-Extended-AMFName,
id-Extended-ConnectedTime,
id-Extended-RANNodeName,
id-FiveG-S-TMSI,
id-GlobalRANNodeID,
id-GUAMI,
id-HandoverFlag,
id-HandoverType,
id-IAB-Authorized,
id-IAB-Supported,
id-IABNodeIndication,
id-IMSVoiceSupportIndicator,
id-IndexToRFSP,
id-InfoOnRecommendedCellsAndRANNodesForPaging,
id-IntersystemSONConfigurationTransferDL,
id-IntersystemSONConfigurationTransferUL,
id-LocationReportingRequestType,
id-LTEM-Indication,
id-LTEV2XServicesAuthorized,
id-LTEUESidelinkAggregateMaximumBitrate,
id-ManagementBasedMDTPLMNList,
id-MaskedIMEISV,
id-MessageIdentifier,
id-MobilityRestrictionList,
id-NAS-PDU,
id-NASC,
id-NASSecurityParametersFromNGRAN,
id-NB-IoT-DefaultPagingDRX,
id-NB-IoT-PagingDRX,
id-NB-IoT-Paging-eDRXInfo,
id-NB-IoT-UEPriority,
id-NewAMF-UE-NGAP-ID,
id-NewGUAMI,
id-NewSecurityContextInd,
id-NGAP-Message,
id-NGRAN-CGI,
id-NGRAN-TNLAssociationToRemoveList,
id-NGRANTraceID,
id-NotifySourceNGRANNode,
id-NPN-AccessInformation,
id-NR-CGI,

id-NRPPa-PDU,
id-NRV2XServicesAuthorized,
id-NRUESidelinkAggregateMaximumBitrate,
id-NumberOfBroadcastsRequested,
id-OldAMF,
id-OverloadStartNSSAList,
id-PagingAssisDataforCEcapabUE,
id-PagingDRX,
id-PagingDRXInformation,
id-PagingOrigin,
id-PagingPriority,
id-PDUSessionResourceAdmittedList,
id-PDUSessionResourceFailedToModifyListModCfm,
id-PDUSessionResourceFailedToModifyListModRes,
id-PDUSessionResourceFailedToResumeListRESReq,
id-PDUSessionResourceFailedToResumeListRESRes,
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-PDUSessionResourceResumeListRESReq,
id-PDUSessionResourceResumeListRESRes,
id-PDUSessionResourceSecondaryRATUsageList,
id-PDUSessionResourceSetupListCxtReq,
id-PDUSessionResourceSetupListCxtRes,
id-PDUSessionResourceSetupListHOReq,
id-PDUSessionResourceSetupListSUSReq,
id-PDUSessionResourceSetupListSURES,
id-PDUSessionResourceSuspendListSUSReq,
id-PDUSessionResourceSwitchedList,
id-PDUSessionResourceToBeSwitchedDLLList,
id-PDUSessionResourceToReleaseListHOCmd,
id-PDUSessionResourceToReleaseListRelCmd,
id-PLMNSupportList,
id-PrivacyIndicator,
id-PWSFailedCellIDList,
id-PC5QoSParameters,
id-RANNodeName,
id-RANPagingPriority,
id-RANStatusTransfer-TransparentContainer,

id-RAN-UE-NGAP-ID,
id-RedirectionVoiceFallback,
id-RelativeAMFCapacity,
id-RepetitionPeriod,
id-ResetType,
id-RGLevelWirelineAccessCharacteristics,
id-RoutingID,
id-RRCEstablishmentCause,
id-RRCInactiveTransitionReportRequest,
id-RRC-Resume-Cause,
id-RRCState,
id-S-NSSAI,
id-SecurityContext,
id-SecurityKey,
id-SelectedPLMNIdentity,
id-SerialNumber,
id-ServedGUAMIList,
id-SliceSupportList,
id-S-NSSAI,
id-SONConfigurationTransferDL,
id-SONConfigurationTransferUL,
id-SourceAMF-UE-NGAP-ID,
id-SourceToTarget-TransparentContainer,
id-SourceToTarget-AMFInformationReroute,
id-SRVCCOperationPossible,
id-SupportedTAList,
id-Suspend-Request-Indication,
id-Suspend-Response-Indication,
id-TAI,
id-TAIListForPaging,
id-TAIListForRestart,
id-TargetID,
id-TargetToSource-TransparentContainer,
id-TargettoSource-Failure-TransparentContainer,
id-TimeToWait,
id-TNGFIdentityInformation,
id-TraceActivation,
id-TraceCollectionEntityIPAddress,
id-TraceCollectionEntityURI,
id-TWIFIdentityInformation,
id-UEAggregateMaximumBitRate,
id-UE-associatedLogicalNG-connectionList,
id-UECapabilityInfoRequest,
id-UEContextRequest,
id-UE-DifferentiationInfo,
id-UE-NGAP-IDs,
id-UEPagingIdentity,
id-UEPresenceInAreaOfInterestList,
id-UERadioCapability,
id-UERadioCapabilityForPaging,
id-UERadioCapabilityID,
id-UERadioCapability-EUTRA-Format,
id-UERetentionInformation,
id-UESecurityCapabilities,

```

id-UE-UP-CIoT-Support,
id-UL-CP-SecurityInformation,
id-UnavailableGUAMIList,
id-UserLocationInformation,
id-W-AGFIdentityInformation,
id-WarningAreaCoordinates,
id-WarningAreaList,
id-WarningMessageContents,
id-WarningSecurityInfo,
id-WarningType,
id-WUS-Assistance-Information,
id-RIMInformationTransfer

FROM NGAP-Constants;

-- *****
--
-- PDU SESSION MANAGEMENT ELEMENTARY PROCEDURES
--
-- *****

-- *****
--
-- PDU Session Resource Setup Elementary Procedure
--
-- *****

-- *****
--
-- PDU SESSION RESOURCE SETUP REQUEST
--
-- *****

PDUSessionResourceSetupRequest ::= SEQUENCE {
    protocolIES      ProtocolIE-Container      { {PDUSessionResourceSetupRequestIES} },
    ...
}

PDUSessionResourceSetupRequestIES 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-PDUSessionResourceSetupListSReq CRITICALITY reject TYPE PDUSessionResourceSetupListSReq PRESENCE mandatory } |
    { ID id-UEAggregateMaximumBitRate CRITICALITY ignore TYPE UEAggregateMaximumBitRate PRESENCE optional   },
    ...
}

-- *****
--
-- PDU SESSION RESOURCE SETUP RESPONSE
--
-- *****

```

```

PDU SessionResourceSetupResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PDU SessionResourceSetupResponseIEs} },
    ...
}

PDU SessionResourceSetupResponseIEs 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-PDU SessionResourceSetupListSUsRes CRITICALITY ignore TYPE PDU SessionResourceSetupListSUsRes PRESENCE optional }|
    { ID id-PDU SessionResourceFailedToSetupListSUsRes CRITICALITY ignore TYPE PDU SessionResourceFailedToSetupListSUsRes PRESENCE optional }|
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

-- *****
--
-- PDU Session Resource Release Elementary Procedure
--
-- *****

-- *****
--
-- PDU SESSION RESOURCE RELEASE COMMAND
--
-- *****

PDU SessionResourceReleaseCommand ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PDU SessionResourceReleaseCommandIEs} },
    ...
}

PDU SessionResourceReleaseCommandIEs 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-PDU SessionResourceToReleaseListRelCmd CRITICALITY reject TYPE PDU SessionResourceToReleaseListRelCmd PRESENCE mandatory },
    ...
}

-- *****
--
-- PDU SESSION RESOURCE RELEASE RESPONSE
--
-- *****

PDU SessionResourceReleaseResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PDU SessionResourceReleaseResponseIEs} },
    ...
}

PDU SessionResourceReleaseResponseIEs 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 }|
}

```

```

    { ID id-UserLocationInformation          CRITICALITY ignore TYPE UserLocationInformation          PRESENCE optional    },
    ...
}

-- *****
--
-- 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 optional    }|
    { 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-CoreNetworkAssistanceInformationForInactive CRITICALITY ignore TYPE CoreNetworkAssistanceInformationForInactive 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 }
{ ID id-RedirectionVoiceFallback CRITICALITY ignore TYPE RedirectionVoiceFallback PRESENCE optional }
{ ID id-LocationReportingRequestType CRITICALITY ignore TYPE LocationReportingRequestType PRESENCE optional }
{ ID id-CNAssistedRANTuning CRITICALITY ignore TYPE CNAssistedRANTuning PRESENCE optional }
{ ID id-SRVCCOperationPossible CRITICALITY ignore TYPE SRVCCOperationPossible PRESENCE optional }
{ ID id-IAB-Authorized CRITICALITY ignore TYPE IAB-Authorized PRESENCE optional }
{ ID id-Enhanced-CoverageRestriction CRITICALITY ignore TYPE Enhanced-CoverageRestriction PRESENCE optional }
{ ID id-Extended-ConnectedTime CRITICALITY ignore TYPE Extended-ConnectedTime PRESENCE optional }
{ ID id-UE-DifferentiationInfo CRITICALITY ignore TYPE UE-DifferentiationInfo PRESENCE optional }
{ ID id-NRV2XServicesAuthorized CRITICALITY ignore TYPE NRV2XServicesAuthorized PRESENCE optional }
{ ID id-LTEV2XServicesAuthorized CRITICALITY ignore TYPE LTEV2XServicesAuthorized PRESENCE optional }
{ ID id-NRUESidelinkAggregateMaximumBitrate CRITICALITY ignore TYPE NRUESidelinkAggregateMaximumBitrate PRESENCE optional }
{ ID id-LTEUESidelinkAggregateMaximumBitrate CRITICALITY ignore TYPE LTEUESidelinkAggregateMaximumBitrate PRESENCE optional }
{ ID id-PC5QoSParameters CRITICALITY ignore TYPE PC5QoSParameters PRESENCE optional }
{ ID id-CEmodeRestricted CRITICALITY ignore TYPE CEmodeRestricted PRESENCE optional }
{ ID id-UE-UP-CIoT-Support CRITICALITY ignore TYPE UE-UP-CIoT-Support PRESENCE optional }
{ ID id-RGLevelWirelineAccessCharacteristics CRITICALITY ignore TYPE RGLevelWirelineAccessCharacteristics PRESENCE optional }
{ ID id-ManagementBasedMDTPLMNList CRITICALITY ignore TYPE MDTPLMNList PRESENCE optional }
{ ID id-UERadioCapabilityID CRITICALITY reject TYPE UERadioCapabilityID 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 }|
    { ID id-PagingAssisDataforCEcapabUE CRITICALITY ignore TYPE PagingAssisDataforCEcapabUE PRESENCE optional },
    ...
}

-- *****
--
-- UE Context Resume Elementary Procedure
--
-- *****

```

```

-- *****
--
-- UE CONTEXT RESUME REQUEST
--
-- *****

UEContextResumeRequest ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {UEContextResumeRequestIEs} },
    ...
}

UEContextResumeRequestIEs 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-RRC-Resume-Cause        CRITICALITY ignore TYPE RRCEstablishmentCause    PRESENCE mandatory }|
    { ID id-PDUSessionResourceResumeListRESReq CRITICALITY reject TYPE PDUSessionResourceResumeListRESReq PRESENCE optional }|
    { ID id-PDUSessionResourceFailedToResumeListRESReq CRITICALITY reject TYPE PDUSessionResourceFailedToResumeListRESReq PRESENCE optional }|
    optional }|
    { ID id-Suspend-Request-Indication CRITICALITY ignore TYPE Suspend-Request-Indication PRESENCE optional },
    ...
}

-- *****
--
-- UE CONTEXT RESUME RESPONSE
--
-- *****

UEContextResumeResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {UEContextResumeResponseIEs} },
    ...
}

UEContextResumeResponseIEs 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-PDUSessionResourceResumeListRESRes CRITICALITY reject TYPE PDUSessionResourceResumeListRESRes PRESENCE optional }|
    { ID id-PDUSessionResourceFailedToResumeListRESRes CRITICALITY reject TYPE PDUSessionResourceFailedToResumeListRESRes PRESENCE optional }|
    optional }|
    { ID id-SecurityContext          CRITICALITY reject TYPE SecurityContext          PRESENCE optional }|
    { ID id-Suspend-Response-Indication CRITICALITY ignore TYPE Suspend-Response-Indication PRESENCE optional }|
    { ID id-Extended-ConnectedTime    CRITICALITY ignore TYPE Extended-ConnectedTime    PRESENCE optional }|
    { ID id-CriticalityDiagnostics     CRITICALITY ignore TYPE CriticalityDiagnostics     PRESENCE optional },
    ...
}

-- *****
--
-- UE CONTEXT RESUME FAILURE
--
-- *****

UEContextResumeFailure ::= SEQUENCE {

```

```

    protocolIEs      ProtocolIE-Container      { { UEContextResumeFailureIEs } },
    ...
}

UEContextResumeFailureIEs 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   },
  ...
}

-- *****
--
-- UE Context Suspend Elementary Procedure
--
-- *****
--
-- *****
--
-- UE CONTEXT SUSPEND REQUEST
--
-- *****

UEContextSuspendRequest ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container      { {UEContextSuspendRequestIEs} },
  ...
}

UEContextSuspendRequestIEs 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-InfoOnRecommendedCellsAndRANNodesForPaging CRITICALITY ignore TYPE InfoOnRecommendedCellsAndRANNodesForPaging PRESENCE optional
  }|
  { ID id-PagingAssisDataforCEcapabUE CRITICALITY ignore TYPE PagingAssisDataforCEcapabUE PRESENCE optional
  }|
  { ID id-PDUSessionResourceSuspendListSUSReq CRITICALITY reject TYPE PDUSessionResourceSuspendListSUSReq PRESENCE optional
  }, ...
}

-- *****
--
-- UE CONTEXT SUSPEND RESPONSE
--
-- *****

UEContextSuspendResponse ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container      { {UEContextSuspendResponseIEs} },
  ...
}

```

```

UEContextSuspendResponseIEs 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-SecurityContext          CRITICALITY reject TYPE SecurityContext        PRESENCE optional   }|
  { ID id-CriticalityDiagnostics   CRITICALITY ignore  TYPE CriticalityDiagnostics  PRESENCE optional   },
  ...
}

-- *****
--
-- UE CONTEXT SUSPEND FAILURE
--
-- *****

UEContextSuspendFailure ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container      { { UEContextSuspendFailureIEs } },
  ...
}

UEContextSuspendFailureIEs 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   },
  ...
}

-- *****
--
-- 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-CoreNetworkAssistanceInformationForInactive CRITICALITY ignore  TYPE CoreNetworkAssistanceInformationForInactive PRESENCE optional },
  ...
}

```

```

{ ID id-EmergencyFallbackIndicator          CRITICALITY reject TYPE EmergencyFallbackIndicator PRESENCE optional }|
{ ID id-NewAMF-UE-NGAP-ID                  CRITICALITY reject TYPE AMF-UE-NGAP-ID PRESENCE optional }|
{ ID id-RRCInactiveTransitionReportRequest  CRITICALITY ignore  TYPE RRCInactiveTransitionReportRequest PRESENCE optional }|
{ ID id-NewGUAMI                            CRITICALITY reject TYPE GUAMI PRESENCE optional }|
{ ID id-CNAssistedRANTuning                 CRITICALITY ignore  TYPE CNAssistedRANTuning PRESENCE optional }|
{ ID id-SRVCCOperationPossible              CRITICALITY ignore  TYPE SRVCCOperationPossible PRESENCE optional }|
{ ID id-IAB-Authorized                      CRITICALITY ignore  TYPE IAB-Authorized PRESENCE optional }|
{ ID id-NRV2XServicesAuthorized             CRITICALITY ignore  TYPE NRV2XServicesAuthorized PRESENCE optional }|
{ ID id-LTEV2XServicesAuthorized            CRITICALITY ignore  TYPE LTEV2XServicesAuthorized PRESENCE optional }|
{ ID id-NRUESidelinkAggregateMaximumBitrate CRITICALITY ignore  TYPE NRUESidelinkAggregateMaximumBitrate PRESENCE optional }|
{ ID id-LTEUESidelinkAggregateMaximumBitrate CRITICALITY ignore  TYPE LTEUESidelinkAggregateMaximumBitrate PRESENCE optional }|
{ ID id-PC5QoSParameters                   CRITICALITY ignore  TYPE PC5QoSParameters PRESENCE optional }|
{ ID id-UERadioCapabilityID                 CRITICALITY reject  TYPE UERadioCapabilityID 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 }|
    { 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 },
    ...
}

-- *****
--
-- Retrieve UE Information
--
-- *****

RetrieveUEInformation ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { { RetrieveUEInformationIEs } },
    ...
}

RetrieveUEInformationIEs NGAP-PROTOCOL-IES ::= {
    { ID id-FiveG-S-TMSI            CRITICALITY reject  TYPE FiveG-S-TMSI            PRESENCE mandatory },
    ...
}

-- *****
--
-- UE Information Transfer
--
-- *****

UEInformationTransfer ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { { UEInformationTransferIEs } },
    ...
}

UEInformationTransferIEs NGAP-PROTOCOL-IES ::= {
    { ID id-FiveG-S-TMSI            CRITICALITY reject  TYPE FiveG-S-TMSI            PRESENCE mandatory }|
    { ID id-NB-IoT-UEPriority        CRITICALITY ignore  TYPE NB-IoT-UEPriority        PRESENCE optional }|
    { ID id-UERadioCapability        CRITICALITY ignore  TYPE UERadioCapability        PRESENCE optional }|
    { ID id-S-NSSAI                  CRITICALITY ignore  TYPE S-NSSAI                  PRESENCE optional }|
    { ID id-AllowedNSSAI             CRITICALITY ignore  TYPE AllowedNSSAI             PRESENCE optional }|
}

```



```

    { ID id-UE-DifferentiationInfo      CRITICALITY ignore  TYPE UE-DifferentiationInfo      PRESENCE optional  },
    ...
}

-- *****
--
-- RAN CP Relocation Indication
--
-- *****

RANCPRelocationIndication ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container { { RANCPRelocationIndicationIEs } },
    ...
}

RANCPRelocationIndicationIEs NGAP-PROTOCOL-IES ::= {
    { ID id-RAN-UE-NGAP-ID                CRITICALITY reject  TYPE RAN-UE-NGAP-ID                PRESENCE mandatory  }|
    { ID id-FiveG-S-TMSI                  CRITICALITY reject  TYPE FiveG-S-TMSI                  PRESENCE mandatory  }|
    { ID id-EUTRA-CGI                      CRITICALITY ignore  TYPE EUTRA-CGI                      PRESENCE mandatory  }|
    { ID id-TAI                            CRITICALITY ignore  TYPE TAI                            PRESENCE mandatory  }|
    { ID id-UL-CP-SecurityInformation      CRITICALITY reject  TYPE UL-CP-SecurityInformation      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" or "5GStoUTRAN" --
    { ID id-PDUSessionResourceHandoverList TYPE PDUSessionResourceHandoverList PRESENCE optional }|
    { 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 }|
    { ID id-TargettoSource-Failure-TransparentContainer CRITICALITY ignore TYPE TargettoSource-Failure-TransparentContainer 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-CoreNetworkAssistanceInformationForInactive CRITICALITY ignore TYPE CoreNetworkAssistanceInformationForInactive 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-PDUSessionResourceSetupListHOREq CRITICALITY reject TYPE PDUSessionResourceSetupListHOREq 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 }|
    { ID id-RedirectionVoiceFallback CRITICALITY ignore TYPE RedirectionVoiceFallback PRESENCE optional }|
    { ID id-CNAssistedRANTuning     CRITICALITY ignore TYPE CNAssistedRANTuning     PRESENCE optional }|
    { ID id-SRVCCOperationPossible  CRITICALITY ignore TYPE SRVCCOperationPossible  PRESENCE optional }|
    { ID id-IAB-Authorized          CRITICALITY reject TYPE IAB-Authorized          PRESENCE optional }|
    { ID id-Enhanced-CoverageRestriction CRITICALITY ignore TYPE Enhanced-CoverageRestriction PRESENCE optional }|
    { ID id-UE-DifferentiationInfo  CRITICALITY ignore TYPE UE-DifferentiationInfo  PRESENCE optional }|
    { ID id-NRV2XServicesAuthorized CRITICALITY ignore TYPE NRV2XServicesAuthorized PRESENCE optional }|
    { ID id-LTEV2XServicesAuthorized CRITICALITY ignore TYPE LTEV2XServicesAuthorized PRESENCE optional }|
    { ID id-NRUESidelinkAggregateMaximumBitrate CRITICALITY ignore TYPE NRUESidelinkAggregateMaximumBitrate PRESENCE optional }|
    { ID id-LTEUESidelinkAggregateMaximumBitrate CRITICALITY ignore TYPE LTEUESidelinkAggregateMaximumBitrate PRESENCE optional }|
    { ID id-PC5QoSParameters        CRITICALITY ignore TYPE PC5QoSParameters        PRESENCE optional }|
    { ID id-CEmodeBrestricted       CRITICALITY ignore TYPE CEmodeBrestricted       PRESENCE optional }|
    { ID id-UE-UP-CIoT-Support     CRITICALITY ignore TYPE UE-UP-CIoT-Support     PRESENCE optional }|
    { ID id-ManagementBasedMDTPLMNList CRITICALITY ignore TYPE MDTPLMNList            PRESENCE optional }|
    { ID id-UERadioCapabilityID     CRITICALITY reject TYPE UERadioCapabilityID     PRESENCE optional }|
    ...
}
```

