**3GPP TSG- Meeting #**

**21 February – 3 March 2022**

|  |
| --- |
| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** |  | **rev** | **10** | **Current version:** | **16.8.0** |  |
|  |
| *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)*.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **x** | Core Network | **x** |

|  |
| --- |
|  |
| ***Title:***  | Introduction of NTN |
|  |  |
| ***Source to WG:*** | , Huawei, Thales, Ericsson, Nokia, Nokia Shanghai Bell, CATT |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | NR\_NTN\_solutions |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** |  |
|  | *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 canbe 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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | Support for NTN features according to the RAN WID NR\_NTN\_solutions in rel-17. |
|  |  |
| ***Summary of change:*** | 1. Bits in the *RAT Restriction Information* IE (in the Mobility Restriction List) are assigned to NR satellite access, for different constellations.
2. Similarly for bits in the *Primary RAT Restriction* IE in the *Extended RAT Restriction* IE, also in the Mobility Restriction List.
3. Additional codepoints (for NR satellite access) are added to the *RAT Information* IE associated with a TAC.
4. The *RAN UE NGAP ID* IE is introduced in the source NG-RAN node to Target NG-RAN node transparent container
5. A new cause value is added (“UE not in PLMN serving area”) to inform the AMF of the reason beyond the related context release request
6. A new *NTN NAI Information* IE is added to the User Location Information for NTN (including a TAC list and a location derived TAI).
 |
|  |  |
| ***Consequences if not approved:*** | No support for NTN in NGAP rel-17 |
|  |  |
| ***Clauses affected:*** | 8.4.2.2, 9.3.1.2, 9.3.1.16, 9.3.1.29, 9.3.1.85, 9.3.1.125, 9.3.1.126, 9.4.5, 9.4.7 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 38.423 CR#0488 |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | r3: R3-211278 endorsed as BL CRr4: issued for endorsement as BL at RAN3#112-er5: issued for endorsement as BL at RAN3#113-er6: includes TP in R3-213539 (agreed at RAN3#113-e)r7: issued for endorsement as BL at RAN3#114-er8: issued for endorsement as BL at RAN3#114bis-er9: includes TPs from RAN3#114bis (R3-221299 and R3-221362)r10; includes TP from RAN3#115 (R3-222862) |

### 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. The procedure uses UE-associated signalling.

#### 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 HANDOVER REQUEST message to the target NG-RAN node.

\*\* Unchanged part is skipped \*\*

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

If the target NG-RAN node receives the *UE Context Reference at Source* IE in the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE, it may use it to identify an existing UE.

**>>> 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,CAG only access denied, Insufficient UE Capabilities) |  |
| *>Transport Layer* |  |  |  |  |
| >>Transport Layer Cause | M |  | ENUMERATED(Transport resource unavailable,Unspecified,…) |  |
| *>NAS* |  |  |  |  |
| >>NAS Cause | M |  | ENUMERATED(Normal release,Authentication failure,Deregister,Unspecified, …, UE not in PLMN serving area) |  |
| *>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 or SNPN,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, or release is requested, 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. |
| Insufficient UE Capabilities | The procedure can’t proceed due to insufficient UE capabilities. |

|  |  |
| --- | --- |
| 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 other cause values applies but still the cause is NAS related. |
| UE not in PLMN serving area | The release is due to the UE not being within the serving area of its current PLMN (for NTN). |

|  |  |
| --- | --- |
| 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 or SNPN | The AMF does not identify any PLMN or SNPN 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 <<<**

#### 9.3.1.16 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 *User Location Information* | M |  |  |  | - |  |
| >*E-UTRA user location information* |  |  |  |  |  |  |
| >>E-UTRA CGI | M |  | 9.3.1.9 |  | - |  |
| >>TAI | M |  | 9.3.3.11 |  | - |  |
| >>Age of Location | O |  | Time Stamp9.3.1.75 | Indicates the UTC time when the location information was generated. | - |  |
| >>PSCell Information | O |  | NG-RAN CGI9.3.1.73 |  | YES | ignore |
| >*NR user location information* |  |  |  |  |  |  |
| >>NR CGI | M |  | 9.3.1.7 |  | - |  |
| >>TAI | M |  | 9.3.3.11 | In NTN, this IE is ignored if the *NR NTN TAI Information* IE is present. | - |  |
| >>Age of Location | O |  | Time Stamp9.3.1.75 | Indicates the UTC time when the location information was generated. | - |  |
| >>PSCell Information | O |  | NG-RAN CGI9.3.1.73 |  | YES | ignore |
| >>NID | O |  | 9.3.3.42 |  | YES | reject |
| >>NR NTN TAI Information | O |  | 9.3.3.x |  | YES | ignore |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| >*N3IWF user location information* |  |  |  |  |  |  |
| >>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. | - |  |
| >*TNGF user location information* |  |  |  |  | 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. | - |  |
| >*TWIF user location information* |  |  |  |  | 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 |  | - |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofTACs | Maximum no. of TACs. Value is 256. |

