**3GPP TSG- WG3 Meeting #**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** | **1** | **Current version:** |  |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network | **X** |

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| ***Title:*** | Rapporteur cleanup of NGAP | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Rapporteur (Nokia) | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI16 | | | | |  | ***Date:*** | | | 2020-08-06 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Cleanup of errors and inconsistencies. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Fix IE type and reference (9.2.2.1, 9.2.3.4, 9.3.1.66, 9.3.1.141, 9.3.1.170, 9.3.3.35, 9.3.3.36, 9.3.4.2, 9.3.4.6, 9.3.4.8, 9.3.4.11) 2. Alphabetize definitions in 3.1 3. Change “gNB” to “NG-RAN node” for PAGING message (9.2.4.1) 4. Align order of cause values with cause descriptions and ASN.1 (9.3.1.2) 5. Add missing presence information (9.3.1.180) 6. Change “AMF” to “UPF” for UP Transport Layer Information (9.3.2.2) 7. Fix formatting error where IE description merged into the tabular (9.3.3.42) 8. Other minor errors (e.g. capitalization, IE naming, etc.) 9. Add TS 36.306 to list of references and fix broken reference (9.3.1.156) | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Errors and inconsistencies would remain in the specification, which could lead to confusion. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 3.1, 3.2, 8.4.7.1, 8.9.1.2, 8.9.1.4, 9.2.2.1, 9.2.3.4, 9.2.4.1, 9.3.1.2, 9.3.1.66, 9.3.1.141, 9.3.1.150, 9.3.1.151, 9.3.1.153, 9.3.1.156, 9.3.1.170, 9.3.1.177, 9.3.1.178, 9.3.1.179, 9.3.1.180, 9.3.2.2, 9.3.3.35, 9.3.3.36, 9.3.3.40, 9.3.3.42, 9.3.3.45, 9.3.4.2, 9.3.4.5, 9.3.4.6, 9.3.4.8, 9.3.4.11, 9.4.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*Beginning of Text Proposal for TS 38.413*

# 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".

*Next change*

## 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].

**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].

**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].

*Next change*

## 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

*Next change*

#### 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.

*Next change*

#### 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 Indictor* 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 *Repetitio*n *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".

*Next change*

#### 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-ifPDUsessionResourceSetup |  | 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..<maxnoofPDUSessions>* |  |  | - |  |
| >>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. | - |  |
| 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 CIoT 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 *PDU Session Resource Setup List* IE is present. |

*Next change*

#### 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 arespecified in TS 24.501 [26]. | YES | reject |
| **PDU Session Resource Setup List** |  | *1* |  |  | YES | reject |
| **>PDU Session Resource Setup Item** |  | *1..<maxnoofPDUSessions>* |  |  | - |  |
| >>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 CIoT 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. |

*Next change*

#### 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..<maxnoofTAIforPaging>* |  |  | - |  |
| >>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 *Paging DRX* 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. |

*Next change*

#### 9.3.1.2 Cause

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| CHOICE *Cause Group* | M |  |  |  |
| >*Radio Network Layer* |  |  |  |  |
| >>Radio Network Layer Cause | M |  | 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) |  |
| *>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 *PDU Session Resource to Release List* IEor *QoS flow to Release List* 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. |

|  |  |
| --- | --- |
| 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 enoughuser 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. |

*Next change*

#### 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..<maxnoofTAIinAoI>* |  |  |
| >>TAI | M |  | 9.3.3.11 |  |
| **Area of Interest Cell List** |  | *0..1* |  |  |
| **>Area of Interest Cell Item** |  | *1..<maxnoofCellinAoI>* |  |  |
| >>NG-RAN CGI | M |  | 9.3.1.73 |  |
| **Area of Interest RAN Node List** |  | *0..1* |  |  |
| **>Area of Interest RAN Node Item** |  | *1..<maxnoofRANNodeinAoI>* |  |  |
| >>Global RAN Node ID | M |  | 9.3.1.5 |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofTAIinAoI | Maximum no. of tracking areas in an area of interest. Value is 16. |
| maxnoofCellinAoI | Maximum no. of cells in an area of interest. Value is 256. |
| maxnoofRANNodeinAoI | Maximum no. of NG-RAN nodes in an area of interest. Value is 64. |

*Next change*

#### 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 *UEPagingCoverageInformation* message as defined in 10.2.2 of TS 36.331 [21], or the *UEPagingCoverageInformation-NB* message as defined in 10.6.2 of TS 36.331 [21]. |