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

```

-- 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 }|
    { ID id-TargettoSource-Failure-TransparentContainer CRITICALITY ignore TYPE TargettoSource-Failure-TransparentContainer 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 mandatory }|
  { ID id-NotifySourceNGRANNode   CRITICALITY ignore TYPE NotifySourceNGRANNode  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 }|
  { ID id-RRC-Resume-Cause        CRITICALITY ignore  TYPE RRCEstablishmentCause   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 reject 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-CoreNetworkAssistanceInformationForInactive CRITICALITY ignore TYPE CoreNetworkAssistanceInformationForInactive PRESENCE optional }|
optional }|
    { ID id-RRCInactiveTransitionReportRequest CRITICALITY ignore TYPE RRCInactiveTransitionReportRequest PRESENCE optional }|
    { ID id-CriticalityDiagnostics          CRITICALITY ignore TYPE CriticalityDiagnostics          PRESENCE optional }|
    { ID id-RedirectionVoiceFallback        CRITICALITY ignore TYPE RedirectionVoiceFallback        PRESENCE optional }|
    { ID id-CNAssistedRANTuning             CRITICALITY ignore TYPE CNAssistedRANTuning             PRESENCE optional }|
    { ID id-SRVCCOperationPossible          CRITICALITY ignore TYPE SRVCCOperationPossible          PRESENCE optional }|
    { ID id-Enhanced-CoverageRestriction    CRITICALITY ignore TYPE Enhanced-CoverageRestriction    PRESENCE optional }|
    { ID id-Extended-ConnectedTime         CRITICALITY ignore TYPE Extended-ConnectedTime         PRESENCE optional }|
    { ID id-UE-DifferentiationInfo         CRITICALITY ignore TYPE UE-DifferentiationInfo         PRESENCE optional }|
    { ID id-NRV2XServicesAuthorized         CRITICALITY ignore TYPE NRV2XServicesAuthorized         PRESENCE optional }|
    { ID id-LTEV2XServicesAuthorized        CRITICALITY ignore TYPE LTEV2XServicesAuthorized        PRESENCE optional }|
    { ID id-NRUESidelinkAggregateMaximumBitrate CRITICALITY ignore TYPE NRUESidelinkAggregateMaximumBitrate PRESENCE optional }|
    { ID id-LTEUESidelinkAggregateMaximumBitrate CRITICALITY ignore TYPE LTEUESidelinkAggregateMaximumBitrate PRESENCE optional }|
    { ID id-PC5QoSParameters                CRITICALITY ignore TYPE PC5QoSParameters                PRESENCE optional }|
    { ID id-CEmodeBrestricted               CRITICALITY ignore TYPE CEmodeBrestricted               PRESENCE optional }|
    { ID id-UE-UP-CIoT-Support              CRITICALITY ignore TYPE UE-UP-CIoT-Support              PRESENCE optional }|
    { ID id-UERadioCapabilityID             CRITICALITY reject TYPE UERadioCapabilityID             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 }|
    ...
}

-- *****
--
-- HANDOVER SUCCESS ELEMENTARY PROCEDURE
--
-- *****
--
-- *****
--
-- HANDOVER SUCCESS
--
-- *****

HandoverSuccess ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { { HandoverSuccessIEs } },
    ...
}

HandoverSuccessIEs 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 },
    ...
}

-- *****
--
-- UPLINK RAN EARLY STATUS TRANSFER ELEMENTARY PROCEDURE
--
-- *****
--
-- *****
--
-- Uplink RAN Early Status Transfer
--
-- *****

UplinkRANEarlyStatusTransfer ::= SEQUENCE {
    protocolIES          ProtocolIE-Container          { {UplinkRANEarlyStatusTransferIEs} },
    ...
}

UplinkRANEarlyStatusTransferIEs 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-EarlyStatusTransfer-TransparentContainer  CRITICALITY reject  TYPE EarlyStatusTransfer-TransparentContainer  PRESENCE mandatory},
    ...
}

-- *****
--
-- DOWNLINK RAN EARLY STATUS TRANSFER ELEMENTARY PROCEDURE
--
-- *****
--
-- *****
--
-- Downlink RAN Early Status Transfer
--
-- *****

DownlinkRANEarlyStatusTransfer ::= SEQUENCE {
    protocolIES          ProtocolIE-Container          { {DownlinkRANEarlyStatusTransferIEs} },
    ...
}

DownlinkRANEarlyStatusTransferIEs 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-EarlyStatusTransfer-TransparentContainer  CRITICALITY reject  TYPE EarlyStatusTransfer-TransparentContainer  PRESENCE mandatory},
    ...
}

-- *****

```



```

--
-- 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-TAIListForPaging           CRITICALITY ignore TYPE TAIListForPaging           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   } |
  { ID id-NB-IoT-Paging-eDRXInfo     CRITICALITY ignore TYPE NB-IoT-Paging-eDRXInfo     PRESENCE optional   } |
  { ID id-NB-IoT-PagingDRX           CRITICALITY ignore TYPE NB-IoT-PagingDRX           PRESENCE optional   } |
  { ID id-Enhanced-CoverageRestriction CRITICALITY ignore TYPE Enhanced-CoverageRestriction PRESENCE optional   } |
  { ID id-WUS-Assistance-Information CRITICALITY ignore TYPE WUS-Assistance-Information  PRESENCE optional   } |
  { ID id-PagingeDRXInformation       CRITICALITY ignore TYPE PagingeDRXInformation       PRESENCE optional   } |
  { ID id-CEmodeBrestricted          CRITICALITY ignore TYPE CEmodeBrestricted          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   } |
  { ID id-SourceToTarget-AMFInformationReroute CRITICALITY ignore TYPE SourceToTarget-AMFInformationReroute PRESENCE optional   } |
}

```

```

    { ID id-SelectedPLMNIdentity          CRITICALITY ignore TYPE PLMNIdentity          PRESENCE optional }
    { ID id-IABNodeIndication             CRITICALITY reject TYPE IABNodeIndication        PRESENCE optional }
    { ID id-CEmodeBSupport-Indicator       CRITICALITY reject TYPE CEmodeBSupport-Indicator    PRESENCE optional }
    { ID id-LTEM-Indication                CRITICALITY ignore TYPE LTEM-Indication            PRESENCE optional }
    { ID id-EDT-Session                   CRITICALITY ignore TYPE EDT-Session                PRESENCE optional }
    { ID id-AuthenticatedIndication        CRITICALITY ignore TYPE AuthenticatedIndication    PRESENCE optional }
    { ID id-NPN-AccessInformation           CRITICALITY reject TYPE NPN-AccessInformation      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   }
    { ID id-SRVCCOperationPossible    CRITICALITY ignore TYPE SRVCCOperationPossible  PRESENCE optional   }
    { ID id-Enhanced-CoverageRestriction CRITICALITY ignore TYPE Enhanced-CoverageRestriction PRESENCE optional }
    { ID id-Extended-ConnectedTime    CRITICALITY ignore TYPE Extended-ConnectedTime  PRESENCE optional   }
    { ID id-UE-DifferentiationInfo    CRITICALITY ignore TYPE UE-DifferentiationInfo  PRESENCE optional   }
    { ID id-CEmodeBrestricted         CRITICALITY ignore TYPE CEmodeBrestricted        PRESENCE optional   }
    { ID id-UERadioCapability         CRITICALITY ignore TYPE UERadioCapability        PRESENCE optional   }
    { ID id-UECapabilityInfoRequest   CRITICALITY ignore TYPE UECapabilityInfoRequest  PRESENCE optional   }
    { ID id-EndIndication             CRITICALITY ignore TYPE EndIndication            PRESENCE optional   }
    { ID id-UERadioCapabilityID       CRITICALITY reject TYPE UERadioCapabilityID      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 }|
  { ID id-W-AGFIdentityInformation CRITICALITY reject  TYPE OCTET STRING            PRESENCE optional   }|
  { ID id-TNGFIdentityInformation CRITICALITY reject  TYPE OCTET STRING            PRESENCE optional   }|
  { ID id-TWIFIdentityInformation CRITICALITY reject  TYPE OCTET STRING            PRESENCE optional   },
  ...
}

-- *****
--
-- 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   }|
  { ID id-SourceToTarget-AMFInformationReroute CRITICALITY ignore  TYPE SourceToTarget-AMFInformationReroute 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 } |
    { ID id-UERetentionInformation    CRITICALITY ignore TYPE UERetentionInformation    PRESENCE optional   } |
    { ID id-NB-IoT-DefaultPagingDRX  CRITICALITY ignore TYPE NB-IoT-DefaultPagingDRX  PRESENCE optional   } |
    { ID id-Extended-RANNodeName     CRITICALITY ignore TYPE Extended-RANNodeName     PRESENCE optional   },
    ...
}

-- *****
--
-- 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   } |
    { ID id-UERetentionInformation    CRITICALITY ignore TYPE UERetentionInformation    PRESENCE optional   } |
    { ID id-IAB-Supported            CRITICALITY ignore TYPE IAB-Supported            PRESENCE optional   } |
    { ID id-Extended-AMFName         CRITICALITY ignore TYPE Extended-AMFName         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 }|
    { ID id-GlobalRANNodeID CRITICALITY ignore  TYPE GlobalRANNodeID    PRESENCE optional }|
    { ID id-NGRAN-TNLAssociationToRemoveList CRITICALITY reject  TYPE NGRAN-TNLAssociationToRemoveList PRESENCE optional }|
    { ID id-NB-IoT-DefaultPagingDRX CRITICALITY ignore  TYPE NB-IoT-DefaultPagingDRX PRESENCE optional }|
    { ID id-Extended-RANNodeName CRITICALITY ignore  TYPE Extended-RANNodeName 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-ServedGUAMList  CRITICALITY reject  TYPE ServedGUAMList  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   }|
  { ID id-Extended-AMFName  CRITICALITY ignore  TYPE Extended-AMFName  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 }|
    { ID id-FiveG-S-TMSI             CRITICALITY ignore TYPE FiveG-S-TMSI             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 }|
    { ID id-ENDC-SONConfigurationTransferUL     CRITICALITY ignore TYPE EN-DCSONConfigurationTransfer PRESENCE optional }|
    { ID id-IntersystemSONConfigurationTransferUL CRITICALITY ignore TYPE IntersystemSONConfigurationTransfer 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 }|
    { ID id-ENDC-SONConfigurationTransferDL     CRITICALITY ignore TYPE EN-DCSONConfigurationTransfer PRESENCE optional }|
    { ID id-IntersystemSONConfigurationTransferDL CRITICALITY ignore TYPE IntersystemSONConfigurationTransfer 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 } |
    { ID id-PrivacyIndicator        CRITICALITY ignore  TYPE PrivacyIndicator        PRESENCE optional   } |
    { ID id-TraceCollectionEntityURI CRITICALITY ignore  TYPE URI-address            PRESENCE optional   },
    ...
}

-- *****
--
-- 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 }|
  { ID id-UERadioCapability-EUTRA-Format CRITICALITY ignore TYPE UERadioCapability        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 }|
  { ID id-UERadioCapabilityID      CRITICALITY reject TYPE UERadioCapabilityID      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 ::= {
    ...
}

-- *****
--
-- DATA USAGE REPORTING ELEMENTARY PROCEDURES
--
-- *****

-- *****
--
-- SECONDARY RAT DATA USAGE REPORT
--
-- *****

SecondaryRATDataUsageReport ::= SEQUENCE {

```

```

    protocolIEs      ProtocolIE-Container      { {SecondaryRATDataUsageReportIEs} },
    ...
}

SecondaryRATDataUsageReportIEs 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-PDUSessionResourceSecondaryRATUsageList  CRITICALITY ignore  TYPE PDUSessionResourceSecondaryRATUsageList  PRESENCE mandatory
    } |
    { ID id-HandoverFlag            CRITICALITY ignore  TYPE HandoverFlag          PRESENCE optional
    } |
    { ID id-UserLocationInformation  CRITICALITY ignore  TYPE UserLocationInformation  PRESENCE optional
    },
    ...
}

-- *****
--
-- RIM INFORMATION TRANSFER ELEMENTARY PROCEDURES
--
-- *****

-- *****
--
-- UPLINK RIM INFORMATION TRANSFER
--
-- *****

UplinkRIMInformationTransfer ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {UplinkRIMInformationTransferIEs} },
    ...
}

UplinkRIMInformationTransferIEs NGAP-PROTOCOL-IES ::= {
    { ID id-RIMInformationTransfer  CRITICALITY ignore  TYPE RIMInformationTransfer  PRESENCE optional  },
    ...
}

-- *****
--
-- DOWNLINK RIM INFORMATION TRANSFER
--
-- *****

DownlinkRIMInformationTransfer ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {DownlinkRIMInformationTransferIEs} },
    ...
}

DownlinkRIMInformationTransferIEs NGAP-PROTOCOL-IES ::= {
    { ID id-RIMInformationTransfer  CRITICALITY ignore  TYPE RIMInformationTransfer  PRESENCE optional  },
    ...
}

```

```

}
-- *****
--
-- Connection Establishment Indication
--
-- *****

ConnectionEstablishmentIndication ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container { {ConnectionEstablishmentIndicationIEs} },
    ...
}

ConnectionEstablishmentIndicationIEs 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   } |
    { ID id-EndIndication           CRITICALITY ignore TYPE EndIndication           PRESENCE optional   } |
    { ID id-S-NSSAI                 CRITICALITY ignore TYPE S-NSSAI                 PRESENCE optional   } |
    { ID id-AllowedNSSAI            CRITICALITY ignore TYPE AllowedNSSAI            PRESENCE optional   } |
    { ID id-UE-DifferentiationInfo  CRITICALITY ignore TYPE UE-DifferentiationInfo  PRESENCE optional   } |
    { ID id-DL-CP-SecurityInformation CRITICALITY ignore TYPE DL-CP-SecurityInformation PRESENCE optional   } |
    { ID id-NB-IoT-UEPriority        CRITICALITY ignore TYPE NB-IoT-UEPriority        PRESENCE optional   } |
    ...
}

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

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

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

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

```

```

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

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

-- *****
--
-- AMF CP Relocation Indication
--
-- *****

AMFCPRelocationIndication ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container { { AMFCPRelocationIndicationIEs } },
    ...
}

AMFCPRelocationIndicationIEs 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-S-NSSAI                      CRITICALITY ignore TYPE S-NSSAI                      PRESENCE optional   }|
    { ID id-AllowedNSSAI                 CRITICALITY ignore TYPE AllowedNSSAI                 PRESENCE optional   },
    ...
}

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-AdditionalDLForwardingUPTNLInformation,
id-AdditionalULForwardingUPTNLInformation,
id-AdditionalDLQoSFlowPerTNLInformation,
id-AdditionalDLUPTNLInformationForHOLList,
id-AdditionalNGU-UP-TNLInformation,
id-AdditionalRedundantDL-NGU-UP-TNLInformation,
id-AdditionalRedundantDLQoSFlowPerTNLInformation,
id-AdditionalRedundantNGU-UP-TNLInformation,
id-AdditionalRedundantUL-NGU-UP-TNLInformation,
id-AdditionalUL-NGU-UP-TNLInformation,
id-AlternativeQoSParaSetList,
id-Cause,
id-CNPacketDelayBudgetDL,
id-CNPacketDelayBudgetUL,
id-CNTypeRestrictionsForEquivalent,
id-CNTypeRestrictionsForServing,
id-CommonNetworkInstance,
id-ConfiguredTACIndication,
id-CurrentQoSParaSetIndex,
id-DAPSRequestInfo,
id-DAPSResponseInfoList,
id-DataForwardingNotPossible,
id-DataForwardingResponseERABList,
id-DirectForwardingPathAvailability,
id-DL-NGU-UP-TNLInformation,
id-EndpointIPAddressAndPort,
id-ExtendedPacketDelayBudget,
id-ExtendedRATRestrictionInformation,
id-ExtendedSliceSupportList,
id-ExtendedTAISliceSupportList,
id-GlobalRANNodeID,
id-GlobalTNGF-ID,
id-GlobalTWIF-ID,
id-GlobalW-AGF-ID,
id-GUAMIType,
id-LastEUTRAN-PLMNIdentity,
id-LocationReportingAdditionalInfo,
id-MaximumIntegrityProtectedDataRate-DL,
id-MDTConfiguration,
id-NetworkInstance,
id-NID,
id-NPN-MobilityInformation,
id-NPN-PagingAssistanceInformation,
id-NPN-Support,
id-OldAssociatedQoSFlowList-ULendmarkerexpected,
id-PagingAssisDataforCEcapabUE,
id-PagingeDRXInformation,
id-PDUSessionAggregateMaximumBitRate,
id-PDUSessionResourceFailedToSetupListCxtFail,
id-PDUSessionResourceReleaseResponseTransfer,
id-PDUSessionType,
id-PSCellInformation,

id-QosFlowAddOrModifyRequestList,
id-QosFlowSetupRequestList,
id-QosFlowToReleaseList,
id-QosMonitoringRequest,
id-RAT-Information,
id-RedundantCommonNetworkInstance,
id-RedundantDL-NGU-TNLInformationReused,
id-RedundantDL-NGU-UP-TNLInformation,
id-RedundantDLQosFlowPerTNLInformation,
id-RedundantPDUSessionInformation,
id-RedundantQosFlowIndicator,
id-RedundantUL-NGU-UP-TNLInformation,
id-SCTP-TLAs,
id-SecondaryRATUsageInformation,
id-SecurityIndication,
id-SecurityResult,
id-SgNB-UE-X2AP-ID,
id-S-NSSAI,
id-SONInformationReport,
id-TNLAssociationTransportLayerAddressNGRAN,
id-TargetRNC-ID,
id-TraceCollectionEntityURI,
id-TSCTrafficCharacteristics,
id-UEHistoryInformationFromTheUE,
id-UERadioCapabilityForPagingOfNB-IoT,
id-UL-NGU-UP-TNLInformation,
id-UL-NGU-UP-TNLModifyList,
id-ULForwarding,
id-ULForwardingUP-TNLInformation,
id-UsedRSNInformation,
id-UserLocationInformationTNGF,
id-UserLocationInformationTWIF,
id-UserLocationInformationW-AGF,
maxnoofAllowedAreas,
maxnoofAllowedCAGsperPLMN,
maxnoofAllowedS-NSSAIs,
maxnoofBluetoothName,
maxnoofBPLMNs,
maxnoofCAGSperCell,
maxnoofCandidateCells,
maxnoofCellIDforMDT,
maxnoofCellIDforWarning,
maxnoofCellinAoI,
maxnoofCellinEAI,
maxnoofCellsingNB,
maxnoofCellsinngeNB,
maxnoofCellinTAI,
maxnoofCellsinUEHistoryInfo,
maxnoofCellsUEMovingTrajectory,
maxnoofDRBs,
maxnoofEmergencyAreaID,
maxnoofEAIforRestart,
maxnoofEPLMNs,
maxnoofEPLMNsPlusOne,

```
maxnoofE-RABs,  
maxnoofErrors,  
maxnoofExtSliceItems,  
maxnoofForbTACs,  
maxnoofFreqforMDT,  
maxnoofMDTPLMNs,  
maxnoofMultiConnectivity,  
maxnoofMultiConnectivityMinusOne,  
maxnoofNeighPCIforMDT,  
maxnoofNGConnectionsToReset,  
maxNRARFCN,  
maxnoofNRCellBands,  
maxnoofPC5QoSFlows,  
maxnoofPDUSessions,  
maxnoofPLMNs,  
maxnoofQoSFlows,  
maxnoofQoSParaSets,  
maxnoofRANNodeinAoI,  
maxnoofRecommendedCells,  
maxnoofRecommendedRANNodes,  
maxnoofAoI,  
maxnoofSensorName,  
maxnoofServedGUAMIs,  
maxnoofSliceItems,  
maxnoofTACs,  
maxnoofTAforMDT,  
maxnoofTAIforInactive,  
maxnoofTAIforPaging,  
maxnoofTAIforRestart,  
maxnoofTAIforWarning,  
maxnoofTAIinAoI,  
maxnoofTimePeriods,  
maxnoofTNLAssociations,  
maxnoofWLANName,  
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

```

AdditionalDLUPTNLInformationForHOList ::= SEQUENCE (SIZE(1..maxnoofMultiConnectivityMinusOne)) OF AdditionalDLUPTNLInformationForHOItem

AdditionalDLUPTNLInformationForHOItem ::= SEQUENCE {
    additionalDL-NGU-UP-TNLInformation          UPTransportLayerInformation,
    additionalQosFlowSetupResponseList        QosFlowListWithDataForwarding,
    additionalDLForwardingUPTNLInformation    UPTransportLayerInformation          OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { { AdditionalDLUPTNLInformationForHOItem-ExtIEs} } OPTIONAL,
    ...
}

AdditionalDLUPTNLInformationForHOItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    { ID id-AdditionalRedundantDL-NGU-UP-TNLInformation CRITICALITY ignore EXTENSION UPTransportLayerInformation PRESENCE optional },
    ...
}

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 ::= {
    ...
}

Allowed-CAG-List-per-PLMN ::= SEQUENCE (SIZE(1..maxnoofAllowedCAGsperPLMN)) OF CAG-ID

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 ::= {
    ...
}

Allowed-PNI-NPN-List ::= SEQUENCE (SIZE(1..maxnoofEPLMNsPlusOne)) OF Allowed-PNI-NPN-Item

Allowed-PNI-NPN-Item ::= SEQUENCE {
    pLMNIdentity          PLMNIdentity,
    pNI-NPN-restricted    ENUMERATED {restricted, not-restricted, ...},
    allowed-CAG-List-per-PLMN Allowed-CAG-List-per-PLMN,
    iE-Extensions          ProtocolExtensionContainer { {Allowed-PNI-NPN-Item-ExtIEs} } OPTIONAL,
}