**>>> NEXT CHANGE <<<**

#### 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 *HandoverPreparationInformation* message as defined in TS 38.331 [18] if the target is a gNB.Includes the RRC *HandoverPreparationInformation* 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..<maxnoofPDUSessions>* |  |  | - |  |
| >>PDU Session ID | M |  | 9.3.1.50 |  | - |  |
| **>>QoS Flow Information List** |  | *1* |  |  | - |  |
| **>>>QoS Flow Information Item** |  | *1..<maxnoofQoSFlows>* |  |  | - |  |
| >>>>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..<maxnoofE-RABs>* |  |  | - |  |
| >>E-RAB ID | M |  | 9.3.2.3 |  | - |  |
| >>DL Forwarding | O |  | 9.3.1.33 |  | - |  |
| Target Cell ID | M |  | NG-RAN CGI9.3.1.73 |  | - |  |
| 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 |
| UE Context Reference at Source | O |  | RAN UE NGAP ID 9.3.3.2 |  | YES | ignore |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofPDUSessions | 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. |

**>>> NEXT CHANGE <<<**

#### 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 Identity9.3.3.5 |  | - |  |
| **Equivalent PLMNs** |  | *0..<maxnoofEPLMNs>* |  | 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..<maxnoofEPLMNsPlusOne>* |  | 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),nR-LEO (3),nR-MEO (4),nR-GEO (5),nR-OTHERSAT (6)}(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.Bit 7 reserved for future use. | - |  |
| >Extended RAT Restriction Information | O |  | 9.3.1.126 | If this IE is included, the *RAT Restriction Information* IE is ignored. | YES | ignore |
| **Forbidden Area Information** |  | *0..<maxnoofEPLMNsPlusOne>* |  | This IE contains Forbidden Area information as specified in TS 23.501 [9]. | - |  |
| >PLMN Identity | M |  | 9.3.3.5 |  | - |  |
| **>Forbidden TACs** |  | *1..<maxnoofForbTACs>* |  |  | - |  |
| >>TAC | M |  | 9.3.3.10 | The TAC of the forbidden TAI. | - |  |
| **Service Area Information** |  | *0..<maxnoofEPLMNsPlusOne>* |  | This IE contains Service Area Restriction information as specified in TS 23.501 [9]. | - |  |
| >PLMN Identity | M |  | 9.3.3.5 |  | - |  |
| **>Allowed TACs** |  | *0..<maxnoofAllowedAreas>* |  |  | - |  |
| >>TAC | M |  | 9.3.3.10 | The TAC of the allowed TAI. | - |  |
| **>Not Allowed TACs** |  | *0..<maxnoofAllowedAreas>* |  |  | - |  |
| >>TAC | M |  | 9.3.3.10 | The TAC of the not-allowed TAI. | - |  |
| Last E-UTRAN PLMN Identity | O |  | PLMN Identity9.3.3.5 | 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..<maxnoofEPLMNs>* |  |  | YES | ignore |
| >PLMN Identity | M |  | 9.3.3.5 | Includes any of the Equivalent PLMNs listed in the *Mobility Restriction List* 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 |

**>>> NEXT CHANGE <<<**

#### 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, ..., nR-LEO,nR-MEO,nR-GEO,nR-OTHERSAT) |  |

#### 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), nR-LEO (3),nR-MEO (4),nR-GEO (5),nR-OTHERSAT (6)}(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.Bit 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 Secondary 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, distinct from the UE’s primary RAT, used in any cell serving the UE excluding the PCell. |

**>>> NEXT CHANGE <<**

#### 9.3.3.X NR NTN TAI Information

This IE contains the broadcast TAC(s) for the serving PLMN, and the TAI information derived from the actual UE location if available.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| **TAC List in NR NTN** |  | *1..<maxnoofTACsinNTN>* |  | Includes all TAC(s) broadcast in the cell, for the UE’s serving PLMN. |
| >TAC | M |  | 9.3.3.10 |  |
| UE location derived TAI in NR NTN | O |  | TAI9.3.3.11 | For NR NTN, this IE contains TAI information derived from the actual UE location, if available. |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofTACsinNTN | Maximum no. of TACs broadcast per cell. Value is 12.  |

**>>> NEXT CHANGE <<**

### 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-AdditionalDLUPTNLInformationForHOList,

 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-BroadcastTACList,

 id-BurstArrivalTimeDownlink,

 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-ExtendedUEIdentityIndexValue,

 id-GlobalCable-ID,

 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-MicoAllPLMN,

 id-NetworkInstance,

 id-NID,

 id-NRNTNTAIInformation,

 id-NPN-MobilityInformation,

 id-NPN-PagingAssistanceInformation,

 id-NPN-Support,

 id-OldAssociatedQosFlowList-ULendmarkerexpected,

 id-PagingAssisDataforCEcapabUE,

 id-PagingeDRXInformation,

 id-PDUSessionAggregateMaximumBitRate,

 id-PduSessionExpectedUEActivityBehaviour,

 id-PDUSessionResourceFailedToSetupListCxtFail,

 id-PDUSessionResourceReleaseResponseTransfer,

 id-PDUSessionType,

 id-PSCellInformation,

 id-QosFlowAddOrModifyRequestList,

 id-QosFlowFailedToSetupList,

 id-QosFlowFeedbackList,

 id-QosFlowParametersList,

 id-QosFlowSetupRequestList,

 id-QosFlowToReleaseList,

 id-QosMonitoringRequest,

 id-QosMonitoringReportingFrequency,

 id-RAN-UE-NGAP-ID,

 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-UERadioCapabilityForPaging,