*Next change*

#### 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. |

*Next change*

#### 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 *Alternative QoS Parameters Set List* IE corresponding to the currently fulfilled alternative QoS parameters set. Value 0 indicates that NG-RAN cannot even fulfil the lowest alternative parameters set. |

*Next change*

#### 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, …) |  |

*Next change*

#### 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 *Area Scope of MDT* | M |  |  |  |
| >*Cell based* |  |  |  |  |
| >>**Cell ID List for MDT** |  | *1..<maxnoofCellIDforMDT>* |  |  |
| >>>E-UTRA CGI | M |  | 9.3.1.9 |  |
| >*TA based* |  |  |  |  |
| >>**TA List for MDT** |  | *1..<maxnoofTAforMDT>* |  |  |
| >>>TAC | M |  | 9.3.3.10 | The TAI is derived using the current serving PLMN. |
| >*PLMN wide* |  |  | NULL |  |
| >*TAI based* |  |  |  |  |
| >>**TAI List for MDT** |  | *1..<maxnoofTAforMDT>* |  |  |
| >>>TAI | M |  | 9.3.3.11 |  |
| MDT Mode | M |  | OCTET STRING | *MDTMode* 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. |

*Next change*

#### 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 *Sensor Name* | M |  |  |  |
| >>>*Uncompensated Barometric* |  |  |  |  |
| >>>>Uncompensated Barometric Configuration | M |  | ENUMERATED (true, …) |  |
| >>>*UE speed* |  |  |  |  |
| >>>>UE Speed Configuration | M |  | ENUMERATED (true, …) |  |
| >>>*UE orientation* |  |  |  |  |
| >>>>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 *Event trigger type* | M |  |  |  |
| >*Out-of-coverage* |  |  |  |  |
| >>Out-of-Coverage Configuration | M |  | ENUMERATED (true, ...) |  |
| >*L1 Event* |  |  |  |  |
| >>CHOICE *L1 Event Threshold* | 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]. |
| >>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. |

*Next change*

#### 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 *UP Transport Layer Information* | M |  |  |  |
| >*GTP tunnel* |  |  |  |  |
| >>Endpoint IP Address | M |  | Transport Layer Address  9.3.2.4 |  |
| >>GTP-TEID | M |  | 9.3.2.5 |  |

*Next change*

#### 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 *SON Information Report* | M |  |  |  |
| >*Failure Indication Information* |  |  |  |  |
| >>Failure Indication | M |  | 9.3.3.37 |  |
| >*HO Report Information* |  |  |  |  |
| >>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 *SON Information Report* | M |  |  |  |
| *>HO Report Information* |  |  |  |  |
| >>Inter-system HO Report | M |  | 9.3.3.40 |  |
| >*Failure Indication Information* |  |  |  |  |
| >>Inter-system Failure Indication | M |  | 9.3.3.38 |  |

*Next change*

#### 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 *Handover Report Type* | M |  |  |  |
| *>Too early Inter-system HO* |  |  |  |  |
| >>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 |  |
| *>Inter-system Unnecessary HO* |  |  |  |  |
| >>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 *Candidate Cell Type* | 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 *Candidate Cell List* 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] |

*Next change*

#### 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]. |

*Next change*

#### 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 PLMN cells for each PLMN.

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

*Next change*

#### 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 |

*Next change*

#### 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** |  | *0..1* |  |  | - |  |
| **>QoS Flow Notify Item** |  | *1..<maxnoofQoSFlows>* |  |  | - |  |
| >>QoS Flow Identifier | M |  | 9.3.1.51 |  | - |  |
| >>Notification Cause | M |  | ENUMERATED (fullfilled, 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 |

*Next change*

#### 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 *DL NG-U UP TNL Information* IE. | - |  |
| **>QoS Flow Accepted Item** |  | *1..<maxnoofQoSFlows>* |  |  | - |  |
| >>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. |

*Next change*

#### 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 *DL NG-U UP TNL Information* 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..<maxnoofMultiConnectivityMinusOne>* |  | 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 *Handover Request Transfer* 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 *Additional* *DL NG-U UP TNL Information* 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. |

*Next change*

### 9.4.5 Information Element Definitions

\*\* unchanged text skipped \*\*

PC5QoSParameters ::= SEQUENCE {

pc5QoSFlowList PC5QoSFlowList,

pc5LinkAggregateBitRates BitRate OPTIONAL,

iE-Extensions ProtocolExtensionContainer { { PC5QoSParameters-ExtIEs} } OPTIONAL,

...

}

*End of Text Proposal for TS 38.413*