```

```

}
...
}
Allowed-PNI-NPN-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
AllowedTACs ::= SEQUENCE (SIZE(1..maxnoofAllowedAreas)) OF TAC
AlternativeQoSParaSetIndex ::= INTEGER (1..8, ...)
AlternativeQoSParaSetNotifyIndex ::= INTEGER (0..8, ...)
AlternativeQoSParaSetList ::= SEQUENCE (SIZE(1..maxnoofQoSParaSets)) OF AlternativeQoSParaSetItem
AlternativeQoSParaSetItem ::= SEQUENCE {
    alternativeQoSParaSetIndex      AlternativeQoSParaSetIndex,
    guaranteedFlowBitRateDL         BitRate                               OPTIONAL,
    guaranteedFlowBitRateUL         BitRate                               OPTIONAL,
    packetDelayBudget               PacketDelayBudget                 OPTIONAL,
    packetErrorRate                 PacketErrorRate                 OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {AlternativeQoSParaSetItem-ExtIEs} } OPTIONAL,
    ...
}
AlternativeQoSParaSetItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
AMFName ::= PrintableString (SIZE(1..150, ...))
AMFNameVisibleString ::= VisibleString (SIZE(1..150, ...))
AMFNameUTF8String ::= UTF8String (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..maxnoofTNLAAssociations)) OF aMF-TNLAssociationToAddItem

aMF-TNLAssociationToAddItem ::= SEQUENCE {
    aMF-TNLAssociationAddress      CPTransportLayerInformation,
    tNLAssociationUsage            TNLAAssociationUsage                OPTIONAL,
    tNLAddressWeightFactor        TNLAAddressWeightFactor,
    iE-Extensions      ProtocolExtensionContainer { {aMF-TNLAssociationToAddItem-ExtIEs} } OPTIONAL,
    ...
}

aMF-TNLAssociationToAddItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

aMF-TNLAssociationToRemoveList ::= SEQUENCE (SIZE(1..maxnoofTNLAAssociations)) OF aMF-TNLAssociationToRemoveItem

aMF-TNLAssociationToRemoveItem ::= SEQUENCE {
    aMF-TNLAssociationAddress      CPTransportLayerInformation,
    iE-Extensions      ProtocolExtensionContainer { {aMF-TNLAssociationToRemoveItem-ExtIEs} } OPTIONAL,
    ...
}

aMF-TNLAssociationToRemoveItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    {ID id-TNLAssociationTransportLayerAddressNGRAN CRITICALITY reject EXTENSION CPTransportLayerInformation PRESENCE optional},
    ...
}

aMF-TNLAssociationToUpdateList ::= SEQUENCE (SIZE(1..maxnoofTNLAAssociations)) OF aMF-TNLAssociationToUpdateItem

aMF-TNLAssociationToUpdateItem ::= SEQUENCE {
    aMF-TNLAssociationAddress      CPTransportLayerInformation,
    tNLAssociationUsage            TNLAAssociationUsage                OPTIONAL,
    tNLAddressWeightFactor        TNLAAddressWeightFactor            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 ::= {
  { ID id-NPN-PagingAssistanceInformation  CRITICALITY ignore  EXTENSION NPN-PagingAssistanceInformation  PRESENCE optional } |
  { ID id-PagingAssisDataforCEcapabUE     CRITICALITY ignore  EXTENSION PagingAssisDataforCEcapabUE     PRESENCE optional },
  ...
}

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 ::= {
  { ID id-CurrentQoSParaSetIndex          CRITICALITY ignore  EXTENSION AlternativeQoSParaSetIndex          PRESENCE optional },
  ...
}

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

AveragingWindow ::= INTEGER (0..4095, ...)

AreaScopeOfMDT-NR ::= CHOICE {
  cellBased                               CellBasedMDT-NR,
  tABased                                 TABasedMDT,
  pLMNWide                                NULL,
  tAIBased                                 TAIBasedMDT,
  choice-Extensions                       ProtocolIE-SingleContainer { {AreaScopeOfMDT-NR-ExtIEs} }
}

```

```

AreaScopeOfMDT-NR-ExtIEs NGAP-PROTOCOL-IES ::= {
  ...
}

AreaScopeOfMDT-EUTRA ::= CHOICE {
  cellBased          CellBasedMDT-EUTRA,
  tABased           TABasedMDT,
  pLMNWide         NULL,
  tAIBased          TAIBasedMDT,
  choice-Extensions ProtocolIE-SingleContainer { {AreaScopeOfMDT-EUTRA-ExtIEs} }
}

AreaScopeOfMDT-EUTRA-ExtIEs NGAP-PROTOCOL-IES ::= {
  ...
}

AreaScopeOfNeighCellsList ::= SEQUENCE (SIZE(1..maxnoofFreqforMDT)) OF AreaScopeOfNeighCellsItem
AreaScopeOfNeighCellsItem ::= SEQUENCE {
  nrFrequencyInfo      NRFrequencyInfo,
  pciListForMDT        PCIListForMDT                                OPTIONAL,
  iE-Extensions        ProtocolExtensionContainer { { AreaScopeOfNeighCellsItem-ExtIEs} } OPTIONAL,
  ...
}

AreaScopeOfNeighCellsItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- 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 ::= {
  {ID id-NPN-Support CRITICALITY reject EXTENSION NPN-Support PRESENCE optional}|
  {ID id-ExtendedTAISliceSupportList CRITICALITY reject EXTENSION ExtendedSliceSupportList PRESENCE optional},
  ...
}

BluetoothMeasurementConfiguration ::= SEQUENCE {
  bluetoothMeasConfig          BluetoothMeasConfig,
  bluetoothMeasConfigNameList BluetoothMeasConfigNameList OPTIONAL,
  bt-rssi                      ENUMERATED {true, ...} OPTIONAL,
  iE-Extensions                ProtocolExtensionContainer { { BluetoothMeasurementConfiguration-ExtIEs } } OPTIONAL,
  ...
}

BluetoothMeasurementConfiguration-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

BluetoothMeasConfigNameList ::= SEQUENCE (SIZE(1..maxnoofBluetoothName)) OF BluetoothMeasConfigNameItem

BluetoothMeasConfigNameItem ::= SEQUENCE {
  bluetoothName          BluetoothName,
  iE-Extensions          ProtocolExtensionContainer { { BluetoothMeasConfigNameItem-ExtIEs } } OPTIONAL,
  ...
}

BluetoothMeasConfigNameItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

BluetoothMeasConfig ::= ENUMERATED {setup, ...}

BluetoothName ::= OCTET STRING (SIZE (1..248))

BurstArrivalTime ::= OCTET STRING

-- C

CAG-ID ::= BIT STRING (SIZE(32))

```

```

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 ::= {
    ...
}

CandidateCellList ::= SEQUENCE (SIZE(1.. maxnoofCandidateCells)) OF CandidateCellItem

CandidateCellItem ::= SEQUENCE{
    candidateCell      CandidateCell,
    iE-Extensions      ProtocolExtensionContainer { {CandidateCellItem-ExtIEs} } OPTIONAL,
    ...
}

CandidateCellItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CandidateCell ::= CHOICE {
    candidateCGI      CandidateCellID,
    candidatePCI      CandidatePCI,
    choice-Extensions ProtocolIE-SingleContainer { { CandidateCell-ExtIEs} }
}

CandidateCell-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

CandidateCellID ::= SEQUENCE {
    candidateCellID   NR-CGI,
    iE-Extensions     ProtocolExtensionContainer { { CandidateCellID-ExtIEs} }           OPTIONAL,
    ...
}

CandidateCellID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CandidatePCI ::= SEQUENCE {
    candidatePCI      INTEGER (0..1007, ...),
    candidateNRARFCN  INTEGER (0..3279165),
    iE-Extensions     ProtocolExtensionContainer { { CandidatePCI-ExtIEs} }           OPTIONAL,
    ...
}

CandidatePCI-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,
...,
n26-interface-not-available,
release-due-to-pre-emption,
multiple-location-reporting-reference-ID-instances,
rsn-not-available-for-the-up,
nbn-access-denied,
cag-only-access-denied
}

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

Cell-CAGInformation ::= SEQUENCE {
    nGRAN-CGI          NGRAN-CGI,
    cellCAGList       CellCAGList,
    iE-Extensions     ProtocolExtensionContainer { {Cell-CAGInformation-ExtIEs} } OPTIONAL,
    ...
}

Cell-CAGInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

CellCAGList ::= SEQUENCE (SIZE(1..maxnoofCAGSperCell)) OF CAG-ID

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 ::= {
    ...
}

CModeBSupport-Indicator ::= ENUMERATED {supported,...}

CModeBrestricted ::= ENUMERATED {
    restricted,
    not-restricted,
    ...
}

CNAssistedRANTuning ::= SEQUENCE {
    expectedUEBehaviour          ExpectedUEBehaviour          OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { {CNAssistedRANTuning-ExtIEs} } OPTIONAL,
    ...
}

CNAssistedRANTuning-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CNTTypeRestrictionsForEquivalent ::= SEQUENCE (SIZE(1..maxnoofEPLMNs)) OF CNTTypeRestrictionsForEquivalentItem

CNTTypeRestrictionsForEquivalentItem ::= SEQUENCE {
    plmnIdentity          PLMNIdentity,
    cn-Type               ENUMERATED {epc-forbidden, fiveGC-forbidden, ...},
    iE-Extensions         ProtocolExtensionContainer { {CNTTypeRestrictionsForEquivalentItem-ExtIEs} }    OPTIONAL,
    ...
}

CNTTypeRestrictionsForEquivalentItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```
CNTypeRestrictionsForServing ::= ENUMERATED {
    epc-forbidden,
    ...
}

CommonNetworkInstance ::= OCTET STRING

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,
    ...
}

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

CoreNetworkAssistanceInformationForInactive ::= SEQUENCE {
    ueIdentityIndexValue          UEIdentityIndexValue,
    ueSpecificDRX                 PagingDRX                                OPTIONAL,
    periodicRegistrationUpdateTimer  PeriodicRegistrationUpdateTimer,
    mICOModeIndication            MICOModeIndication                OPTIONAL,
    tAIListForInactive            TAIListForInactive,
    expectedUEBehaviour           ExpectedUEBehaviour                OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { {CoreNetworkAssistanceInformationForInactive-ExtIEs} } OPTIONAL,
    ...
}

CoreNetworkAssistanceInformationForInactive-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    { ID id-PagingeDRXInformation  CRITICALITY ignore  EXTENSION PagingeDRXInformation  PRESENCE optional },
    ...
}

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 ::= {
    ...
}

CoverageEnhancementLevel ::= OCTET STRING

CPTransportLayerInformation ::= CHOICE {
    endpointIPAddress      TransportLayerAddress,
    choice-Extensions      ProtocolIE-SingleContainer { {CPTransportLayerInformation-ExtIEs} }
}

CPTransportLayerInformation-ExtIEs NGAP-PROTOCOL-IES ::= {
    { ID id-EndpointIPAddressAndPort          CRITICALITY reject TYPE EndpointIPAddressAndPort PRESENCE mandatory },
    ...
}

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 ::= {
    ...
}

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

CellBasedMDT-NR-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

```

```

    ...
}

CellIdListforMDT-NR ::= SEQUENCE (SIZE(1..maxnoofCellIDforMDT)) OF NR-CGI

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

CellBasedMDT-EUTRA-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellIdListforMDT-EUTRA ::= SEQUENCE (SIZE(1..maxnoofCellIDforMDT)) OF EUTRA-CGI

-- 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 ::= {
    ...
}

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

DAPSRequestInfo-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

```

```

}
...
DAPSResponseInfoList ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DAPSResponseInfoItem

DAPSResponseInfoItem ::= SEQUENCE {
    drb-ID                DRB-ID,
    dAPSResponseInfo      DAPSResponseInfo,
    iE-Extension          ProtocolExtensionContainer { {DAPSResponseInfoItem-ExtIEs} }    OPTIONAL,
    ...
}

DAPSResponseInfoItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

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

DAPSResponseInfo-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

DataForwardingResponseERABList ::= SEQUENCE (SIZE(1..maxnoofE-RABs)) OF DataForwardingResponseERABListItem

DataForwardingResponseERABListItem ::= SEQUENCE {
    e-RAB-ID                E-RAB-ID,
    dlForwardingUP-TNLInformation    UPTransportLayerInformation,
    iE-Extensions          ProtocolExtensionContainer { {DataForwardingResponseERABListItem-ExtIEs} }    OPTIONAL,
    ...
}

DataForwardingResponseERABListItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

DelayCritical ::= ENUMERATED {
    delay-critical,
    non-delay-critical,
    ...
}

DL-CP-SecurityInformation ::= SEQUENCE {
    dl-NAS-MAC              DL-NAS-MAC,
    iE-Extensions          ProtocolExtensionContainer { { DL-CP-SecurityInformation-ExtIEs} }    OPTIONAL,
    ...
}

DL-CP-SecurityInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

}
DL-NAS-MAC ::= BIT STRING (SIZE (16))

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 ::= {
    { ID id-OldAssociatedQosFlowList-ULendmarkerexpected    CRITICALITY reject EXTENSION AssociatedQosFlowList    PRESENCE optional },
    ...
}

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 ::= {

```

```

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

Dynamic5QIDescriptor ::= SEQUENCE {
    priorityLevelQos          PriorityLevelQos,
    packetDelayBudget         PacketDelayBudget,
    packetErrorRate           PacketErrorRate,
    fiveQI                    FiveQI                                OPTIONAL,
    delayCritical              DelayCritical                        OPTIONAL,
-- The above IE shall be present in case of GBR QoS flow
    averagingWindow           AveragingWindow                    OPTIONAL,
-- The above IE shall be present in case of GBR QoS flow
    maximumDataBurstVolume    MaximumDataBurstVolume            OPTIONAL,
    iE-Extensions             ProtocolExtensionContainer { {Dynamic5QIDescriptor-ExtIEs} } OPTIONAL,
    ...
}

Dynamic5QIDescriptor-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    { ID id-ExtendedPacketDelayBudget CRITICALITY ignore EXTENSION ExtendedPacketDelayBudget PRESENCE optional } |
    { ID id-CNPacketDelayBudgetDL CRITICALITY ignore EXTENSION ExtendedPacketDelayBudget PRESENCE optional } |
    { ID id-CNPacketDelayBudgetUL CRITICALITY ignore EXTENSION ExtendedPacketDelayBudget PRESENCE optional } ,
    ...
}

-- E

EarlyStatusTransfer-TransparentContainer ::= SEQUENCE {
    procedureStage            ProcedureStageChoice,
    iE-Extensions             ProtocolExtensionContainer { {EarlyStatusTransfer-TransparentContainer-ExtIEs} } OPTIONAL,
    ...
}

EarlyStatusTransfer-TransparentContainer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

ProcedureStageChoice ::= CHOICE {
    first-dl-count            FirstDLCount,
    choice-Extensions         ProtocolIE-SingleContainer { {ProcedureStageChoice-ExtIEs} }
}

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

FirstDLCount ::= SEQUENCE {
    drBsSubjectToEarlyStatusTransfer DRBsSubjectToEarlyStatusTransfer-List,
    iE-Extension                ProtocolExtensionContainer { {FirstDLCount-ExtIEs} } OPTIONAL,
    ...
}

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

```

```

}

DRBsSubjectToEarlyStatusTransfer-List ::= SEQUENCE (SIZE (1.. maxnoofDRBs)) OF DRBsSubjectToEarlyStatusTransfer-Item

DRBsSubjectToEarlyStatusTransfer-Item ::= SEQUENCE {
    dRB-ID                DRB-ID,
    firstDLCOUNT          DRBStatusDL,
    iE-Extension          ProtocolExtensionContainer { { DRBsSubjectToEarlyStatusTransfer-Item-ExtIEs} } OPTIONAL,
    ...
}

DRBsSubjectToEarlyStatusTransfer-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

EDT-Session ::= ENUMERATED {
    true,
    ...
}

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,
    ...
}

ENB-ID ::= CHOICE {
    macroENB-ID          BIT STRING (SIZE(20)),
    homeENB-ID          BIT STRING (SIZE(28)),
    short-macroENB-ID   BIT STRING (SIZE(18)),
    long-macroENB-ID    BIT STRING (SIZE(21)),
    choice-Extensions   ProtocolIE-SingleContainer { { ENB-ID-ExtIEs} }
}

```

```

ENB-ID-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

Enhanced-CoverageRestriction ::= ENUMERATED {restricted, ... }

Extended-ConnectedTime ::= INTEGER (0..255)

EN-DCSONConfigurationTransfer ::= OCTET STRING

EndpointIPAddressAndPort ::=SEQUENCE {
    endpointIPAddress TransportLayerAddress,
    portNumber          PortNumber,
    iE-Extensions       ProtocolExtensionContainer { { EndpointIPAddressAndPort-ExtIEs} } OPTIONAL
}

EndIndication ::= ENUMERATED {
    no-further-data,
    further-data-exists,
    ...
}

EndpointIPAddressAndPort-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

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 {
    plmniIdentity          PLMNIIdentity,
    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)
    iE-Extensions                 ProtocolExtensionContainer { {ExpectedUEMovingTrajectoryItem-ExtIEs} } OPTIONAL,
    ...
}

ExpectedUEMovingTrajectoryItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

Extended-AMFName ::= SEQUENCE {
    amFNameVisibleString          AMFNameVisibleString          OPTIONAL,
    amFNameUTF8String             AMFNameUTF8String             OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { { Extended-AMFName-ExtIEs } } OPTIONAL,
    ...
}

Extended-AMFName-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

ExtendedPacketDelayBudget ::= INTEGER (1..65535, ...)

Extended-RANNodeName ::= SEQUENCE {
    rANNodeNameVisibleString      RANNodeNameVisibleString      OPTIONAL,
    rANNodeNameUTF8String         RANNodeNameUTF8String         OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { { Extended-RANNodeName-ExtIEs } } OPTIONAL, ...
}

```

```
Extended-RANNodeName-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

ExtendedRATRestrictionInformation ::= SEQUENCE {
    primaryRATRestriction      BIT STRING (SIZE(8, ...)),
    secondaryRATRestriction    BIT STRING (SIZE(8, ...)),
    iE-Extensions              ProtocolExtensionContainer { {ExtendedRATRestrictionInformation-ExtIEs} } OPTIONAL,
    ...
}

ExtendedRATRestrictionInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

ExtendedRNC-ID
    ::= INTEGER (4096..65535)

ExtendedSliceSupportList ::= SEQUENCE (SIZE(1..maxnoofExtSliceItems)) OF SliceSupportItem

EventTrigger ::= CHOICE {
    outOfCoverage              ENUMERATED {true, ...},
    eventL1LoggedMDTConfig      EventL1LoggedMDTConfig,
    choice-Extensions          ProtocolIE-SingleContainer { { EventTrigger-ExtIEs} }
}

EventTrigger-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

EventL1LoggedMDTConfig ::= SEQUENCE {
    l1Threshold                MeasurementThresholdL1LoggedMDT,
    hysteresis                  Hysteresis,
    timeToTrigger               TimeToTrigger,
    iE-Extensions              ProtocolExtensionContainer { { EventL1LoggedMDTConfig-ExtIEs} } OPTIONAL,
    ...
}

EventL1LoggedMDTConfig-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

MeasurementThresholdL1LoggedMDT ::= CHOICE {
    threshold-RSRP              Threshold-RSRP,
    threshold-RSRQ              Threshold-RSRQ,
    choice-Extensions          ProtocolIE-SingleContainer { { MeasurementThresholdL1LoggedMDT-ExtIEs} }
}

MeasurementThresholdL1LoggedMDT-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

-- F
```

```

FailureIndication ::= SEQUENCE {
    uERLFReportContainer    UERLFReportContainer,
    iE-Extensions          ProtocolExtensionContainer { { FailureIndication-ExtIEs } } OPTIONAL,
    ...
}

FailureIndication-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

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

FromEUTRANToNGRAN ::= SEQUENCE {
    sourceeNBID             IntersystemSONeNBID,
    targetNGRANnodeID       IntersystemSONNGRANnodeID,
    iE-Extensions          ProtocolExtensionContainer { { FromEUTRANToNGRAN-ExtIEs } } OPTIONAL
}

FromEUTRANToNGRAN-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

FromNGRANToEUTRAN ::= SEQUENCE {
    sourceNGRANnodeID       IntersystemSONNGRANnodeID,

```

```

    targeteNBID          IntersystemSONeNBID,
    iE-Extensions        ProtocolExtensionContainer { { FromNGRANtoEUTRAN-ExtIEs } }      OPTIONAL
}

FromNGRANtoEUTRAN-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

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

GlobalENB-ID ::= SEQUENCE {
    plMNIdentity      PLMNIdentity,
    eNB-ID            ENB-ID,
    iE-Extensions     ProtocolExtensionContainer { {GlobalENB-ID-ExtIEs} }      OPTIONAL,
    ...
}

GlobalENB-ID-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 ::= {
}
...
GlobalLine-ID ::= SEQUENCE {
  globalLineIdentity      GlobalLineIdentity,
  lineType                LineType
  iE-Extensions          ProtocolExtensionContainer { {GlobalLine-ID-ExtIEs} } OPTIONAL,
  ...
}
GlobalLine-ID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
}
...
GlobalLineIdentity ::= OCTET STRING
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 ::= {
  { ID id-GlobalTNGF-ID   CRITICALITY reject TYPE GlobalTNGF-ID   PRESENCE mandatory }|
  { ID id-GlobalTWIF-ID   CRITICALITY reject TYPE GlobalTWIF-ID   PRESENCE mandatory }|
  { ID id-GlobalW-AGF-ID   CRITICALITY reject TYPE GlobalW-AGF-ID   PRESENCE mandatory },
  ...
}
GlobalTNGF-ID ::= SEQUENCE {
  pLMNIdentity           PLMNIdentity,
  tNGF-ID                TNGF-ID,
  iE-Extensions          ProtocolExtensionContainer { {GlobalTNGF-ID-ExtIEs} } OPTIONAL,
  ...
}
GlobalTNGF-ID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
}
...