 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,

 maxnoofTACsinNTN

**\*\*\* skip unchanged text in same section \*\*\***

CauseMisc ::= ENUMERATED {

 control-processing-overload,

 not-enough-user-plane-processing-resources,

 hardware-failure,

 om-intervention,

 unknown-PLMN-or-SNPN,

 unspecified,

 ...

}

CauseNas ::= ENUMERATED {

 normal-release,

 authentication-failure,

 deregister,

 unspecified,

 ... ,

 uE-not-in-PLMN-serving-area

}

**\*\*\* skip unchanged text in same section \*\*\***

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

NRNTNTAIInformation ::= SEQUENCE {

 tACListIn-NRNTN TACListIn-NRNTN,

 uELocationDerivedTAIIn-NRNTN TAI OPTIONAL,

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

 ...

}

NRNTNTAIInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 ...

}

NumberOfBroadcasts ::= INTEGER (0..65535)

NumberOfBroadcastsRequested ::= INTEGER (0..65535)

**\*\*\* skip unchanged text in same section \*\*\***

RAT-Information ::= ENUMERATED {

 unlicensed,

 nb-IoT,

 ...,

 nR-LEO,

 nR-MEO,

 nR-GEO,

 nR-OTHERSAT

}

**\*\*\* skip unchanged text in same section \*\*\***

SONInformationRequest ::= ENUMERATED {

 xn-TNL-configuration-info,

 ...

}

SourceNGRANNode-ToTargetNGRANNode-TransparentContainer ::= SEQUENCE {

 rRCContainer RRCContainer,

 pDUSessionResourceInformationList PDUSessionResourceInformationList OPTIONAL,

 e-RABInformationList E-RABInformationList OPTIONAL,

 targetCell-ID NGRAN-CGI,

 indexToRFSP IndexToRFSP OPTIONAL,

 uEHistoryInformation UEHistoryInformation,

 iE-Extensions ProtocolExtensionContainer { {SourceNGRANNode-ToTargetNGRANNode-TransparentContainer-ExtIEs} } OPTIONAL,

 ...

}

SourceNGRANNode-ToTargetNGRANNode-TransparentContainer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 { ID id-SgNB-UE-X2AP-ID CRITICALITY ignore EXTENSION SgNB-UE-X2AP-ID PRESENCE optional }|

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

 { ID id-RAN-UE-NGAP-ID CRITICALITY ignore EXTENSION RAN-UE-NGAP-ID PRESENCE optional },

 ...

}

SourceOfUEActivityBehaviourInformation ::= ENUMERATED {

 subscription-information,

 statistics,

 ...

}

**\*\*\* skip unchanged text in same section \*\*\***

-- T

TAC ::= OCTET STRING (SIZE(3))

TAI ::= SEQUENCE {

 pLMNIdentity PLMNIdentity,

 tAC TAC,

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

 ...

}

TACListIn-NRNTN ::= SEQUENCE (SIZE(1..maxnoofTACsinNTN)) OF TAC

**\*\*\* skip unchanged text in same section \*\*\***

UserLocationInformationNR ::= SEQUENCE {

 nR-CGI NR-CGI,

 tAI TAI,

 timeStamp TimeStamp OPTIONAL,

 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 }|

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

 ...

}

UserPlaneSecurityInformation ::= SEQUENCE {

 securityResult SecurityResult,

 securityIndication SecurityIndication,

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

 ...

}

**>>> NEXT CHANGE <<**

### 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

**\*\*\* skip unchanged text in same section \*\*\***

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- 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

 maxnoofPDUSessions 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

 maxnoofTACsinNTN INTEGER ::= 12

**\*\*\* skip unchanged text in same section \*\*\***

 id-QosMonitoringReportingFrequency ProtocolIE-ID ::= 276

 id-QosFlowParametersList ProtocolIE-ID ::= 277

 id-QosFlowFeedbackList ProtocolIE-ID ::= 278

 id-BurstArrivalTimeDownlink ProtocolIE-ID ::= 279

 id-ExtendedUEIdentityIndexValue ProtocolIE-ID ::= 280

 id-PduSessionExpectedUEActivityBehaviour ProtocolIE-ID ::= 281

 id-MicoAllPLMN ProtocolIE-ID ::= 282

 id-QosFlowFailedToSetupList ProtocolIE-ID ::= 283

 id-NRNTNTAIInformation ProtocolIE-ID ::= xxx

END

-- ASN1STOP

**>>> END OF CHANGES <<<**