```


}

```

GlobalTWIF-ID ::= SEQUENCE {
    pLMNIdentity      PLMNIdentity,
    twif-ID           TWIF-ID,
    iE-Extensions    ProtocolExtensionContainer { { GlobalTWIF-ID-ExtIEs } } OPTIONAL,
    ...
}

```

```

GlobalTWIF-ID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

GlobalW-AGF-ID ::= SEQUENCE {
    pLMNIdentity      PLMNIdentity,
    w-AGF-ID         W-AGF-ID,
    iE-Extensions    ProtocolExtensionContainer { { GlobalW-AGF-ID-ExtIEs } } OPTIONAL,
    ...
}

```

```

GlobalW-AGF-ID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

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 ::= {
    ...
}
GUAMIType ::= ENUMERATED {native, mapped, ...}

-- H

HandoverCommandTransfer ::= SEQUENCE {
    dlForwardingUP-TNLInformation      UPTransportLayerInformation          OPTIONAL,
    qosFlowToBeForwardedList           QosFlowToBeForwardedList          OPTIONAL,
    dataForwardingResponseDRBList      DataForwardingResponseDRBList      OPTIONAL,
    iE-Extensions                      ProtocolExtensionContainer { {HandoverCommandTransfer-ExtIEs} } OPTIONAL,
    ...
}

HandoverCommandTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    { ID id-AdditionalDLForwardingUPTNLInformation      CRITICALITY ignore EXTENSION QosFlowPerTNLInformationList PRESENCE optional } |
    { ID id-ULForwardingUP-TNLInformation              CRITICALITY reject  EXTENSION UPTransportLayerInformation PRESENCE optional } |
    { ID id-AdditionalULForwardingUPTNLInformation      CRITICALITY reject  EXTENSION UPTransportLayerInformationList PRESENCE optional } |
    { ID id-DataForwardingResponseERABList             CRITICALITY ignore  EXTENSION DataForwardingResponseERABList PRESENCE optional } |
    ...
}

HandoverFlag ::= ENUMERATED {
    handover-preparation,
    ...
}

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      QosFlowListWithDataForwarding,
    qosFlowFailedToSetupList      QosFlowListWithCause                      OPTIONAL,
    dataForwardingResponseDRBList DataForwardingResponseDRBList          OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { {HandoverRequestAcknowledgeTransfer-ExtIEs} } OPTIONAL,
    ...
}

HandoverRequestAcknowledgeTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

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```

    { ID id-AdditionalDLUPTNLInformationForHOList      CRITICALITY ignore  EXTENSION AdditionalDLUPTNLInformationForHOList  PRESENCE optional }|
    { ID id-ULForwardingUP-TNLInformation              CRITICALITY reject  EXTENSION UPTransportLayerInformation              PRESENCE optional }|
    { ID id-AdditionalULForwardingUPTNLInformation     CRITICALITY reject  EXTENSION UPTransportLayerInformationList          PRESENCE optional }|
    { ID id-DataForwardingResponseERABList           CRITICALITY ignore  EXTENSION DataForwardingResponseERABList          PRESENCE optional }|
    { ID id-RedundantDL-NGU-UP-TNLInformation         CRITICALITY ignore  EXTENSION UPTransportLayerInformation              PRESENCE optional }|
    { ID id-UsedRSNInformation                         CRITICALITY ignore  EXTENSION RedundantPDUSessionInformation           PRESENCE optional }|
    { ID id-GlobalRANNodeID                           CRITICALITY ignore  EXTENSION GlobalRANNodeID                          PRESENCE optional }|
  },
  ...
}

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,
  ...,
  fivegs-to-utran
}

HFCNode-ID ::= OCTET STRING

HOReport ::= SEQUENCE {
  handoverReportType      ENUMERATED {ho-too-early, ho-to-wrong-cell, intersystem-ping-pong, ...},
  handoverCause           Cause,
  sourcecellCGI           NGRAN-CGI,
  targetcellCGI          NGRAN-CGI,
  reestablishmentcellCGI NGRAN-CGI              OPTIONAL,
  -- The above IE shall be present if the Handover Report Type IE is set to the value "HO to wrong cell" --
  sourcecellC-RNTI       BIT STRING (SIZE(16))      OPTIONAL,
  targetcellinE-UTRAN    EUTRA-CGI                  OPTIONAL,
  -- The above IE shall be present if the Handover Report Type IE is set to the value "Inter System ping-pong" --
  mobilityInformation     MobilityInformation        OPTIONAL,
  uERLFReportContainer    UERLFReportContainer       OPTIONAL,
}

```

```
    iE-Extensions      ProtocolExtensionContainer { { HOReport-ExtIEs } } OPTIONAL,
  ...
}

HOReport-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

Hysteresis ::=
    INTEGER (0..30)

-- I

IAB-Authorized ::= ENUMERATED {
  authorized,
  not-authorized,
  ...
}

IAB-Supported ::= ENUMERATED {
  true,
  ...
}

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

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))

ImmediateMDTnr ::= SEQUENCE {
    measurementsToActivate
    m1Configuration          MeasurementsToActivate,
                             M1Configuration          OPTIONAL,
-- The above IE shall be present if the Measurements to Activate IE has the first bit set to "1"
    m4Configuration          M4Configuration          OPTIONAL,
-- The above IE shall be present if the Measurements to Activate IE has the third bit set to "1"
    m5Configuration          M5Configuration          OPTIONAL,
-- The above IE shall be present if the Measurements to Activate IE has the fourth bit set to "1"
    m6Configuration          M6Configuration          OPTIONAL,
-- The above IE shall be present if the Measurements to Activate IE has the fifth bit set to "1"
    m7Configuration          M7Configuration          OPTIONAL,
-- The above IE shall be present if the Measurements to Activate IE has the sixth bit set to "1"
    bluetoothMeasurementConfiguration BluetoothMeasurementConfiguration OPTIONAL,
    wlanMeasurementConfiguration WLANMeasurementConfiguration OPTIONAL,
    mDT-Location-Info        MDT-Location-Info        OPTIONAL,
    sensorMeasurementConfiguration SensorMeasurementConfiguration OPTIONAL,
    iE-Extensions            ProtocolExtensionContainer { { ImmediateMDTnr-ExtIEs } } OPTIONAL,
    ...
}

ImmediateMDTnr-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

InterSystemFailureIndication ::= SEQUENCE {
    uERLFRReportContainer    UERLFRReportContainer    OPTIONAL,
    iE-Extensions            ProtocolExtensionContainer { { InterSystemFailureIndication-ExtIEs } } OPTIONAL,
    ...
}

InterSystemFailureIndication-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

IntersystemSONConfigurationTransfer ::= SEQUENCE {
    transferType              IntersystemSONTransferType,
    intersystemSONInformation IntersystemSONInformation,
    iE-Extensions            ProtocolExtensionContainer { { IntersystemSONConfigurationTransfer-ExtIEs } } OPTIONAL,
    ...
}

IntersystemSONConfigurationTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

```

```

}
...
}
IntersystemSONTransferType ::= CHOICE {
    fromEUTRANtoNGRAN          FromEUTRANtoNGRAN,
    fromNGRANtoEUTRAN          FromNGRANtoEUTRAN,
    choice-Extensions          ProtocolIE-SingleContainer { { IntersystemSONTransferType-ExtIEs } }
}
IntersystemSONTransferType-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

IntersystemSONeNBID ::= SEQUENCE {
    globaleNBID                GlobalENB-ID,
    selectedEPSTAI              EPS-TAI,
    iE-Extensions              ProtocolExtensionContainer { { IntersystemSONeNBID-ExtIEs } }          OPTIONAL,
    ...
}
IntersystemSONeNBID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

IntersystemSONNGRANnodeID ::= SEQUENCE {
    globalRANnodeID            GlobalRANnodeID,
    selectedTAI                TAI,
    iE-Extensions              ProtocolExtensionContainer { { IntersystemSONNGRANnodeID-ExtIEs } }          OPTIONAL,
    ...
}
IntersystemSONNGRANnodeID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

IntersystemSONInformation ::= CHOICE {
    intersystemSONInformationReport IntersystemSONInformationReport,
    choice-Extensions              ProtocolIE-SingleContainer { { IntersystemSONInformation-ExtIEs } }
}
IntersystemSONInformation-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

IntersystemSONInformationReport ::= CHOICE {
    hOReportInformation          InterSystemHOReport,
    failureIndicationInformation InterSystemFailureIndication,
    choice-Extensions           ProtocolIE-SingleContainer { { IntersystemSONInformationReport-ExtIEs } }
}
IntersystemSONInformationReport-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

InterSystemHOReport ::= SEQUENCE {

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    handoverReportType      InterSystemHandoverReportType,
    iE-Extensions           ProtocolExtensionContainer { { InterSystemHOReport-ExtIEs} }      OPTIONAL,
    ...
}

InterSystemHOReport-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

InterSystemHandoverReportType ::= CHOICE {
    tooearlyIntersystemHO      TooeearlyIntersystemHO,
    intersystemUnnecessaryHO   IntersystemUnnecessaryHO,
    choice-Extensions         ProtocolIE-SingleContainer { { InterSystemHandoverReportType-ExtIEs} }
}

InterSystemHandoverReportType-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

IntersystemUnnecessaryHO ::= SEQUENCE {
    sourcecellID              NGRAN-CGI,
    targetcellID              EUTRA-CGI,
    earlyIRATHO               ENUMERATED {true, false, ...},
    candidateCellList         CandidateCellList,
    iE-Extensions             ProtocolExtensionContainer { { IntersystemUnnecessaryHO-ExtIEs} }      OPTIONAL,
    ...
}

IntersystemUnnecessaryHO-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- J
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LAC ::= OCTET STRING (SIZE (2))

LAI ::= SEQUENCE {
    pLMNIdentity              PLMNIdentity,
    LAC                       LAC,
    iE-Extensions             ProtocolExtensionContainer { {LAI-ExtIEs} } OPTIONAL,
    ...
}

LAI-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

LastVisitedCellInformation ::= CHOICE {
    nGRANCell                LastVisitedNGRANCellInformation,
    eUTRANCell               LastVisitedEUTRANCellInformation,
    uTRANCell                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

LineType ::= ENUMERATED {
  dsl,
  pon,
  ...
}

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

LocationReportingReferenceID ::= INTEGER (1..64, ...)

LocationReportingRequestType ::= SEQUENCE {
  eventType              EventType,
  reportArea            ReportArea,

```



```

    areaOfInterestList                AreaOfInterestList                OPTIONAL,
    locationReportingReferenceIDToBeCancelled LocationReportingReferenceID OPTIONAL,
-- The above IE shall be present if the event type is set to "stop reporting UE presence in the area of interest"
    iE-Extensions          ProtocolExtensionContainer { {LocationReportingRequestType-ExtIEs} } OPTIONAL,
    ...
}

LocationReportingRequestType-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    { ID id-LocationReportingAdditionalInfo CRITICALITY ignore EXTENSION LocationReportingAdditionalInfo PRESENCE optional },
    ...
}

LoggedMDTnr ::= SEQUENCE {
    loggingInterval          LoggingInterval,
    loggingDuration         LoggingDuration,
    loggedMDTTrigger        LoggedMDTTrigger,
    bluetoothMeasurementConfiguration BluetoothMeasurementConfiguration OPTIONAL,
    wlanMeasurementConfiguration WLANMeasurementConfiguration OPTIONAL,
    sensorMeasurementConfiguration SensorMeasurementConfiguration OPTIONAL,
    areaScopeOfNeighCellsList AreaScopeOfNeighCellsList OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { {LoggedMDTnr-ExtIEs} } OPTIONAL,
    ...
}

LoggedMDTnr-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

LoggingInterval ::= ENUMERATED {
    ms320, ms640, ms1280, ms2560, ms5120, ms10240, ms20480, ms30720, ms40960, ms61440,
    infinity,
    ...
}

LoggingDuration ::= ENUMERATED {m10, m20, m40, m60, m90, m120, ...}

Links-to-log ::= ENUMERATED {
    uplink,
    downlink,
    both-uplink-and-downlink,
    ...
}

LoggedMDTTrigger ::= CHOICE{
    periodical          NULL,
    eventTrigger        EventTrigger,
    choice-Extensions   ProtocolIE-SingleContainer { {LoggedMDTTrigger-ExtIEs} }
}

LoggedMDTTrigger-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

LTE-M-Indication ::= ENUMERATED {lte-m,...}

```

```

LTEUERLFReportContainer ::= OCTET STRING

LTEV2XServicesAuthorized ::= SEQUENCE {
    vehicleUE          VehicleUE          OPTIONAL,
    pedestrianUE      PedestrianUE        OPTIONAL,
    iE-Extensions     ProtocolExtensionContainer { {LTEV2XServicesAuthorized-ExtIEs} } OPTIONAL,
    ...
}

LTEV2XServicesAuthorized-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

LTEUESidelinkAggregateMaximumBitrate ::= SEQUENCE {
    uESidelinkAggregateMaximumBitrate BitRate,
    iE-Extensions     ProtocolExtensionContainer { {LTEUE-Sidelink-Aggregate-MaximumBitrates-ExtIEs} } OPTIONAL,
    ...
}

LTEUE-Sidelink-Aggregate-MaximumBitrates-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- M

MaskedIMEISV ::= BIT STRING (SIZE(64))

MaximumDataBurstVolume ::= INTEGER (0..4095, ..., 4096.. 2000000)

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

MaximumIntegrityProtectedDataRate ::= ENUMERATED {
    bitrate64kbs,
    maximum-UE-rate,
    ...
}

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

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

MobilityRestrictionList ::= SEQUENCE {
    servingPLMN          PLMNIdentity,
    equivalentPLMNs      EquivalentPLMNs          OPTIONAL,
    rATRestrictions      RATRestrictions          OPTIONAL,
    forbiddenAreaInformation ForbiddenAreaInformation OPTIONAL,
    serviceAreaInformation ServiceAreaInformation OPTIONAL,
    iE-Extensions     ProtocolExtensionContainer { {MobilityRestrictionList-ExtIEs} } OPTIONAL,
    ...
}

```

```

MobilityRestrictionList-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  { ID id-LastEUTRAN-PLMNIdentity          CRITICALITY ignore EXTENSION PLMNIdentity          PRESENCE optional } |
  { ID id-CNTypeRestrictionsForServing     CRITICALITY ignore EXTENSION CNTypeRestrictionsForServing PRESENCE optional } |
  { ID id-CNTypeRestrictionsForEquivalent CRITICALITY ignore EXTENSION CNTypeRestrictionsForEquivalent PRESENCE optional } |
  { ID id-NPN-MobilityInformation          CRITICALITY reject  EXTENSION NPN-MobilityInformation          PRESENCE optional } |
  ...
}

MDTPLMNList ::= SEQUENCE (SIZE(1..maxnoofMDTPLMNs)) OF PLMNIdentity

MDT-Configuration ::= SEQUENCE {
  mdt-Config-NR          MDT-Configuration-NR          OPTIONAL,
  mdt-Config-EUTRA      MDT-Configuration-EUTRA        OPTIONAL,
  iE-Extensions          ProtocolExtensionContainer { { MDT-Configuration-ExtIEs} } OPTIONAL,
  ...
}

MDT-Configuration-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

MDT-Configuration-NR ::= SEQUENCE {
  mdt-Activation          MDT-Activation,
  areaScopeOfMDT          AreaScopeOfMDT-NR,
  mDTModeNr              MDTModeNr,
  signallingBasedMDTPLMNList MDTPLMNList                OPTIONAL,
  iE-Extensions          ProtocolExtensionContainer { { MDT-Configuration-NR-ExtIEs} } OPTIONAL,
  ...
}

MDT-Configuration-NR-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

MDT-Configuration-EUTRA ::= SEQUENCE {
  mdt-Activation          MDT-Activation,
  areaScopeOfMDT          AreaScopeOfMDT-EUTRA,
  mDTMode                 MDTModeEutra,
  signallingBasedMDTPLMNList MDTPLMNList                OPTIONAL,
  iE-Extensions          ProtocolExtensionContainer { { MDT-Configuration-EUTRA-ExtIEs} } OPTIONAL,
  ...
}

MDT-Configuration-EUTRA-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

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

```

```

MDTModeNr ::= CHOICE {
    immediateMDTNr           ImmediateMDTNr,
    loggedMDTNr             LoggedMDTNr,
    choice-Extensions       ProtocolIE-SingleContainer { {MDTModeNr-ExtIEs} }
}

MDTModeNr-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

MDTModeEutra ::= OCTET STRING

MeasurementsToActivate ::= BIT STRING(SIZE(8))

M1Configuration ::= SEQUENCE {
    mlreportingTrigger       M1ReportingTrigger,
    mlthresholdEventA2       M1ThresholdEventA2
    -- The above IE shall be present if the M1 Reporting Trigger IE is set to "A2event-triggered" or "A2event-triggered periodic"
    mlperiodicReporting      M1PeriodicReporting
    -- The above IE shall be present if the M1 Reporting Trigger IE is set to "periodic" or "A2event-triggered periodic"
    iE-Extensions           ProtocolExtensionContainer { { M1Configuration-ExtIEs } }
    ...
}

M1Configuration-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

M1ReportingTrigger ::= ENUMERATED{
    periodic,
    a2eventtriggered,
    a2eventtriggered-periodic,
    ...
}

M1ThresholdEventA2 ::= SEQUENCE {
    mlThresholdType          M1ThresholdType,
    iE-Extensions           ProtocolExtensionContainer { { M1ThresholdEventA2-ExtIEs } }
    ...
}

M1ThresholdEventA2-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

M1ThresholdType ::= CHOICE {
    threshold-RSRP          Threshold-RSRP,
    threshold-RSRQ          Threshold-RSRQ,
    threshold-SINR          Threshold-SINR,
    choice-Extensions       ProtocolIE-SingleContainer { {M1ThresholdType-ExtIEs} }
}

M1ThresholdType-ExtIEs NGAP-PROTOCOL-IES ::= {

```

```

}
...
}
M1PeriodicReporting ::= SEQUENCE {
    reportInterval          ReportIntervalMDT,
    reportAmount           ReportAmountMDT,
    iE-Extensions         ProtocolExtensionContainer { { M1PeriodicReporting-ExtIEs } } OPTIONAL,
    ...
}
M1PeriodicReporting-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
M4Configuration ::= SEQUENCE {
    m4period              M4period,
    m4-links-to-log      Links-to-log,
    iE-Extensions        ProtocolExtensionContainer { { M4Configuration-ExtIEs } } OPTIONAL,
    ...
}
M4Configuration-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
M4period ::= ENUMERATED {ms1024, ms2048, ms5120, ms10240, min1, ... }
M5Configuration ::= SEQUENCE {
    m5period              M5period,
    m5-links-to-log      Links-to-log,
    iE-Extensions        ProtocolExtensionContainer { { M5Configuration-ExtIEs } } OPTIONAL,
    ...
}
M5Configuration-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
M5period ::= ENUMERATED {ms1024, ms2048, ms5120, ms10240, min1, ... }
M6Configuration ::= SEQUENCE {
    m6report-Interval    M6report-Interval,
    m6-links-to-log      Links-to-log,
    iE-Extensions        ProtocolExtensionContainer { { M6Configuration-ExtIEs } } OPTIONAL,
    ...
}
M6Configuration-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
M6report-Interval ::= ENUMERATED {
    ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960, min1, min6, min12, min30,
    ...
}

```

```
}

M7Configuration ::= SEQUENCE {
    m7period          M7period,
    m7-links-to-log   Links-to-log,
    iE-Extensions     ProtocolExtensionContainer { { M7Configuration-ExtIEs} } OPTIONAL,
    ...
}

M7Configuration-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

M7period ::= INTEGER(1..60, ...)

MDT-Location-Info ::= SEQUENCE {
    mDT-Location-Information MDT-Location-Information,
    iE-Extensions           ProtocolExtensionContainer { { MDT-Location-Info-ExtIEs} } OPTIONAL,
    ...
}

MDT-Location-Info-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

MDT-Location-Information ::= BIT STRING (SIZE (8))

-- 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

NB-IoT-DefaultPagingDRX ::= ENUMERATED {
    rf128, rf256, rf512, rf1024,
    ...
}

NB-IoT-PagingDRX ::= ENUMERATED {
    rf32, rf64, rf128, rf256, rf512, rf1024,
    ...
}

NB-IoT-Paging-eDRXCycle ::= ENUMERATED {
```

```
hf2, hf4, hf6, hf8, hf10, hf12, hf14, hf16, hf32, hf64, hf128, hf256, hf512, hf1024,
...
}
NB-IoT-Paging-TimeWindow ::= ENUMERATED {
s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16,
...
}
NB-IoT-Paging-eDRXInfo ::= SEQUENCE {
nB-IoT-Paging-eDRXCycle      NB-IoT-Paging-eDRXCycle,
nB-IoT-Paging-TimeWindow    NB-IoT-Paging-TimeWindow          OPTIONAL,
IE-Extensions               ProtocolExtensionContainer { { NB-IoT-Paging-eDRXInfo-ExtIEs } } OPTIONAL,
...
}
NB-IoT-Paging-eDRXInfo-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
...
}
NB-IoT-UEPriority ::= INTEGER (0..255, ...)
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 ::= {
...
}
NotifySourceNGRANNode ::= ENUMERATED {
notifySource,
...
}
NGRAN-CGI ::= CHOICE {
```

```

nR-CGI          NR-CGI,
eUTRA-CGI       EUTRA-CGI,
choice-Extensions ProtocolIE-SingleContainer { {NGRAN-CGI-ExtIEs} }
}

NGRAN-CGI-ExtIEs NGAP-PROTOCOL-IES ::= {
  ...
}

NGRAN-TNLAssociationToRemoveList ::= SEQUENCE (SIZE(1..maxnoofTNLAssociations)) OF NGRAN-TNLAssociationToRemoveItem

NGRAN-TNLAssociationToRemoveItem ::= SEQUENCE {
  tNLAssociationTransportLayerAddress      CPTransportLayerInformation,
  tNLAssociationTransportLayerAddressAMF    CPTransportLayerInformation      OPTIONAL,
  iE-Extensions          ProtocolExtensionContainer { { NGRAN-TNLAssociationToRemoveItem-ExtIEs } } OPTIONAL
}

NGRAN-TNLAssociationToRemoveItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

NGRANTraceID ::= OCTET STRING (SIZE(8))

NID ::= BIT STRING (SIZE(44))

NonDynamic5QIDescriptor ::= SEQUENCE {
  fiveQI          FiveQI,
  priorityLevelQos      PriorityLevelQos      OPTIONAL,
  averagingWindow      AveragingWindow      OPTIONAL,
  maximumDataBurstVolume      MaximumDataBurstVolume      OPTIONAL,
  iE-Extensions          ProtocolExtensionContainer { {NonDynamic5QIDescriptor-ExtIEs} } OPTIONAL,
  ...
}

NonDynamic5QIDescriptor-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  { ID id-CNPacketDelayBudgetDL  CRITICALITY ignore  EXTENSION ExtendedPacketDelayBudget  PRESENCE optional  }|
  { ID id-CNPacketDelayBudgetUL  CRITICALITY ignore  EXTENSION ExtendedPacketDelayBudget  PRESENCE optional  }|
  ...
}

NotAllowedTACs ::= SEQUENCE (SIZE(1..maxnoofAllowedAreas)) OF TAC

NotificationCause ::= ENUMERATED {
  fulfilled,
  not-fulfilled,
  ...
}

NotificationControl ::= ENUMERATED {
  notification-requested,
  ...
}

NPN-AccessInformation ::= CHOICE {

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```

    pNI-NPN-Access-Information      CellCAGList,
    choice-Extensions                ProtocolIE-SingleContainer { {NPN-AccessInformation-ExtIEs} }
}

NPN-AccessInformation-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

NPN-MobilityInformation ::= CHOICE {
    sNPN-MobilityInformation        SNPN-MobilityInformation,
    pNI-NPN-MobilityInformation     PNI-NPN-MobilityInformation,
    choice-Extensions                ProtocolIE-SingleContainer { {NPN-MobilityInformation-ExtIEs} }
}

NPN-MobilityInformation-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

NPN-PagingAssistanceInformation ::= CHOICE {
    pNI-NPN-PagingAssistance        Allowed-PNI-NPN-List,
    choice-Extensions                ProtocolIE-SingleContainer { {NPN-PagingAssistanceInformation-ExtIEs} }
}

NPN-PagingAssistanceInformation-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

NPN-Support ::= CHOICE {
    sNPN                            NID,
    choice-Extensions                ProtocolIE-SingleContainer { {NPN-Support-ExtIEs} }
}

NPN-Support-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

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, ...))
NRMobilityHistoryReport ::= OCTET STRING
NRPPa-PDU ::= OCTET STRING
NRUERLFReportContainer ::= OCTET STRING
NumberOfBroadcasts ::= INTEGER (0..65535)
NumberOfBroadcastsRequested ::= INTEGER (0..65535)
NRARFCN ::= INTEGER (0.. maxNRARFCN)
NRFrequencyBand ::= INTEGER (1..1024, ...)
NRFrequencyBand-List ::= SEQUENCE (SIZE(1..maxnoofNRCellBands)) OF NRFrequencyBandItem
NRFrequencyBandItem ::= SEQUENCE {
    nr-frequency-band          NRFrequencyBand,
    iE-Extension               ProtocolExtensionContainer { {NRFrequencyBandItem-ExtIEs} }   OPTIONAL,
    ...
}
NRFrequencyBandItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
NRFrequencyInfo ::= SEQUENCE {
    nrARFCN                    NRARFCN,
    frequencyBand-List        NRFrequencyBand-List,
    iE-Extension               ProtocolExtensionContainer { {NRFrequencyInfo-ExtIEs} }   OPTIONAL,
    ...
}
NRFrequencyInfo-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
NR-PCI ::= INTEGER (0..1007, ...)
NRV2XServicesAuthorized ::= SEQUENCE {
    vehicleUE                  VehicleUE                               OPTIONAL,
    pedestrianUE               PedestrianUE                           OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { {NRV2XServicesAuthorized-ExtIEs} } OPTIONAL,
    ...
}
NRV2XServicesAuthorized-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

VehicleUE ::= ENUMERATED {
    authorized,
    not-authorized,
    ...
}

PedestrianUE ::= ENUMERATED {
    authorized,
    not-authorized,
    ...
}

NRUESidelinkAggregateMaximumBitrate ::= SEQUENCE {
    uESidelinkAggregateMaximumBitrate BitRate,
    iE-Extensions ProtocolExtensionContainer { {NRUESidelinkAggregateMaximumBitrate-ExtIEs} } OPTIONAL,
    ...
}

NRUESidelinkAggregateMaximumBitrate-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- O

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, ...)

PagingAssisDataforCEcapabUE ::= SEQUENCE {
    eUTRA-CGI      EUTRA-CGI,
    coverageEnhancementLevel CoverageEnhancementLevel,
    iE-Extensions  ProtocolExtensionContainer { { PagingAssisDataforCEcapabUE-ExtIEs} } OPTIONAL,
    ...
}

PagingAssisDataforCEcapabUE-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

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,
    ...
}

PagingeDRXInformation ::= SEQUENCE {
    paging-eDRX-Cycle      Paging-eDRX-Cycle,
    paging-Time-Window    Paging-Time-Window          OPTIONAL,
    iE-Extensions         ProtocolExtensionContainer { {PagingeDRXInformation-ExtIEs} } OPTIONAL,
    ...
}

PagingeDRXInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

Paging-eDRX-Cycle ::= ENUMERATED {
    hfhalf, hf1, hf2, hf4, hf6,
    hf8, hf10, hf12, hf14, hf16,
    hf32, hf64, hf128, hf256,
    ...
}

Paging-Time-Window ::= ENUMERATED {
    s1, s2, s3, s4, s5,
    s6, s7, s8, s9, s10,
    s11, s12, s13, s14, s15, s16,
    ...
}

PagingProbabilityInformation ::= ENUMERATED {
    p00, p05, p10, p15, p20, p25, p30, p35, p40, p45, p50, p55, p60, p65, p70, p75, p80, p85, p90, p95, p100,
    ...
}

PathSwitchRequestAcknowledgeTransfer ::= SEQUENCE {
    uL-NGU-UP-TNLInformation      UPTransportLayerInformation          OPTIONAL,
    securityIndication            SecurityIndication                  OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { {PathSwitchRequestAcknowledgeTransfer-ExtIEs} } OPTIONAL,
    ...
}

PathSwitchRequestAcknowledgeTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    { ID id-AdditionalNGU-UP-TNLInformation          CRITICALITY ignore EXTENSION UPTransportLayerInformationPairList PRESENCE optional }
}

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    { ID id-RedundantUL-NGU-UP-TNLInformation          CRITICALITY ignore EXTENSION UPTransportLayerInformation          PRESENCE optional } |
    { ID id-AdditionalRedundantNGU-UP-TNLInformation   CRITICALITY ignore EXTENSION UPTransportLayerInformationPairList PRESENCE optional },
    ...
}

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 ::= {
    { ID id-AdditionalDLQosFlowPerTNLInformation   CRITICALITY ignore EXTENSION QosFlowPerTNLInformationList          PRESENCE optional } |
    { ID id-RedundantDL-NGU-UP-TNLInformation     CRITICALITY ignore EXTENSION UPTransportLayerInformation          PRESENCE optional } |
    { ID id-RedundantDL-NGU-TNLInformationReused  CRITICALITY ignore EXTENSION DL-NGU-TNLInformationReused          PRESENCE optional } |
    { ID id-AdditionalRedundantDLQosFlowPerTNLInformation CRITICALITY ignore EXTENSION QosFlowPerTNLInformationList          PRESENCE optional } |
    { ID id-UsedRSNInformation                   CRITICALITY ignore EXTENSION RedundantPDUSessionInformation        PRESENCE optional } |
    { ID id-GlobalRANNodeID                     CRITICALITY ignore EXTENSION GlobalRANNodeID                       PRESENCE
optional },
    ...
}

PathSwitchRequestUnsuccessfulTransfer ::= SEQUENCE {
    cause          Cause,
    iE-Extensions  ProtocolExtensionContainer { {PathSwitchRequestUnsuccessfulTransfer-ExtIEs} } OPTIONAL,
    ...
}

PathSwitchRequestUnsuccessfulTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PC5QoSParameters ::= SEQUENCE {
    pc5QoSFlowList          PC5QoSFlowList,
    pc5LinkAggregateBitRates BitRate          OPTIONAL,
    iE-Extensions           ProtocolExtensionContainer { { PC5QoSParameters-ExtIEs } } OPTIONAL,
    ...
}

PC5QoSParameters-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

}
PC5QoSFlowList ::= SEQUENCE (SIZE(1..maxnoofPC5QoSFlows)) OF PC5QoSFlowItem
PC5QoSFlowItem ::= SEQUENCE {
    pQI                    FiveQI,
    pc5FlowBitRates       PC5FlowBitRates                      OPTIONAL,
    range                  Range                                OPTIONAL,
    iE-Extensions         ProtocolExtensionContainer { { PC5QoSFlowItem-ExtIEs } } OPTIONAL,
    ...
}
PC5QoSFlowItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
PC5FlowBitRates ::= SEQUENCE {
    guaranteedFlowBitRate BitRate,
    maximumFlowBitRate    BitRate,
    iE-Extensions         ProtocolExtensionContainer { { PC5FlowBitRates-ExtIEs } } OPTIONAL,
    ...
}
PC5FlowBitRates-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
PCIListForMDT ::= SEQUENCE (SIZE(1.. maxnoofNeighPCIforMDT)) OF NR-PCI
PrivacyIndicator ::= ENUMERATED {
    immediate-MDT,
    logged-MDT,
    ...
}
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),

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    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 ::= {
    ...
}

PDUSessionResourceFailedToResumeListRESReq ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceFailedToResumeItemRESReq

PDUSessionResourceFailedToResumeItemRESReq ::= SEQUENCE {
    pDUSessionID                PDUSessionID,
    cause                       Cause,
    iE-Extensions      ProtocolExtensionContainer { {PDUSessionResourceFailedToResumeItemRESReq-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceFailedToResumeItemRESReq-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceFailedToResumeListRESRes ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceFailedToResumeItemRESRes

PDUSessionResourceFailedToResumeItemRESRes ::= SEQUENCE {
    pDUSessionID                PDUSessionID,
    cause                       Cause,
    iE-Extensions      ProtocolExtensionContainer { {PDUSessionResourceFailedToResumeItemRESRes-ExtIEs} } OPTIONAL,

```



```

}
...
}
PDUSessionResourceFailedToResumeItemRESRes-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 ::= {
  ...
}

PDUSessionResourceFailedToSetupListSURES ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceFailedToSetupItemSURES

PDUSessionResourceFailedToSetupItemSURES ::= SEQUENCE {
  pduSessionID          PDUSessionID,
  pduSessionResourceSetupUnsuccessfulTransfer OCTET STRING (CONTAINING PDUSessionResourceSetupUnsuccessfulTransfer),
  iE-Extensions        ProtocolExtensionContainer { {PDUSessionResourceFailedToSetupItemSURES-ExtIEs} } OPTIONAL,
  ...
}

PDUSessionResourceFailedToSetupItemSURES-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 ::= {

```

```

    { ID id-PDUSessionResourceReleaseResponseTransfer CRITICALITY ignore EXTENSION OCTET STRING (CONTAINING
PDUSessionResourceReleaseResponseTransfer) PRESENCE optional },
    ...
}

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,
    uLNGU-UP-TNLInformation        UPTransportLayerInformation,
    additionalNG-UUPTNLInformation UPTransportLayerInformationPairList OPTIONAL,
    qosFlowFailedToModifyList      QosFlowListWithCause OPTIONAL,
    iE-Extensions                  ProtocolExtensionContainer { {PDUSessionResourceModifyConfirmTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceModifyConfirmTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    { ID id-RedundantUL-NGU-UP-TNLInformation CRITICALITY ignore EXTENSION UPTransportLayerInformation PRESENCE optional } |
    { ID id-AdditionalRedundantNGU-UP-TNLInformation CRITICALITY ignore EXTENSION UPTransportLayerInformationPairList PRESENCE optional },
    ...
}

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 QosFlowListWithCause                  PRESENCE optional }|
    { ID id-AdditionalUL-NGU-UP-TNLInformation     CRITICALITY reject TYPE UPTransportLayerInformationList        PRESENCE optional }|
    { ID id-CommonNetworkInstance                CRITICALITY ignore TYPE CommonNetworkInstance                PRESENCE optional }|
    { ID id-AdditionalRedundantUL-NGU-UP-TNLInformation CRITICALITY ignore TYPE UPTransportLayerInformationList        PRESENCE optional }|
    { ID id-RedundantCommonNetworkInstance        CRITICALITY ignore TYPE CommonNetworkInstance        PRESENCE optional },
    ...
}

PDUSessionResourceModifyResponseTransfer ::= SEQUENCE {
    dL-NGU-UP-TNLInformation      UPTransportLayerInformation      OPTIONAL,
    uL-NGU-UP-TNLInformation      UPTransportLayerInformation      OPTIONAL,
    qosFlowAddOrModifyResponseList QosFlowAddOrModifyResponseList  OPTIONAL,
    additionalDLQosFlowPerTNLInformation QosFlowPerTNLInformationList    OPTIONAL,
    qosFlowFailedToAddOrModifyList QosFlowListWithCause            OPTIONAL,
    iE-Extensions      ProtocolExtensionContainer { {PDUSessionResourceModifyResponseTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceModifyResponseTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    { ID id-AdditionalNGU-UP-TNLInformation      CRITICALITY ignore EXTENSION UPTransportLayerInformationPairList PRESENCE optional }|
    { ID id-RedundantDL-NGU-UP-TNLInformation   CRITICALITY ignore EXTENSION UPTransportLayerInformation      PRESENCE optional }|
    { ID id-RedundantUL-NGU-UP-TNLInformation   CRITICALITY ignore EXTENSION UPTransportLayerInformation      PRESENCE optional }|
    { ID id-AdditionalRedundantDLQosFlowPerTNLInformation CRITICALITY ignore EXTENSION QosFlowPerTNLInformationList PRESENCE optional }|
    { ID id-AdditionalRedundantNGU-UP-TNLInformation CRITICALITY ignore EXTENSION UPTransportLayerInformationPairList PRESENCE optional },
    ...
}

PDUSessionResourceModifyIndicationTransfer ::= SEQUENCE {
    dLQosFlowPerTNLInformation      QosFlowPerTNLInformation,
    additionalDLQosFlowPerTNLInformation QosFlowPerTNLInformationList    OPTIONAL,
    iE-Extensions      ProtocolExtensionContainer { {PDUSessionResourceModifyIndicationTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceModifyIndicationTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    { ID id-SecondaryRATUsageInformation      CRITICALITY ignore EXTENSION SecondaryRATUsageInformation PRESENCE optional }|
    { ID id-SecurityResult                    CRITICALITY ignore EXTENSION SecurityResult          PRESENCE optional }|
    { ID id-RedundantDLQosFlowPerTNLInformation CRITICALITY ignore EXTENSION QosFlowPerTNLInformation PRESENCE optional }|
    { ID id-AdditionalRedundantDLQosFlowPerTNLInformation CRITICALITY ignore EXTENSION QosFlowPerTNLInformationList PRESENCE optional }|
    { ID id-GlobalRANNodeID                  CRITICALITY ignore EXTENSION GlobalRANNodeID          PRESENCE optional },
    ...
}

```

```

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 ::= {
    {ID id-S-NSSAI    CRITICALITY reject  EXTENSION S-NSSAI    PRESENCE optional  },
    ...
}

PDUSessionResourceModifyListModRes ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceModifyItemModRes

PDUSessionResourceModifyItemModRes ::= SEQUENCE {
    pDUSessionID                PDUSessionID,
    pDUSessionResourceModifyResponseTransfer OCTET STRING (CONTAINING PDUSessionResourceModifyResponseTransfer),
    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 ::= {
    { ID id-SecondaryRATUsageInformation    CRITICALITY ignore EXTENSION SecondaryRATUsageInformation    PRESENCE optional },
    ...
}

PDUSessionResourceNotifyTransfer ::= SEQUENCE {
    qosFlowNotifyList     QosFlowNotifyList                                     OPTIONAL,
    qosFlowReleasedList   QosFlowListWithCause                               OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { {PDUSessionResourceNotifyTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceNotifyTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    { ID id-SecondaryRATUsageInformation    CRITICALITY ignore EXTENSION SecondaryRATUsageInformation    PRESENCE optional },
    ...
}

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

PDUSessionResourceResumeListRESReq ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceResumeItemRESReq

PDUSessionResourceResumeItemRESReq ::= SEQUENCE {
    pDUSessionID          PDUSessionID,
    uEContextResumeRequestTransfer OCTET STRING (CONTAINING UEContextResumeRequestTransfer),
    iE-Extensions          ProtocolExtensionContainer { {PDUSessionResourceResumeItemRESReq-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceResumeItemRESReq-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceResumeListRESRes ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceResumeItemRESRes

PDUSessionResourceResumeItemRESRes ::= SEQUENCE {
    pDUSessionID          PDUSessionID,
    uEContextResumeResponseTransfer OCTET STRING (CONTAINING UEContextResumeResponseTransfer),
    iE-Extensions          ProtocolExtensionContainer { {PDUSessionResourceResumeItemRESRes-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceResumeItemRESRes-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceSecondaryRATUsageList ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceSecondaryRATUsageItem

PDUSessionResourceSecondaryRATUsageItem ::= SEQUENCE {
    pDUSessionID          PDUSessionID,
    secondaryRATDataUsageReportTransfer OCTET STRING (CONTAINING SecondaryRATDataUsageReportTransfer),
    iE-Extensions          ProtocolExtensionContainer { {PDUSessionResourceSecondaryRATUsageItem-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceSecondaryRATUsageItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceSetupListCxtReq ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceSetupItemCxtReq

PDUSessionResourceSetupItemCxtReq ::= SEQUENCE {
    pDUSessionID          PDUSessionID,

```



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    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

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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 UPTRANSPORTLAYERINFORMATIONLIST 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 } |
    { ID id-COMMONNETWORKINSTANCE                          CRITICALITY ignore TYPE COMMONNETWORKINSTANCE PRESENCE optional } |
    { ID id-DIRECTFORWARDINGPATHAVAILABILITY              TYPE DIRECTFORWARDINGPATHAVAILABILITY PRESENCE optional } |
    { ID id-REDUNDANTUL-NGU-UP-TNLINFORMATION              CRITICALITY ignore TYPE UPTRANSPORTLAYERINFORMATION PRESENCE optional } |
    { ID id-ADDITIONALREDUNDANTUL-NGU-UP-TNLINFORMATION    CRITICALITY ignore TYPE UPTRANSPORTLAYERINFORMATIONLIST PRESENCE optional } |
    { ID id-REDUNDANTCOMMONNETWORKINSTANCE                CRITICALITY ignore TYPE COMMONNETWORKINSTANCE PRESENCE optional } |
    { ID id-REDUNDANTPDUSESSIONINFORMATION                CRITICALITY ignore TYPE REDUNDANTPDUSESSIONINFORMATION PRESENCE optional } |
    ...
}

PDUSessionResourceSetupResponseTransfer ::= SEQUENCE {
    dlQosFlowPerTNLInformation                QosFlowPerTNLInformation,
    additionalDLQosFlowPerTNLInformation      QosFlowPerTNLInformationList OPTIONAL,
    securityResult                            SecurityResult OPTIONAL,
    qosFlowFailedToSetupList                  QosFlowListWithCause OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { {PDUSESSIONRESOURCESETUPRESPONSETRANSFER-EXTIES} } OPTIONAL,
    ...
}

PDUSessionResourceSetupResponseTransfer-ExtIES NGAP-PROTOCOL-EXTENSION ::= {
    { ID id-REDUNDANTDLQOSFLOWPERTNLINFORMATION                CRITICALITY ignore EXTENSION QOSFLOWPERTNLINFORMATION PRESENCE optional } |
    { ID id-ADDITIONALREDUNDANTDLQOSFLOWPERTNLINFORMATION      CRITICALITY ignore EXTENSION QOSFLOWPERTNLINFORMATIONLIST PRESENCE optional } |
    { ID id-USERSNINFORMATION                                  CRITICALITY ignore EXTENSION REDUNDANTPDUSESSIONINFORMATION PRESENCE optional } |
    { ID id-GLOBALRANNODEID                                    CRITICALITY ignore EXTENSION GLOBALRANNODEID PRESENCE optional } |
    ...
}

PDUSessionResourceSetupUnsuccessfulTransfer ::= SEQUENCE {
    cause                Cause,

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```

    criticalityDiagnostics      CriticalityDiagnostics      OPTIONAL,
    iE-Extensions      ProtocolExtensionContainer { {PDUSessionResourceSetupUnsuccessfulTransfer-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceSetupUnsuccessfulTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

PDUSessionResourceSuspendListSUSReq ::= SEQUENCE (SIZE(1..maxnoofPDUSessions)) OF PDUSessionResourceSuspendItemSUSReq

PDUSessionResourceSuspendItemSUSReq ::= SEQUENCE {
    pDUSessionID      PDUSessionID,
    ueContextSuspendRequestTransfer      OCTET STRING (CONTAINING UEContextSuspendRequestTransfer),
    iE-Extensions      ProtocolExtensionContainer { {PDUSessionResourceSuspendItemSUSReq-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionResourceSuspendItemSUSReq-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,
    ...
}

PDUSessionUsageReport ::= SEQUENCE {
    rATType                ENUMERATED {nr, eutra, ..., nr-unlicensed, e-utra-unlicensed},
    pDUSessionTimedReportList VolumeTimedReportList,
    iE-Extensions                ProtocolExtensionContainer { {PDUSessionUsageReport-ExtIEs} } OPTIONAL,
    ...
}

PDUSessionUsageReport-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

Periodicity ::= INTEGER (0..640000, ...)

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 ::= {
  { ID id-NPN-Support          CRITICALITY reject  EXTENSION NPN-Support          PRESENCE optional } |
  { ID id-ExtendedSliceSupportList  CRITICALITY reject  EXTENSION ExtendedSliceSupportList  PRESENCE optional },
  ...
}

PNI-NPN-MobilityInformation ::= SEQUENCE {
  allowed-PNI-NPI-List          Allowed-PNI-NPN-List,
  iE-Extensions                ProtocolExtensionContainer { {PNI-NPN-MobilityInformation-ExtIEs} } OPTIONAL,
  ...
}

PNI-NPN-MobilityInformation-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 ::= {
    { ID id-CurrentQoSParaSetIndex CRITICALITY ignore EXTENSION AlternativeQoSParaSetIndex PRESENCE optional },
    ...
}

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 ::= {
    { ID id-TSCTrafficCharacteristics CRITICALITY ignore EXTENSION TSCTrafficCharacteristics PRESENCE optional }|
    { ID id-RedundantQosFlowIndicator CRITICALITY ignore EXTENSION RedundantQosFlowIndicator PRESENCE optional },
    ...
}

QosFlowAddOrModifyResponseList ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowAddOrModifyResponseItem

QosFlowAddOrModifyResponseItem ::= SEQUENCE {
    qosFlowIdentifier      QosFlowIdentifier,
    iE-Extensions          ProtocolExtensionContainer { {QosFlowAddOrModifyResponseItem-ExtIEs} } OPTIONAL,
    ...
}

QosFlowAddOrModifyResponseItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    { ID id-CurrentQoSParaSetIndex CRITICALITY ignore EXTENSION AlternativeQoSParaSetIndex PRESENCE optional },
    ...
}

QosFlowIdentifier ::= INTEGER (0..63, ...)

QosFlowInformationList ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowInformationItem

QosFlowInformationItem ::= SEQUENCE {
    qosFlowIdentifier      QosFlowIdentifier,
    dlForwarding           DLForwarding OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { {QosFlowInformationItem-ExtIEs} } OPTIONAL,
    ...
}

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```

QosFlowInformationItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  {ID id-ULForwarding CRITICALITY reject EXTENSION ULForwarding PRESENCE optional},
  ...
}

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

QosMonitoringRequest ::= ENUMERATED {ul, dl, both, ...}

QosFlowListWithCause ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowWithCauseItem

QosFlowWithCauseItem ::= SEQUENCE {
  qosFlowIdentifier          QosFlowIdentifier,
  cause                     Cause,
  iE-Extensions              ProtocolExtensionContainer { {QosFlowWithCauseItem-ExtIEs} } OPTIONAL,
  ...
}

QosFlowWithCauseItem-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,
}

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    iE-Extensions      ProtocolExtensionContainer { {QosFlowNotifyItem-ExtIEs} }  OPTIONAL,
    ...
}

QosFlowNotifyItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  { ID id-CurrentQoSParaSetIndex  CRITICALITY ignore  EXTENSION AlternativeQoSParaSetNotifyIndex  PRESENCE optional },
  ...
}

QosFlowPerTNLInformation ::= SEQUENCE {
  uPTransportLayerInformation      UPTransportLayerInformation,
  associatedQosFlowList            AssociatedQosFlowList,
  iE-Extensions      ProtocolExtensionContainer { { QosFlowPerTNLInformation-ExtIEs} }  OPTIONAL,
  ...
}

QosFlowPerTNLInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

QosFlowPerTNLInformationList ::= SEQUENCE (SIZE(1..maxnoofMultiConnectivityMinusOne)) OF QosFlowPerTNLInformationItem

QosFlowPerTNLInformationItem ::= SEQUENCE {
  qosFlowPerTNLInformation      QosFlowPerTNLInformation,
  iE-Extensions      ProtocolExtensionContainer { { QosFlowPerTNLInformationItem-ExtIEs} }  OPTIONAL,
  ...
}

QosFlowPerTNLInformationItem-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 ::= {
  {ID id-TSCTrafficCharacteristics  CRITICALITY ignore  EXTENSION TSCTrafficCharacteristics  PRESENCE optional }|
  {ID id-RedundantQosFlowIndicator  CRITICALITY ignore  EXTENSION RedundantQosFlowIndicator  PRESENCE optional },
  ...
}

QosFlowListWithDataForwarding ::= SEQUENCE (SIZE(1..maxnoofQosFlows)) OF QosFlowItemWithDataForwarding

QosFlowItemWithDataForwarding ::= SEQUENCE {
  qosFlowIdentifier      QosFlowIdentifier,
  dataForwardingAccepted      DataForwardingAccepted      OPTIONAL,
  iE-Extensions      ProtocolExtensionContainer { {QosFlowItemWithDataForwarding-ExtIEs} }  OPTIONAL,

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}
...
}
QoSFlowItemWithDataForwarding-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  { ID id-CurrentQoSParaSetIndex CRITICALITY ignore EXTENSION AlternativeQoSParaSetIndex PRESENCE optional },
  ...
}
QoSFlowToBeForwardedList ::= SEQUENCE (SIZE(1..maxnoofQoSFlows)) OF QoSFlowToBeForwardedItem
QoSFlowToBeForwardedItem ::= SEQUENCE {
  qosFlowIdentifier QoSFlowIdentifier,
  iE-Extensions ProtocolExtensionContainer { {QoSFlowToBeForwardedItem-ExtIEs} } OPTIONAL,
  ...
}
QoSFlowToBeForwardedItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
QoSFlowsUsageReportList ::= SEQUENCE (SIZE(1..maxnoofQoSFlows)) OF QoSFlowsUsageReport-Item
QoSFlowsUsageReport-Item ::= SEQUENCE {
  qosFlowIdentifier QoSFlowIdentifier,
  rATType ENUMERATED {nr, eutra, ..., nr-unlicensed, e-utra-unlicensed},
  qosFlowsTimedReportList VolumeTimedReportList,
  iE-Extensions ProtocolExtensionContainer { {QoSFlowsUsageReport-Item-ExtIEs} } OPTIONAL,
  ...
}
QoSFlowsUsageReport-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
-- R
Range ::= ENUMERATED {m50, m80, m180, m200, m350, m400, m500, m700, m1000, ...}
RANNodeName ::= PrintableString (SIZE(1..150, ...))
RANNodeNameVisibleString ::= VisibleString (SIZE(1..150, ...))
RANNodeNameUTF8String ::= UTF8String (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)
RAT-Information ::= ENUMERATED {
  unlicensed,
  nb-IoT,
  ...
}
RATRestrictions ::= SEQUENCE (SIZE(1..maxnoofEPLMNsPlusOne)) OF RATRestrictions-Item
RATRestrictions-Item ::= SEQUENCE {
  pLMNIdentity          PLMNIdentity,
  rATRestrictionInformation  RATRestrictionInformation,
  iE-Extensions        ProtocolExtensionContainer { {RATRestrictions-Item-ExtIEs} } OPTIONAL,
  ...
}
RATRestrictions-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  { ID id-ExtendedRATRestrictionInformation  CRITICALITY ignore  EXTENSION ExtendedRATRestrictionInformation  PRESENCE optional },
  ...
}
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 ::= {
  ...
}

RedirectionVoiceFallback ::= ENUMERATED {
  possible,
  not-possible,
  ...
}

RedundantPDUSessionInformation ::= SEQUENCE {
  rSN                  RSN,
  iE-Extensions       ProtocolExtensionContainer { {RedundantPDUSessionInformation-ExtIEs} } OPTIONAL,
  ...
}

RedundantPDUSessionInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

RedundantQosFlowIndicator ::= ENUMERATED {true, false}

ReflectiveQosAttribute ::= ENUMERATED {
  subject-to,
  ...
}

RelativeAMFCapacity ::= INTEGER (0..255)

ReportArea ::= ENUMERATED {
  cell,
  ...
}

RepetitionPeriod ::= INTEGER (0..131071)

ResetAll ::= ENUMERATED {
  reset-all,
  ...
}
```

```
ReportAmountMDT ::= ENUMERATED {
    r1, r2, r4, r8, r16, r32, r64, rinfinity
}

ReportIntervalMDT ::= ENUMERATED {
    ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, min1, min6, min12, min30, min60
}

ResetType ::= CHOICE {
    nG-Interface          ResetAll,
    partOfNG-Interface   UE-associatedLogicalNG-connectionList,
    choice-Extensions     ProtocolIE-SingleContainer { {ResetType-ExtIEs} }
}

ResetType-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

RGLevelWirelineAccessCharacteristics ::= OCTET STRING

RNC-ID ::= INTEGER (0..4095)

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,
    ...,
    notAvailable,
    mo-ExceptionData
}

RRCInactiveTransitionReportRequest ::= ENUMERATED {
    subsequent-state-transition-report,
    single-rrc-connected-state-report,
    cancel-report,
    ...
}

RRCState ::= ENUMERATED {
    inactive,
    connected,
    ...
}
```

```

RSN ::= ENUMERATED {v1, v2, ...}

RIMInformationTransfer ::= SEQUENCE {
    targetRANNodeID      TargetRANNodeID,
    sourceRANNodeID      SourceRANNodeID,
    rIMInformation        RIMInformation,
    iE-Extensions        ProtocolExtensionContainer { {RIMInformationTransfer-ExtIEs} } OPTIONAL,
    ...
}

RIMInformationTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

RIMInformation ::= SEQUENCE {
    targetgNBSetID      GNBSetID,
    rIM-RSDetection     ENUMERATED {rs-detected, rs-disappeared, ...},
    iE-Extensions        ProtocolExtensionContainer { {RIMInformation-ExtIEs} } OPTIONAL,
    ...
}

RIMInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

GNBSetID ::= BIT STRING (SIZE(22))

-- S

ScheduledCommunicationTime ::= SEQUENCE {
    dayOfWeek           BIT STRING (SIZE(7))                OPTIONAL,
    timeOfDayStart      INTEGER (0..86399, ...)             OPTIONAL,
    timeOfDayEnd        INTEGER (0..86399, ...)             OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { { ScheduledCommunicationTime-ExtIEs} } OPTIONAL,
    ...
}

ScheduledCommunicationTime-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

SCTP-TLAs ::= SEQUENCE (SIZE(1..maxnoofXnTLAs)) OF TransportLayerAddress

SD ::= OCTET STRING (SIZE(3))

SecondaryRATUsageInformation ::= SEQUENCE {
    pduSessionUsageReport      PDUUsageReport                OPTIONAL,
    qosFlowsUsageReportList     QoSFlowsUsageReportList       OPTIONAL,
    iE-Extension                ProtocolExtensionContainer { {SecondaryRATUsageInformation-ExtIEs} } OPTIONAL,
    ...
}

```

```

SecondaryRATUsageInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

SecondaryRATDataUsageReportTransfer ::= SEQUENCE {
  secondaryRATUsageInformation      SecondaryRATUsageInformation      OPTIONAL,
  iE-Extensions      ProtocolExtensionContainer { {SecondaryRATDataUsageReportTransfer-ExtIEs} } OPTIONAL,
  ...
}

SecondaryRATDataUsageReportTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

SecurityContext ::= SEQUENCE {
  nextHopChainingCount      NextHopChainingCount,
  nextHopNH      SecurityKey,
  iE-Extensions      ProtocolExtensionContainer { {SecurityContext-ExtIEs} } OPTIONAL,
  ...
}

SecurityContext-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

SecurityIndication ::= SEQUENCE {
  integrityProtectionIndication      IntegrityProtectionIndication,
  confidentialityProtectionIndication      ConfidentialityProtectionIndication,
  maximumIntegrityProtectedDataRate-UL      MaximumIntegrityProtectedDataRate      OPTIONAL,
  -- The above IE shall be present if integrity protection is required or preferred
  iE-Extensions      ProtocolExtensionContainer { {SecurityIndication-ExtIEs} }      OPTIONAL,
  ...
}

SecurityIndication-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  { ID id-MaximumIntegrityProtectedDataRate-DL      CRITICALITY ignore      EXTENSION MaximumIntegrityProtectedDataRate PRESENCE optional },
  ...
}

SecurityKey ::= BIT STRING (SIZE(256))

SecurityResult ::= SEQUENCE {
  integrityProtectionResult      IntegrityProtectionResult,
  confidentialityProtectionResult      ConfidentialityProtectionResult,
  iE-Extensions      ProtocolExtensionContainer { {SecurityResult-ExtIEs} }      OPTIONAL,
  ...
}

SecurityResult-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

SensorMeasurementConfiguration ::= SEQUENCE {
  sensorMeasConfig      SensorMeasConfig,

```

```

    sensorMeasConfigNameList      SensorMeasConfigNameList          OPTIONAL,
    iE-Extensions      ProtocolExtensionContainer { {SensorMeasurementConfiguration-ExtIEs} } OPTIONAL,
    ...
}

SensorMeasurementConfiguration-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

SensorMeasConfigNameList ::= SEQUENCE (SIZE(1..maxnoofSensorName)) OF SensorMeasConfigNameItem

SensorMeasConfigNameItem ::= SEQUENCE {
    sensorNameConfig      SensorNameConfig,
    iE-Extensions      ProtocolExtensionContainer { { SensorMeasConfigNameItem-ExtIEs } } OPTIONAL,
    ...
}

SensorMeasConfigNameItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

SensorMeasConfig ::= ENUMERATED {setup, ...}

SensorNameConfig ::= CHOICE {
    uncompensatedBarometricConfig      ENUMERATED {true, ...},
    ueSpeedConfig      ENUMERATED {true, ...},
    ueOrientationConfig      ENUMERATED {true, ...},
    choice-Extensions      ProtocolIE-SingleContainer { {SensorNameConfig-ExtIEs} }
}

SensorNameConfig-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

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

ServiceAreaInformation ::= SEQUENCE (SIZE(1.. maxnoofEPLMNsPlusOne)) OF ServiceAreaInformation-Item

ServiceAreaInformation-Item ::= SEQUENCE {
    pLMNIdentity      PLMNIdentity,

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```

    allowedTACs           AllowedTACs
    notAllowedTACs       NotAllowedTACs
    iE-Extensions        ProtocolExtensionContainer { {ServiceAreaInformation-Item-ExtIEs} }
    ...
}
ServiceAreaInformation-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
SgNB-UE-X2AP-ID ::= INTEGER (0..4294967295)
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 ::= {
    ...
}
SNPN-MobilityInformation ::= SEQUENCE {
    serving-NID           NID,
    iE-Extensions        ProtocolExtensionContainer { {SNPN-MobilityInformation-ExtIEs} }   OPTIONAL,
    ...
}
SNPN-MobilityInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
S-NSSAI ::= SEQUENCE {
    sST                   SST,
    sD                    SD
    iE-Extensions        ProtocolExtensionContainer { { S-NSSAI-ExtIEs} }   OPTIONAL,
    ...
}
S-NSSAI-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

```



```

}
...
}
SONConfigurationTransfer ::= SEQUENCE {
    targetRANNodeID      TargetRANNodeID,
    sourceRANNodeID      SourceRANNodeID,
    sONInformation        SONInformation,
    xnTNLConfigurationInfo XnTNLConfigurationInfo OPTIONAL,
-- The above IE shall be present if the SON Information Request IE contains the SON Information Request IE set to "Xn TNL Configuration Info"
    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 ::= {
    { ID id-SONInformationReport      CRITICALITY ignore TYPE SONInformationReport      PRESENCE mandatory },
    ...
}

SONInformationReply ::= SEQUENCE {
    xnTNLConfigurationInfo      XnTNLConfigurationInfo OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { {SONInformationReply-ExtIEs} } OPTIONAL,
    ...
}

SONInformationReply-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

SONInformationReport ::= CHOICE {
    failureIndicationInformation      FailureIndication,
    hOReportInformation                HOReport,
    choice-Extensions                ProtocolIE-SingleContainer { {SONInformationReport-ExtIEs} }
}

SONInformationReport-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

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-TargetNGRANNode-TransparentContainer-ExtIEs} } OPTIONAL,
    ...
}

SourceNGRANNode-TargetNGRANNode-TransparentContainer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  { ID id-SgNB-UE-X2AP-ID CRITICALITY ignore EXTENSION SgNB-UE-X2AP-ID          PRESENCE optional } |
  { ID id-UEHistoryInformationFromTheUE CRITICALITY ignore EXTENSION UEHistoryInformationFromTheUE PRESENCE optional },
  ...
}

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.

SourceToTarget-AMFInformationReroute ::= SEQUENCE {
  configuredNSSAI          ConfiguredNSSAI                OPTIONAL,
  rejectedNSSAIinPLMN      RejectedNSSAIinPLMN            OPTIONAL,
  rejectedNSSAIinTA        RejectedNSSAIinTA              OPTIONAL,
  ie-Extensions            ProtocolExtensionContainer { {SourceToTarget-AMFInformationReroute-ExtIEs} } OPTIONAL,
  ...
}

SourceToTarget-AMFInformationReroute-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- This IE includes information from the source Core node to the target Core node for reroute information provide by NSSF.
-- The octets of the OCTET STRING are encoded according to the specifications of the Core network.

SRVCCOperationPossible ::= ENUMERATED {
  possible,

```

```

    notPossible,
    ...
}

ConfiguredNSSAI ::= OCTET STRING (SIZE(128))

RejectedNSSAIinPLMN ::= OCTET STRING (SIZE(32))

RejectedNSSAIinTA ::= OCTET STRING (SIZE(32))

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 ::= {
    {ID id-ConfiguredTACIndication     CRITICALITY ignore EXTENSION ConfiguredTACIndication PRESENCE optional }|
    {ID id-RAT-Information              CRITICALITY reject  EXTENSION RAT-Information     PRESENCE optional },
    ...
}

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

Suspend-Request-Indication ::= ENUMERATED {
    suspend-requested,
    ...
}

Suspend-Response-Indication ::= ENUMERATED {
    suspend-indicated,
    ...
}

-- 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 ::= {
    {ID id-TargetRNC-ID    CRITICALITY reject  TYPE TargetRNC-ID PRESENCE mandatory },
    ...
}

TargetNGRANNode-ToSourceNGRANNode-TransparentContainer ::= SEQUENCE {
    rRCContainer        RRCContainer,
    iE-Extensions      ProtocolExtensionContainer { {TargetNGRANNode-ToSourceNGRANNode-TransparentContainer-ExtIEs} } OPTIONAL,
}

```

```

}
...
}
TargetNGRANNode-ToSourceNGRANNode-TransparentContainer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  { ID id-DAPSResponseInfoList          CRITICALITY reject  EXTENSION DAPSResponseInfoList PRESENCE optional },
  ...
}

TargetNGRANNode-ToSourceNGRANNode-FailureTransparentContainer ::= SEQUENCE {
  cell-CAGInformation      Cell-CAGInformation,
  iE-Extensions            ProtocolExtensionContainer { {TargetNGRANNode-ToSourceNGRANNode-FailureTransparentContainer-ExtIEs} } OPTIONAL,
  ...
}

TargetNGRANNode-ToSourceNGRANNode-FailureTransparentContainer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

TargetRANNodeID ::= SEQUENCE {
  globalRANNodeID         GlobalRANNodeID,
  selectedTAI             TAI,
  iE-Extensions           ProtocolExtensionContainer { {TargetRANNodeID-ExtIEs} } OPTIONAL,
  ...
}

TargetRANNodeID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

TargetRNC-ID ::= SEQUENCE {
  lAI                     LAI,
  rNC-ID                  RNC-ID,
  extendedRNC-ID          ExtendedRNC-ID          OPTIONAL,
  iE-Extensions           ProtocolExtensionContainer { {TargetRNC-ID-ExtIEs} } OPTIONAL,
  ...
}

TargetRNC-ID-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.

TargettoSource-Failure-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 (if applicable).

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)

TNAP-ID ::= OCTET STRING

TNGF-ID ::= CHOICE {
    tNGF-ID          BIT STRING (SIZE(32, ...)),
    choice-Extensions ProtocolIE-SingleContainer { {TNGF-ID-ExtIEs} }
}

TNGF-ID-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

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,
    ...
}

TooearlyIntersystemHO ::= SEQUENCE {
    sourcecellID              EUTRA-CGI,
    failurecellID             NGRAN-CGI,
    uERLFRReportContainer     UERLFRReportContainer OPTIONAL,
    iE-Extensions             ProtocolExtensionContainer { { TooearlyIntersystemHO-ExtIEs} } OPTIONAL,
    ...
}

TooearlyIntersystemHO-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 ::= {
  { ID id-MDTConfiguration      CRITICALITY ignore  EXTENSION MDT-Configuration      PRESENCE optional  }|
  { ID id-TraceCollectionEntityURI CRITICALITY ignore  EXTENSION URI-address          PRESENCE optional  }|
  ...
}

TraceDepth ::= ENUMERATED {
  minimum,
  medium,
  maximum,
  minimumWithoutVendorSpecificExtension,
  mediumWithoutVendorSpecificExtension,
  maximumWithoutVendorSpecificExtension,
  ...
}

TrafficLoadReductionIndication ::= INTEGER (1..99)

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

TypeOfError ::= ENUMERATED {
  not-understood,
  missing,
  ...
}

TAIBasedMDT ::= SEQUENCE {
  tAIListforMDT          TAIListforMDT,
  iE-Extensions          ProtocolExtensionContainer { {TAIBasedMDT-ExtIEs} } OPTIONAL,
  ...
}

TAIBasedMDT-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

TAIListforMDT ::= SEQUENCE (SIZE(1..maxnoofTAforMDT)) OF TAI

TABasedMDT ::= SEQUENCE {
  tAListforMDT          TAListforMDT,
  iE-Extensions          ProtocolExtensionContainer { {TABasedMDT-ExtIEs} } OPTIONAL,
  ...
}

TABasedMDT-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

```



```

}
...
}
TAListforMDT ::= SEQUENCE (SIZE(1..maxnoofTAforMDT)) OF TAC
Threshold-RSRP ::= INTEGER(0..127)
Threshold-RSRQ ::= INTEGER(0..127)
Threshold-SINR ::= INTEGER(0..127)
TimeToTrigger ::= ENUMERATED {ms0, ms40, ms64, ms80, ms100, ms128, ms160, ms256, ms320, ms480, ms512, ms640, ms1024, ms1280, ms2560, ms5120}

TWAP-ID ::= OCTET STRING

TWIF-ID ::= CHOICE {
    twif-ID          BIT STRING (SIZE(32, ...)),
    choice-Extensions ProtocolIE-SingleContainer { {TWIF-ID-ExtIEs} }
}

TWIF-ID-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

TSCAssistanceInformation ::= SEQUENCE {
    periodicity          Periodicity,
    burstArrivalTime    BurstArrivalTime                                OPTIONAL,
    iE-Extensions       ProtocolExtensionContainer { {TSCAssistanceInformation-ExtIEs} }  OPTIONAL,
    ...
}

TSCAssistanceInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

TSCTrafficCharacteristics ::= SEQUENCE {
    tSCAssistanceInformationDL    TSCAssistanceInformation                                OPTIONAL,
    tSCAssistanceInformationUL    TSCAssistanceInformation                                OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { {TSCTrafficCharacteristics-ExtIEs} }  OPTIONAL,
    ...
}

TSCTrafficCharacteristics-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- 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 ::= {
  ...
}
UECapabilityInfoRequest ::= ENUMERATED {
  requested,
  ...
}
UEContextRequest ::= ENUMERATED {requested, ...}
UEContextResumeRequestTransfer ::= SEQUENCE {
  qosFlowFailedToResumeList      QosFlowListWithCause      OPTIONAL,
  iE-Extensions                  ProtocolExtensionContainer { {UEContextResumeRequestTransfer-ExtIEs} } OPTIONAL,
  ...
}
UEContextResumeRequestTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
UEContextResumeResponseTransfer ::= SEQUENCE {
  qosFlowFailedToResumeList      QosFlowListWithCause      OPTIONAL,
  iE-Extensions                  ProtocolExtensionContainer { {UEContextResumeResponseTransfer-ExtIEs} } OPTIONAL,
  ...
}
UEContextResumeResponseTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
UEContextSuspendRequestTransfer ::= SEQUENCE {
  suspendIndicator               SuspendIndicator           OPTIONAL,
  iE-Extensions                  ProtocolExtensionContainer { {UEContextSuspendRequestTransfer-ExtIEs} } OPTIONAL,
  ...
}
UEContextSuspendRequestTransfer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

```

```

}
...
}
UE-DifferentiationInfo ::= SEQUENCE {
    periodicCommunicationIndicator    ENUMERATED {periodically, ondemand, ...}    OPTIONAL,
    periodicTime                     INTEGER (1..3600, ...)                     OPTIONAL,
    scheduledCommunicationTime        ScheduledCommunicationTime                OPTIONAL,
    stationaryIndication              ENUMERATED {stationary, mobile, ...}        OPTIONAL,
    trafficProfile                    ENUMERATED {single-packet, dual-packets, multiple-packets, ...} OPTIONAL,
    batteryIndication                 ENUMERATED {battery-powered, battery-powered-not-rechargeable-or-replaceable, not-battery-powered, ...} OPTIONAL,
    iE-Extensions                     ProtocolExtensionContainer { { UE-DifferentiationInfo-ExtIEs } } OPTIONAL,
    ...
}
UE-DifferentiationInfo-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}
UEHistoryInformation ::= SEQUENCE (SIZE(1..maxnoofCellsinUEHistoryInfo)) OF LastVisitedCellItem
UEHistoryInformationFromTheUE ::= CHOICE {
    nR                                NRMobilityHistoryReport,
    choice-Extensions                 ProtocolIE-SingleContainer { {UEHistoryInformationFromTheUE-ExtIEs} }
}
UEHistoryInformationFromTheUE-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}
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 ::= {
  { ID id-UERadioCapabilityForPagingOfNB-IoT      CRITICALITY ignore EXTENSION UERadioCapabilityForPagingOfNB-IoT      PRESENCE optional },
  ...
}
UERadioCapabilityForPagingOfNB-IoT ::= OCTET STRING
UERadioCapabilityForPagingOfNR ::= OCTET STRING
UERadioCapabilityForPagingOfEUTRA ::= OCTET STRING
UERadioCapabilityID ::= OCTET STRING
UERetentionInformation ::= ENUMERATED {
  ues-retained,

```

```

}
...
}
UERLFReportContainer ::= CHOICE {
  nR          NRUERLFReportContainer,
  lTE         LTEUERLFReportContainer,
  choice-Extensions      ProtocolIE-SingleContainer { {UERLFReportContainer-ExtIEs} }
}
UERLFReportContainer-ExtIEs NGAP-PROTOCOL-IES ::= {
  ...
}
UESecurityCapabilities ::= SEQUENCE {
  nRencryptionAlgorithms          NRencryptionAlgorithms,
  nRintegrityProtectionAlgorithms NRintegrityProtectionAlgorithms,
  eUTRAencryptionAlgorithms       EUTRAencryptionAlgorithms,
  eUTRAintegrityProtectionAlgorithms EUTRAintegrityProtectionAlgorithms,
  iE-Extensions      ProtocolExtensionContainer { {UESecurityCapabilities-ExtIEs} } OPTIONAL,
  ...
}
UESecurityCapabilities-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
UE-UP-CIoT-Support ::= ENUMERATED {supported, ...}
UL-CP-SecurityInformation ::= SEQUENCE {
  ul-NAS-MAC          UL-NAS-MAC,
  ul-NAS-Count        UL-NAS-Count,
  iE-Extensions      ProtocolExtensionContainer { { UL-CP-SecurityInformation-ExtIEs} } OPTIONAL,
  ...
}
UL-CP-SecurityInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}
UL-NAS-MAC ::= BIT STRING (SIZE (16))
UL-NAS-Count ::= BIT STRING (SIZE (5))
UL-NGU-UP-TNLModifyList ::= SEQUENCE (SIZE(1..maxnoofMultiConnectivity)) 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 ::= {
  { ID id-RedundantUL-NGU-UP-TNLInformation CRITICALITY ignore EXTENSION UPTransportLayerInformation PRESENCE optional }|

```

```

    { ID id-RedundantDL-NGU-UP-TNLInformation CRITICALITY ignore EXTENSION UPTransportLayerInformation PRESENCE optional },
    ...
}

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 ::= {
    ...
}

ULForwarding ::= ENUMERATED {
    ul-forwarding-proposed,
    ...
}

UPTransportLayerInformation ::= CHOICE {
    gTPTunnel GTPTunnel,
    choice-Extensions ProtocolIE-SingleContainer { {UPTransportLayerInformation-ExtIEs} }
}

UPTransportLayerInformation-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

UPTransportLayerInformationList ::= SEQUENCE (SIZE(1..maxnoofMultiConnectivityMinusOne)) OF UPTransportLayerInformationItem

UPTransportLayerInformationItem ::= SEQUENCE {
    nGU-UP-TNLInformation UPTransportLayerInformation,
    iE-Extensions ProtocolExtensionContainer { {UPTransportLayerInformationItem-ExtIEs} } OPTIONAL,
    ...
}

UPTransportLayerInformationItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

UPTransportLayerInformationPairList ::= SEQUENCE (SIZE(1..maxnoofMultiConnectivityMinusOne)) OF UPTransportLayerInformationPairItem

UPTransportLayerInformationPairItem ::= SEQUENCE {
    uL-NGU-UP-TNLInformation UPTransportLayerInformation,
    dL-NGU-UP-TNLInformation UPTransportLayerInformation,
    iE-Extensions ProtocolExtensionContainer { {UPTransportLayerInformationPairItem-ExtIEs} } OPTIONAL,
    ...
}

```

```

UPTransportLayerInformationPairItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

URI-address ::= VisibleString

UserLocationInformation ::= CHOICE {
  userLocationInformationEUTRA      UserLocationInformationEUTRA,
  userLocationInformationNR         UserLocationInformationNR,
  userLocationInformationN3IWF      UserLocationInformationN3IWF,
  choice-Extensions                 ProtocolIE-SingleContainer { {UserLocationInformation-ExtIEs} }
}

UserLocationInformation-ExtIEs NGAP-PROTOCOL-IES ::= {
  { ID id-UserLocationInformationTNGF      CRITICALITY ignore  TYPE UserLocationInformationTNGF      PRESENCE mandatory } |
  { ID id-UserLocationInformationTWIF      CRITICALITY ignore  TYPE UserLocationInformationTWIF      PRESENCE mandatory } |
  { ID id-UserLocationInformationW-AGF     CRITICALITY ignore  TYPE UserLocationInformationW-AGF     PRESENCE mandatory } ,
  ...
}

UserLocationInformationEUTRA ::= SEQUENCE {
  eUTRA-CGI          EUTRA-CGI,
  tAI                TAI,
  timeStamp          TimeStamp
  iE-Extensions     ProtocolExtensionContainer { {UserLocationInformationEUTRA-ExtIEs} } OPTIONAL,
  ...
}

UserLocationInformationEUTRA-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  { ID id-PSCellInformation      CRITICALITY ignore  EXTENSION NGRAN-CGI          PRESENCE optional},
  ...
}

UserLocationInformationN3IWF ::= SEQUENCE {
  ipAddress          TransportLayerAddress,
  portNumber         PortNumber,
  iE-Extensions     ProtocolExtensionContainer { {UserLocationInformationN3IWF-ExtIEs} } OPTIONAL,
  ...
}

UserLocationInformationN3IWF-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

UserLocationInformationTNGF ::= SEQUENCE {
  tNAP-ID           TNAP-ID,
  ipAddress         TransportLayerAddress,
  portNumber        PortNumber
  iE-Extensions     ProtocolExtensionContainer { {UserLocationInformationTNGF-ExtIEs} } OPTIONAL,
  ...
}

UserLocationInformationTNGF-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
  ...
}

```

```

}

UserLocationInformationTWIF ::= SEQUENCE {
    tWAP-ID          TWAP-ID,
    ipAddress        TransportLayerAddress,
    portNumber       PortNumber
    iE-Extensions    ProtocolExtensionContainer { {UserLocationInformationTWIF-ExtIEs} } OPTIONAL,
    ...
}

UserLocationInformationTWIF-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

UserLocationInformationW-AGF ::= CHOICE {
    globalLine-ID    GlobalLine-ID,
    hFCNode-ID       HFCNode-ID,
    choice-Extensions ProtocolIE-SingleContainer { { UserLocationInformationW-AGF-ExtIEs} }
}

UserLocationInformationW-AGF-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

UserLocationInformationNR ::= SEQUENCE {
    nR-CGI           NR-CGI,
    tAI              TAI,
    timeStamp        TimeStamp
    iE-Extensions    ProtocolExtensionContainer { {UserLocationInformationNR-ExtIEs} } OPTIONAL,
    ...
}

UserLocationInformationNR-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    { ID id-PSCellInformation CRITICALITY ignore EXTENSION NGRAN-CGI PRESENCE optional }|
    { ID id-NID                CRITICALITY reject EXTENSION NID        PRESENCE optional },
    ...
}

UserPlaneSecurityInformation ::= SEQUENCE {
    securityResult      SecurityResult,
    securityIndication  SecurityIndication,
    iE-Extensions       ProtocolExtensionContainer { {UserPlaneSecurityInformation-ExtIEs} } OPTIONAL,
    ...
}

UserPlaneSecurityInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- V

VolumeTimedReportList ::= SEQUENCE (SIZE(1..maxnoofTimePeriods)) OF VolumeTimedReport-Item

VolumeTimedReport-Item ::= SEQUENCE {

```



```

    startTimeStamp          OCTET STRING (SIZE(4)),
    endTimeStamp           OCTET STRING (SIZE(4)),
    usageCountUL           INTEGER (0..18446744073709551615),
    usageCountDL           INTEGER (0..18446744073709551615),
    iE-Extensions         ProtocolExtensionContainer { {VolumeTimedReport-Item-ExtIEs} } OPTIONAL,
    ...
}

VolumeTimedReport-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- W

W-AGF-ID ::= CHOICE {
    w-AGF-ID                BIT STRING (SIZE(16, ...)),
    choice-Extensions       ProtocolIE-SingleContainer { {W-AGF-ID-ExtIEs} }
}

W-AGF-ID-ExtIEs NGAP-PROTOCOL-IES ::= {
    ...
}

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))

WLANMeasurementConfiguration ::= SEQUENCE {
    wlanMeasConfig            WLANMeasConfig,
    wlanMeasConfigNameList    WLANMeasConfigNameList OPTIONAL,
    wlan-rssi                 ENUMERATED {true, ...} OPTIONAL,
    wlan-rtt                  ENUMERATED {true, ...} OPTIONAL,
    iE-Extensions            ProtocolExtensionContainer { {WLANMeasurementConfiguration-ExtIEs} } OPTIONAL,
    ...
}

WLANMeasurementConfiguration-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

}

WLANMeasConfigNameList ::= SEQUENCE (SIZE(1..maxnoofWLANName)) OF WLANMeasConfigNameItem

WLANMeasConfigNameItem ::= SEQUENCE {
    wlanName          WLANName,
    iE-Extensions     ProtocolExtensionContainer { { WLANMeasConfigNameItem-ExtIEs } } OPTIONAL,
    ...
}

WLANMeasConfigNameItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

WLANMeasConfig ::= ENUMERATED {setup,...}

WLANName ::= OCTET STRING (SIZE (1..32))

WUS-Assistance-Information ::= SEQUENCE {
    pagingProbabilityInformation    PagingProbabilityInformation,
    iE-Extensions                 ProtocolExtensionContainer { { WUS-Assistance-Information-ExtIEs } } OPTIONAL,
    ...
}

WUS-Assistance-Information-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- 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 ::= {
    { ID id-SCTP-TLAs        CRITICALITY ignore EXTENSION SCTP-TLAs    PRESENCE optional },
    ...
}

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-UETNLABindingRelease | 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 |
| id-SecondaryRATDataUsageReport | ProcedureCode ::= 52 |
| id-UplinkRIMInformationTransfer | ProcedureCode ::= 53 |
| id-DownlinkRIMInformationTransfer | ProcedureCode ::= 54 |
| id-RetrieveUEInformation | ProcedureCode ::= 55 |
| id-UEInformationTransfer | ProcedureCode ::= 56 |
| id-RANCPRelocationIndication | ProcedureCode ::= 57 |
| id-UEContextResume | ProcedureCode ::= 58 |
| id-UEContextSuspend | ProcedureCode ::= 59 |
| id-UERadioCapabilityIDMapping | ProcedureCode ::= 60 |
| id-HandoverSuccess | ProcedureCode ::= 61 |
| id-UplinkRANEarlyStatusTransfer | ProcedureCode ::= 62 |
| id-DownlinkRANEarlyStatusTransfer | ProcedureCode ::= 63 |
| id-AMFCPrelocationIndication | ProcedureCode ::= 64 |
| id-ConnectionEstablishmentIndication | ProcedureCode ::= 65 |

```
-- *****
--
-- Extension constants
--
```

```

-- *****
maxPrivateIEs                INTEGER ::= 65535
maxProtocolExtensions        INTEGER ::= 65535
maxProtocolIEs               INTEGER ::= 65535
-- *****
--
-- Lists
--
-- *****

maxnoofAllowedAreas          INTEGER ::= 16
maxnoofAllowedCAGsperPLMN    INTEGER ::= 256
maxnoofAllowedS-NSSAIs       INTEGER ::= 8
maxnoofBluetoothName         INTEGER ::= 4
maxnoofBPLMNs                INTEGER ::= 12
maxnoofCAGsperCell           INTEGER ::= 64
maxnoofCellIDforMDT          INTEGER ::= 32
maxnoofCellIDforWarning      INTEGER ::= 65535
maxnoofCellinAoI             INTEGER ::= 256
maxnoofCellinEAI             INTEGER ::= 65535
maxnoofCellinTAI             INTEGER ::= 65535
maxnoofCellsingNB            INTEGER ::= 16384
maxnoofCellsinngeNB          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
maxnoofExtSliceItems         INTEGER ::= 65535
maxnoofForbTACs              INTEGER ::= 4096
maxnoofFreqforMDT           INTEGER ::= 8
maxnoofMDTPLMNs              INTEGER ::= 16
maxnoofMultiConnectivity     INTEGER ::= 4
maxnoofMultiConnectivityMinusOne INTEGER ::= 3
maxnoofNeighPCIforMDT        INTEGER ::= 32
maxnoofNGConnectionsToReset  INTEGER ::= 65536
maxnoofNRCellBands           INTEGER ::= 32
maxnoofPC5QoSFlows           INTEGER ::= 2048
maxnoofPDU Sessions          INTEGER ::= 256
maxnoofPLMNs                 INTEGER ::= 12
maxnoofQoSFlows              INTEGER ::= 64
maxnoofQoSParaSets           INTEGER ::= 8
maxnoofRANNodeinAoI          INTEGER ::= 64
maxnoofRecommendedCells      INTEGER ::= 16
maxnoofRecommendedRANNodes   INTEGER ::= 16
maxnoofAoI                   INTEGER ::= 64
maxnoofSensorName            INTEGER ::= 3
maxnoofServedGUAMIs          INTEGER ::= 256

```

| | |
|--|----------------------|
| maxnoofSliceItems | INTEGER ::= 1024 |
| maxnoofTACs | INTEGER ::= 256 |
| maxnoofTAforMDT | INTEGER ::= 8 |
| maxnoofTAIforInactive | INTEGER ::= 16 |
| maxnoofTAIforPaging | INTEGER ::= 16 |
| maxnoofTAIforRestart | INTEGER ::= 2048 |
| maxnoofTAIforWarning | INTEGER ::= 65535 |
| maxnoofTAIinAoI | INTEGER ::= 16 |
| maxnoofTimePeriods | INTEGER ::= 2 |
| maxnoofTNLAssociations | INTEGER ::= 32 |
| maxnoofWLANName | INTEGER ::= 4 |
| maxnoofXnExtTLAs | INTEGER ::= 16 |
| maxnoofXnGTP-TLAs | INTEGER ::= 16 |
| maxnoofXnTLAs | INTEGER ::= 2 |
| maxnoofCandidateCells | INTEGER ::= 32 |
| maxNRARFCN | INTEGER ::= 3279165 |
| -- ***** | |
| -- | |
| -- 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-CoreNetworkAssistanceInformationForInactive | 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-PDUSessionResourceToBeSwitchedDLList | 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-TAIListForPaging | ProtocolIE-ID ::= 103 |
| id-TAIListForRestart | 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 |
| id-PDUSessionResourceSecondaryRATUsageList | ProtocolIE-ID ::= 142 |
| id-HandoverFlag | ProtocolIE-ID ::= 143 |
| id-SecondaryRATUsageInformation | ProtocolIE-ID ::= 144 |
| id-PDUSessionResourceReleaseResponseTransfer | ProtocolIE-ID ::= 145 |
| id-RedirectionVoiceFallback | ProtocolIE-ID ::= 146 |
| id-UERetentionInformation | ProtocolIE-ID ::= 147 |
| id-S-NSSAI | ProtocolIE-ID ::= 148 |
| id-PSCellInformation | ProtocolIE-ID ::= 149 |
| id-LastEUTRAN-PLMNIdentity | ProtocolIE-ID ::= 150 |
| id-MaximumIntegrityProtectedDataRate-DL | ProtocolIE-ID ::= 151 |
| id-AdditionalDLForwardingUPTNLInformation | ProtocolIE-ID ::= 152 |
| id-AdditionalDLUPTNLInformationForHOList | ProtocolIE-ID ::= 153 |
| id-AdditionalNGU-UP-TNLInformation | ProtocolIE-ID ::= 154 |
| id-AdditionalDLQoSFlowPerTNLInformation | ProtocolIE-ID ::= 155 |
| id-SecurityResult | ProtocolIE-ID ::= 156 |
| id-ENDC-SONConfigurationTransferDL | ProtocolIE-ID ::= 157 |
| id-ENDC-SONConfigurationTransferUL | ProtocolIE-ID ::= 158 |
| id-OldAssociatedQoSFlowList-ULendmarkerexpected | ProtocolIE-ID ::= 159 |
| id-CNTypeRestrictionsForEquivalent | ProtocolIE-ID ::= 160 |
| id-CNTypeRestrictionsForServing | ProtocolIE-ID ::= 161 |
| id-NewGUAMI | ProtocolIE-ID ::= 162 |
| id-ULForwarding | ProtocolIE-ID ::= 163 |
| id-ULForwardingUP-TNLInformation | ProtocolIE-ID ::= 164 |
| id-CNAssistedRANTuning | ProtocolIE-ID ::= 165 |
| id-CommonNetworkInstance | ProtocolIE-ID ::= 166 |
| id-NGRAN-TNLAssociationToRemoveList | ProtocolIE-ID ::= 167 |
| id-TNLAssociationTransportLayerAddressNGRAN | ProtocolIE-ID ::= 168 |
| id-EndpointIPAddressAndPort | ProtocolIE-ID ::= 169 |
| id-LocationReportingAdditionalInfo | ProtocolIE-ID ::= 170 |
| id-SourceToTarget-AMFInformationReroute | ProtocolIE-ID ::= 171 |
| id-AdditionalULForwardingUPTNLInformation | ProtocolIE-ID ::= 172 |
| id-SCTP-TLAs | ProtocolIE-ID ::= 173 |
| id-SelectedPLMNIdentity | ProtocolIE-ID ::= 174 |
| id-RIMInformationTransfer | ProtocolIE-ID ::= 175 |
| id-GUAMIType | ProtocolIE-ID ::= 176 |
| id-SRVCCOperationPossible | ProtocolIE-ID ::= 177 |
| id-TargetRNC-ID | ProtocolIE-ID ::= 178 |
| id-RAT-Information | ProtocolIE-ID ::= 179 |
| id-ExtendedRATRestrictionInformation | ProtocolIE-ID ::= 180 |
| id-QoSMonitoringRequest | ProtocolIE-ID ::= 181 |
| id-SgNB-UE-X2AP-ID | ProtocolIE-ID ::= 182 |
| id-AdditionalRedundantDL-NGU-UP-TNLInformation | ProtocolIE-ID ::= 183 |
| id-AdditionalRedundantDLQoSFlowPerTNLInformation | ProtocolIE-ID ::= 184 |
| id-AdditionalRedundantNGU-UP-TNLInformation | ProtocolIE-ID ::= 185 |
| id-AdditionalRedundantUL-NGU-UP-TNLInformation | ProtocolIE-ID ::= 186 |
| id-CNPacketDelayBudgetDL | ProtocolIE-ID ::= 187 |
| id-CNPacketDelayBudgetUL | ProtocolIE-ID ::= 188 |
| id-ExtendedPacketDelayBudget | ProtocolIE-ID ::= 189 |
| id-RedundantCommonNetworkInstance | ProtocolIE-ID ::= 190 |
| id-RedundantDL-NGU-TNLInformationReused | ProtocolIE-ID ::= 191 |
| id-RedundantDL-NGU-UP-TNLInformation | ProtocolIE-ID ::= 192 |
| id-RedundantDLQoSFlowPerTNLInformation | ProtocolIE-ID ::= 193 |

| | |
|---|-----------------------|
| id-RedundantQosFlowIndicator | ProtocolIE-ID ::= 194 |
| id-RedundantUL-NGU-UP-TNLInformation | ProtocolIE-ID ::= 195 |
| id-TSCTrafficCharacteristics | ProtocolIE-ID ::= 196 |
| id-RedundantPDUSessionInformation | ProtocolIE-ID ::= 197 |
| id-UsedRSNInformation | ProtocolIE-ID ::= 198 |
| id-IAB-Authorized | ProtocolIE-ID ::= 199 |
| id-IAB-Supported | ProtocolIE-ID ::= 200 |
| id-IABNodeIndication | ProtocolIE-ID ::= 201 |
| id-NB-IoT-PagingDRX | ProtocolIE-ID ::= 202 |
| id-NB-IoT-Paging-eDRXInfo | ProtocolIE-ID ::= 203 |
| id-NB-IoT-DefaultPagingDRX | ProtocolIE-ID ::= 204 |
| id-Enhanced-CoverageRestriction | ProtocolIE-ID ::= 205 |
| id-Extended-ConnectedTime | ProtocolIE-ID ::= 206 |
| id-PagingAssisDataforCEcapabUE | ProtocolIE-ID ::= 207 |
| id-WUS-Assistance-Information | ProtocolIE-ID ::= 208 |
| id-UE-DifferentiationInfo | ProtocolIE-ID ::= 209 |
| id-NB-IoT-UEPriority | ProtocolIE-ID ::= 210 |
| id-UL-CP-SecurityInformation | ProtocolIE-ID ::= 211 |
| id-DL-CP-SecurityInformation | ProtocolIE-ID ::= 212 |
| id-TAI | ProtocolIE-ID ::= 213 |
| id-UERadioCapabilityForPagingOfNB-IoT | ProtocolIE-ID ::= 214 |
| id-LTEV2XServicesAuthorized | ProtocolIE-ID ::= 215 |
| id-NRV2XServicesAuthorized | ProtocolIE-ID ::= 216 |
| id-LTEUESidelinkAggregateMaximumBitrate | ProtocolIE-ID ::= 217 |
| id-NRUESidelinkAggregateMaximumBitrate | ProtocolIE-ID ::= 218 |
| id-PC5QoSParameters | ProtocolIE-ID ::= 219 |
| id-AlternativeQoSParaSetList | ProtocolIE-ID ::= 220 |
| id-CurrentQoSParaSetIndex | ProtocolIE-ID ::= 221 |
| id-CEmodeBrestricted | ProtocolIE-ID ::= 222 |
| id-PagingeDRXInformation | ProtocolIE-ID ::= 223 |
| id-CEmodeBSupport-Indicator | ProtocolIE-ID ::= 224 |
| id-LTEM-Indication | ProtocolIE-ID ::= 225 |
| id-EndIndication | ProtocolIE-ID ::= 226 |
| id-EDT-Session | ProtocolIE-ID ::= 227 |
| id-UECapabilityInfoRequest | ProtocolIE-ID ::= 228 |
| id-PDUSessionResourceFailedToResumeListRESReq | ProtocolIE-ID ::= 229 |
| id-PDUSessionResourceFailedToResumeListRESRes | ProtocolIE-ID ::= 230 |
| id-PDUSessionResourceSuspendListSUSReq | ProtocolIE-ID ::= 231 |
| id-PDUSessionResourceResumeListRESReq | ProtocolIE-ID ::= 232 |
| id-PDUSessionResourceResumeListRESRes | ProtocolIE-ID ::= 233 |
| id-UE-UP-CIoT-Support | ProtocolIE-ID ::= 234 |
| id-Suspend-Request-Indication | ProtocolIE-ID ::= 235 |
| id-Suspend-Response-Indication | ProtocolIE-ID ::= 236 |
| id-RRC-Resume-Cause | ProtocolIE-ID ::= 237 |
| id-RGLevelWirelineAccessCharacteristics | ProtocolIE-ID ::= 238 |
| id-W-AGFIdentityInformation | ProtocolIE-ID ::= 239 |
| id-GlobalTNGF-ID | ProtocolIE-ID ::= 240 |
| id-GlobalTWIF-ID | ProtocolIE-ID ::= 241 |
| id-GlobalW-AGF-ID | ProtocolIE-ID ::= 242 |
| id-UserLocationInformationW-AGF | ProtocolIE-ID ::= 243 |
| id-UserLocationInformationTNGF | ProtocolIE-ID ::= 244 |
| id-AuthenticatedIndication | ProtocolIE-ID ::= 245 |
| id-TNGFIdentityInformation | ProtocolIE-ID ::= 246 |
| id-TWIFIdentityInformation | ProtocolIE-ID ::= 247 |

| | |
|--|-----------------------|
| id-UserLocationInformationTWIF | ProtocolIE-ID ::= 248 |
| id-DataForwardingResponseERABList | ProtocolIE-ID ::= 249 |
| id-IntersystemSONConfigurationTransferDL | ProtocolIE-ID ::= 250 |
| id-IntersystemSONConfigurationTransferUL | ProtocolIE-ID ::= 251 |
| id-SONInformationReport | ProtocolIE-ID ::= 252 |
| id-UEHistoryInformationFromTheUE | ProtocolIE-ID ::= 253 |
| id-ManagementBasedMDTPLMNList | ProtocolIE-ID ::= 254 |
| id-MDTConfiguration | ProtocolIE-ID ::= 255 |
| id-PrivacyIndicator | ProtocolIE-ID ::= 256 |
| id-TraceCollectionEntityURI | ProtocolIE-ID ::= 257 |
| id-NPN-Support | ProtocolIE-ID ::= 258 |
| id-NPN-AccessInformation | ProtocolIE-ID ::= 259 |
| id-NPN-PagingAssistanceInformation | ProtocolIE-ID ::= 260 |
| id-NPN-MobilityInformation | ProtocolIE-ID ::= 261 |
| id-TargettoSource-Failure-TransparentContainer | ProtocolIE-ID ::= 262 |
| id-NID | ProtocolIE-ID ::= 263 |
| id-UERadioCapabilityID | ProtocolIE-ID ::= 264 |
| id-UERadioCapability-EUTRA-Format | ProtocolIE-ID ::= 265 |
| id-DAPSRequestInfo | ProtocolIE-ID ::= 266 |
| id-DAPSResponseInfoList | ProtocolIE-ID ::= 267 |
| id-EarlyStatusTransfer-TransparentContainer | ProtocolIE-ID ::= 268 |
| id-NotifySourceNGRANNode | ProtocolIE-ID ::= 269 |
| id-ExtendedSliceSupportList | ProtocolIE-ID ::= 270 |
| id-ExtendedTAISliceSupportList | ProtocolIE-ID ::= 271 |
| id-ConfiguredTACIndication | ProtocolIE-ID ::= 272 |
| id-Extended-RANNodeName | ProtocolIE-ID ::= 273 |
| id-Extended-AMFName | ProtocolIE-ID ::= 274 |

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:

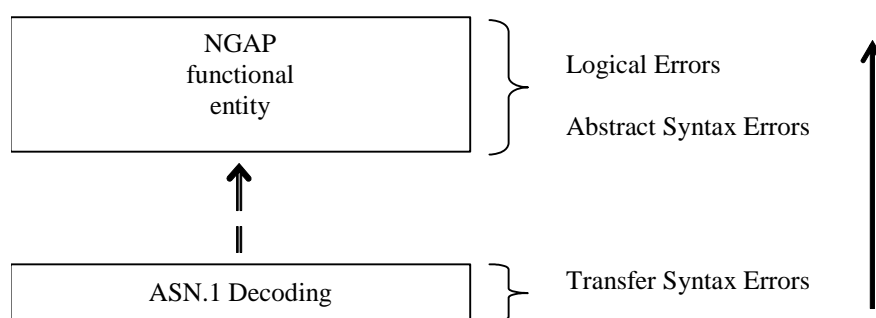


Figure 10.1-1: Protocol Errors in NGAP.

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 subclauses 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 first returned message that includes an unknown local AP ID, the receiving node shall initiate an Error Indication procedure with inclusion of the received AP IDs 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 these AP IDs as local or remote identifier.

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 |
| 2019-03 | RAN#83 | RP-190556 | 0005 | 3 | F | NGAP Corrections for UP Security Handling in DC during PDU Session Lifetime | 15.3.0 |
| 2019-03 | RAN#83 | RP-190555 | 0008 | 2 | F | Separate UL/DL limits for UE's maximum IP rate | 15.3.0 |
| 2019-03 | RAN#83 | RP-190554 | 0009 | 1 | F | Data volume reporting for MR-DC with 5GC | 15.3.0 |
| 2019-03 | RAN#83 | RP-190554 | 0010 | 3 | F | Correction of PDU Session split at handover | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0011 | 1 | F | Correction of EPS Voice Fallback | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0012 | - | F | Correction of slice support over NG | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0014 | 1 | F | Rapporteur updates for TS 38.413 | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0015 | - | F | Correction of User Location Information IE presence in HANDOVER NOTIFY | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0019 | 1 | F | Correction to RRC state report | 15.3.0 |
| 2019-03 | RAN#83 | RP-190555 | 0021 | - | F | Support of RAN initiated multiple SCTP associations | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0023 | - | F | Corrections on RAN/AMF Configuration Update | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0024 | 2 | F | Correction of EPC interworking | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0025 | 1 | F | Correction of Emergency Fallback | 15.3.0 |
| 2019-03 | RAN#83 | RP-190202 | 0027 | 3 | F | Transfer of the PSCell information to Core Network | 15.3.0 |
| 2019-03 | RAN#83 | RP-190558 | 0028 | 1 | F | Release due to pre-emption | 15.3.0 |
| 2019-03 | RAN#83 | RP-190558 | 0029 | - | F | Handling of APID for the first returned message | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0037 | - | F | Clarification on the usage of TNL information | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0044 | 1 | F | NG Setup Correction and UE context retention | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0045 | 1 | F | UE AMBR handling in PDU Session Resource Setup procedure | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0046 | 1 | F | Remove the second tunnel in the PDU session split, 5GC initiated | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0048 | 1 | F | When NG-RAN node fails to set up a QoS flow for IMS voice | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0052 | - | F | Correction of ASN.1 for PDU Session Resource Modify Response | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0053 | 1 | F | Cause value in RRC fallback case | 15.3.0 |
| 2019-03 | RAN#83 | RP-190556 | 0058 | 2 | F | S-NSSAI update during EPS to 5GS handover | 15.3.0 |
| 2019-03 | RAN#83 | RP-190561 | 0064 | 1 | F | Introduction of TNL Address discovery for EN-DC (using new container) | 15.3.0 |
| 2019-03 | RAN#83 | RP-190200 | 0066 | - | F | Correction of ASN.1 for SON Configuration Transfer and PDU Session Resource Modify Request Transfer | 15.3.0 |
| 2019-07 | RAN#84 | RP-191394 | 0099 | 1 | F | Rapporteur updates for TS 38.413 | 15.4.0 |
| 2019-07 | RP-84 | RP-191397 | 0041 | 2 | F | Support of ongoing re-mapping on source side during SDAP mobility | 15.4.0 |
| 2019-07 | RP-84 | RP-191397 | 0067 | 1 | F | NGAP Further Clarification of S-NSSAI Update for EPS to 5GS HO | 15.4.0 |
| 2019-07 | RP-84 | RP-191394 | 0071 | - | F | CR38413 for Clarification on PDU Session resource modify | 15.4.0 |
| 2019-07 | RP-84 | RP-191397 | 0075 | 1 | F | Correction of Core Network Type Restrictions | 15.4.0 |
| 2019-07 | RP-84 | RP-191394 | 0077 | 1 | F | Correction of PDU Session Release | 15.4.0 |
| 2019-07 | RP-84 | RP-191395 | 0084 | 2 | F | Removal of multiple SCTP associations PS: This CR was not implemented as it was not based on the latest version of the spec. | 15.4.0 |
| 2019-07 | RP-84 | RP-191394 | 0095 | | F | Correction on Error Indication procedure | 15.4.0 |
| 2019-07 | RP-84 | RP-191394 | 0096 | | F | Location Report Request Type | 15.4.0 |

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|---------|---------|-----------|------|----|---|---|--------|
| 2019-07 | RP-84 | RP-191394 | 0101 | 2 | F | GUAMI update in case of AMF change | 15.4.0 |
| 2019-07 | RP-84 | RP-191397 | 0102 | 2 | F | Data forwarding and QoS flow remapping | 15.4.0 |
| 2019-07 | RP-84 | RP-191397 | 0111 | 1 | F | Correction of CN Assistance Information | 15.4.0 |
| 2019-07 | RP-84 | RP-191397 | 0112 | | F | Correction of Network Instance | 15.4.0 |
| 2019-07 | RP-84 | RP-191394 | 0117 | 1 | F | Correction of AMF UE NGAP ID | 15.4.0 |
| 2019-07 | RP-84 | RP-191394 | 0130 | 1 | F | Adding PSCell to the User Location Information | 15.4.0 |
| 2019-07 | RP-84 | RP-191394 | 0135 | | F | Correction on Handover Command message | 15.4.0 |
| 2019-07 | RP-84 | RP-191394 | 0148 | | F | Correction of duplicated descriptions on additional UL tunnel information | 15.4.0 |
| 2019-09 | RP-85 | RP-192167 | 0084 | 4 | F | Removal of multiple SCTP associations | 15.5.0 |
| 2019-09 | RP-85 | RP-192166 | 0161 | 2 | F | Correction of secured signalling connection | 15.5.0 |
| 2019-09 | RP-85 | RP-192167 | 0178 | 1 | F | PDU Session fail in Path Switch Request procedure | 15.5.0 |
| 2019-09 | RP-85 | RP-192167 | 0195 | 2 | F | Reroute NSSF provided information | 15.5.0 |
| 2019-09 | RP-85 | RP-192166 | 0199 | | F | Correction of Handover Command message | 15.5.0 |
| 2019-09 | RP-85 | RP-192167 | 0220 | 1 | F | NGAP correction of Initial Context Setup procedure text | 15.5.0 |
| 2019-09 | RP-85 | RP-192167 | 0226 | 1 | F | Rapporteur cleanup of IE semantics descriptions | 15.5.0 |
| 2019-12 | RP-86 | RP-192915 | 0256 | 1 | F | Correction of NAS transparent container | 15.6.0 |
| 2019-12 | RP-86 | RP-192915 | 0258 | 1 | F | Missing procedural texts for NG interface | 15.6.0 |
| 2019-12 | RP-86 | RP-192915 | 0261 | | F | Correction of Handover Command | 15.6.0 |
| 2019-12 | RP-86 | RP-192915 | 0262 | 1 | F | Correction of S-NSSAI coding | 15.6.0 |
| 2019-12 | RP-86 | RP-192916 | 0269 | 1 | F | Correction of Port Number IE in tabular | 15.6.0 |
| 2019-12 | RP-86 | RP-192915 | 0276 | 2 | F | Enable inclusion of the Backup AMF Name IE | 15.6.0 |
| 2019-12 | RP-86 | RP-192916 | 0281 | | F | Correction of NG Handover | 15.6.0 |
| 2019-12 | RP-86 | RP-192896 | 0286 | 3 | F | Addition of abnormal cases for location report procedure | 15.6.0 |
| 2019-12 | RP-86 | RP-192916 | 0300 | 2 | F | CR to 38.413 on clarifications to Xn TNL Configuration Info | 15.6.0 |
| 2019-12 | RP-86 | RP-192916 | 0303 | | F | CR for Clarification on purpose of path switch request | 15.6.0 |
| 2019-12 | RP-86 | RP-193055 | 0304 | - | F | Correction of Xn TNL Configuration Info | 15.6.0 |
| 2019-12 | RP-86 | RP-192912 | 0051 | 7 | B | Support of Direct Data forwarding for handover between 4G and 5G | 16.0.0 |
| 2019-12 | RP-86 | RP-192908 | 0137 | 6 | B | CR to 38.413 for signalling design for RIM | 16.0.0 |
| 2019-12 | RP-86 | RP-192916 | 0143 | 3 | B | The GUAMI and GUMMEI usage for EPS/5GS interworking | 16.0.0 |
| 2019-12 | RP-86 | RP-192913 | 0266 | 1 | C | Extending the MDBV Range | 16.0.0 |
| 2020-03 | RP-87-e | RP-200424 | 0234 | 6 | B | Support of SRVCC from 5G to 3G | 16.1.0 |
| 2020-03 | RP-87-e | RP-200422 | 0291 | 2 | B | Introduction of NR-U | 16.1.0 |
| 2020-03 | RP-87-e | RP-200425 | 0314 | 1 | F | Addition of the PSCell information in the path update procedure | 16.1.0 |
| 2020-03 | RP-87-e | RP-200428 | 0317 | | A | Correction of Warning Security Information in ETWS primary notification | 16.1.0 |
| 2020-03 | RP-87-e | RP-200429 | 0319 | | A | Correction of tabular for Xn TNL Configuration Info | 16.1.0 |
| 2020-03 | RP-87-e | RP-200425 | 0320 | 1 | F | NGAP Rapporteur corrections | 16.1.0 |
| 2020-03 | RP-87-e | RP-200475 | 0329 | 4 | B | E2E delay measurement for QoS monitoring for URLLC | 16.1.0 |
| 2020-03 | RP-87-e | RP-200419 | 0331 | 1 | B | Inter-system direct forwarding with shared SgNB/gNB | 16.1.0 |
| 2020-03 | RP-87-e | RP-200428 | 0335 | | A | Correction of RAN paging priority | 16.1.0 |
| 2020-03 | RP-87-e | RP-200428 | 0337 | 1 | A | PDU session resource in UE context release | 16.1.0 |
| 2020-03 | RP-87-e | RP-200423 | 0347 | 2 | B | Introducing Radio Capability Optimisation (RACS) (The CR is not implemented. The CR was marked agreed by mistake while the WI is not yet complete) | 16.1.0 |
| 2020-07 | RP-88-e | RP-201077 | 0063 | 13 | B | BL CR to 38.413: Support for IAB | 16.2.0 |
| 2020-07 | RP-88-e | RP-201079 | 0082 | 15 | B | Introduction of NR_IOT support to TS 38.413 | 16.2.0 |
| 2020-07 | RP-88-e | RP-201088 | 0120 | 10 | B | Introduction of NB-IoT Paging and eDRX aspects | 16.2.0 |
| 2020-07 | RP-88-e | RP-201086 | 0153 | 11 | B | Common CP/UP aspects of CIoT UEs when connected to 5GC | 16.2.0 |
| 2020-07 | RP-88-e | RP-201335 | 0156 | 11 | B | Introduction of NB-IoT related NG-AP procedures | 16.2.0 |
| 2020-07 | RP-88-e | RP-201088 | 0157 | 9 | B | Introduction of CP UP NB-IoT Others | 16.2.0 |
| 2020-07 | RP-88-e | RP-201074 | 0168 | 10 | B | Support of NR V2X over NG | 16.2.0 |
| 2020-07 | RP-88-e | RP-201087 | 0172 | 10 | B | Introduction of eMTC connected to 5GC | 16.2.0 |
| 2020-07 | RP-88-e | RP-201086 | 0173 | 8 | B | Introduction of Control Plane CIoT 5GS Optimisation for NB-IOT and eMTC | 16.2.0 |
| 2020-07 | RP-88-e | RP-201086 | 0188 | 10 | B | Introduction of Suspend-Resume | 16.2.0 |
| 2020-07 | RP-88-e | RP-201081 | 0192 | 11 | B | CR for introducing WWC in RAN | 16.2.0 |
| 2020-07 | RP-88-e | RP-201082 | 0237 | 10 | B | Addition of SON features | 16.2.0 |
| 2020-07 | RP-88-e | RP-201082 | 0280 | 7 | B | Addition of MDT feature | 16.2.0 |
| 2020-07 | RP-88-e | RP-201080 | 0290 | 9 | B | Introduction of Non-Public Networks | 16.2.0 |

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|---------|---------|-----------|------|---|---|---|--------|
| 2020-07 | RP-88-e | RP-201079 | 0313 | 4 | B | Support of Ethernet Header Compression | 16.2.0 |
| 2020-07 | RP-88-e | RP-201078 | 0347 | 6 | B | Introducing Radio Capability Optimisation (RACS) | 16.2.0 |
| 2020-07 | RP-88-e | RP-201091 | 0357 | 2 | A | Clarification the usage of the New AMF UE NGAP ID included in the UE CONTEXT MODIFICATION REQUEST message | 16.2.0 |
| 2020-07 | RP-88-e | RP-201075 | 0362 | 5 | B | Baseline CR for introducing Rel-16 NR mobility enhancement | 16.2.0 |
| 2020-07 | RP-88-e | RP-201083 | 0364 | | F | ASN.1 Correction of the Data Forwarding Response E-RAB List IE | 16.2.0 |
| 2020-07 | RP-88-e | RP-201085 | 0365 | | F | NGAP Rapporteur corrections | 16.2.0 |
| 2020-07 | RP-88-e | RP-201091 | 0371 | 1 | A | Correction of Revoke E-RAB ID | 16.2.0 |
| 2020-07 | RP-88-e | RP-200795 | 0372 | 3 | F | Voice fallback triggered by PDU session resource setup | 16.2.0 |
| 2020-07 | RP-88-e | RP-201091 | 0379 | 1 | A | Correction on AS rekeying handling | 16.2.0 |
| 2020-07 | RP-88-e | RP-201090 | 0389 | 3 | A | Correction to PDU SESSION RESOURCE MODIFY CONFIRM | 16.2.0 |
| 2020-07 | RP-88-e | RP-201092 | 0392 | 1 | A | Selected PLMN ID for untrusted non-3GPP access | 16.2.0 |
| 2020-07 | RP-88-e | RP-201090 | 0395 | 2 | A | Correstion on PDU Session Resrouce Modification Procedures | 16.2.0 |
| 2020-07 | RP-88-e | RP-201085 | 0401 | 1 | F | QoS monitoring for URLLC | 16.2.0 |
| 2020-07 | RP-88-e | RP-201090 | 0408 | 4 | F | Correction of S-NSSAI range | 16.2.0 |
| 2020-09 | RP-89-e | RP-201955 | 0383 | 3 | F | Support of PSCell/SCell-only operation mode | 16.3.0 |
| 2020-09 | RP-89-e | RP-201945 | 0396 | 4 | B | Update of the NRPPa Transport procedure to support NR positioning | 16.3.0 |
| 2020-09 | RP-89-e | RP-201948 | 0416 | - | F | NGAP tabular corrections and asn.1 review | 16.3.0 |
| 2020-09 | RP-89-e | RP-201950 | 0417 | 1 | F | Rapporteur cleanup of NGAP | 16.3.0 |
| 2020-09 | RP-89-e | RP-201955 | 0425 | 1 | F | Correction of NAS PDU in PDU Session Modify | 16.3.0 |
| 2020-09 | RP-89-e | RP-201948 | 0427 | 1 | F | Correction of NPN CAG Cells and non-CAG Cells | 16.3.0 |
| 2020-09 | RP-89-e | RP-201955 | 0443 | 1 | A | Failure case of user location report | 16.3.0 |
| 2020-09 | RP-89-e | RP-201955 | 0445 | 1 | A | Multiple location reporting requests and report | 16.3.0 |
| 2020-09 | RP-89-e | RP-201955 | 0462 | - | F | Correction of asn.1 in NGAP Elementary Procedure List | 16.3.0 |
| 2020-09 | RP-89-e | RP-201955 | 0463 | 1 | F | Corrections to 38.413 on node name type | 16.3.0 |

History

| Document history | | |
|-------------------------|---------------|-------------|
| V16.2.0 | July 2020 | Publication |
| V16.3.0 | November 2020 | Publication |
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