**3GPP TSG-RAN WG3 #107-e R3-201422**

**24 February-6 March 2020**

**Online**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **38.413** | **CR** | **-** | **rev** | **-** | **Current version:** | **16.0.0** |  |
|  |
| *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)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  |  |
|  |  |
| ***Source to WG:*** | CATT |
| ***Source to TSG:*** | RAN3 |
|  |  |
| ***Work item code:*** | NR\_Mob\_enh-Core |  | ***Date:*** | 2020-03-02 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***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 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-12 (Release 12)Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | In order to enable enhacements to the handover procedure, changes are needed to the NGAP protocol. This is the baseline CR covering all the agreed modification.  |
|  |  |
| ***Summary of change:*** | Following functions were added and modified:* A new procedure was added to enable indicating handover success;
* Introduce the DAPS HO per DRB indicator and DAPS response Info into Handover Preparation procedure and Handover resource allocation procedure.

 **Impact Analysis:**Impact assessment towards the previous version of the specification (same release):  |
|  |  |
| ***Consequences if not approved:*** | Rel-16 NR mobility enhancement is not implemented. |
|  |  |
| ***Clauses affected:*** |  |
|  |  |
|  | **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:*** |  |

////////////////////////////////////////////////////////////// Start of 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].

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

An EP consists of an initiating message and possibly a response message. Two kinds of EPs are used:

- **Class 1:** Elementary Procedures with response (success and/or failure).

- **Class 2:** Elementary Procedures without response.

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

Successful:

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

Unsuccessful:

- A signalling message explicitly indicates that the EP failed.

- On time supervision expiry (i.e., absence of expected response).

Successful and Unsuccessful:

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

Class 2 EPs are considered always successful.

**gNB:** as defined in TS 38.300 [8].

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

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

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

**DAPS HO**: maintaining source NG-RAN connection after reception of RRC message for handover and until releasing the source cell after successful random access to the target NG-RAN.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

5GC 5G Core Network

5QI 5G QoS Identifier

AMF Access and Mobility Management Function

CGI Cell Global Identifier

CP Control Plane

DAPS Dual Active Protocol Stacks

DL Downlink

EPC Evolved Packet Core

GUAMI Globally Unique AMF Identifier

IMEISV International Mobile station Equipment Identity and Software Version number

LMF Location Management Function

N3IWF Non 3GPP InterWorking Function

NGAP NG Application Protocol

NRPPa NR Positioning Protocol Annex

NSCI New Security Context Indicator

NSSAI Network Slice Selection Assistance Information

OTDOA Observed Time Difference of Arrival

PSCell Primary SCG Cell

RIM Remote Interference Management

RIM-RS RIM Reference Signal

SCG Secondary Cell Group

SCTP Stream Control Transmission Protocol

SMF Session Management Function

S-NG-RAN node Secondary NG-RAN node

S-NSSAI Single Network Slice Selection Assistance Information

TAC Tracking Area Code

TAI Tracking Area Identity

TNLA Transport Network Layer Association

UP User Plane

UPF User Plane Function

8.1 List of NGAP Elementary Procedures

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

**Table 8.1-1: Class 1 procedures**

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

**Table 8.1-2: Class 2 procedures**

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

### 8.4.1 Handover Preparation

#### 8.4.1.1 General

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

#### 8.4.1.2 Successful Operation



Figure 8.4.1.2-1: Handover preparation: successful operation

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

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

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

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

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

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

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

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

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

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

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

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

When the preparation, including the reservation of resources at the target side is ready, the AMF responds with the HANDOVER COMMAND message to the source NG-RAN node. In case of intra-system handover, the AMF shall include the *PDU Session Resource Handover List* IE in the HANDOVER COMMAND message.

Upon reception of the HANDOVER COMMAND message the source NG-RAN node shall stop the timer TNGRELOCprep and start the timer TNGRELOCoverall.

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

NOTE: As an exception in case of inter-system handover to LTE, the AMF generates the *Handover Preparation Unsuccessful Transfer* IE in the *PDU Session Resources to Release List* IE.

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

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

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

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

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

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

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

If the *DAPS Information* IE is included for a given DRB within the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE within the HANDOVER REQUIRED message, it indicates that the source NG-RAN node proposes to perform DAPS HO. The target NG-RAN node shall, if supported, include the *DAPS Response information* IE in the *Target NG-RAN Node to Source NG-RAN Node Transparent Container* IE, and then the AMF shall, if supported, include *Target NG-RAN Node to Source NG-RAN Node Transparent Container* in the HANDOVER COMMAND message.

**Interactions with other NGAP procedures:**

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

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

or

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

8.4.2 Handover Resource Allocation

8.4.2.1 General

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

8.4.2.2 Successful Operation

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**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.

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

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

- attempt to execute the requested PDU session configuration and associated security;

- store the received UE Aggregate Maximum Bit Rate in the UE context, and use the received UE Aggregate Maximum Bit Rate for all Non-GBR QoS flows for the concerned UE as specified in TS 23.501 [9];

- store the received Mobility Restriction List in the UE context;

- store the received UE Security Capabilities in the UE context;

- store the received Security Context in the UE context and take it into use as defined in TS 33.501 [13].

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

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

- The list of QoS flows which have been successfully established in the *QoS Flow Setup Response List* IE.

- The *Data Forwarding Accepted* IE if the data forwarding for the QoS flow is accepted.

- The list of QoS flows which have failed to be established, if any, in the *QoS Flow Failed to Setup List* IE.

- The UP transport layer information to be used for the PDU session.

- The security result associated to the PDU session.

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

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

If the HANDOVER REQUEST message contains the *Data Forwarding Not Possible* IE associated with a given PDU session within the *Handover Request Transfer* IE set to "data forwarding not possible", the target NG-RAN node may not include the *DL Forwarding UP TNL Information* IE and for intra-system handover the *Data Forwarding Response DRB List* IE within the *Handover Request Acknowledge Transfer* IE in the HANDOVER REQUEST ACKNOWLEDGE message for that PDU session.

In case of intra-system handover, if the target NG-RAN node accepts the downlink data forwarding for at least one QoS flow for which the *DL Forwarding* IE is set to "DL forwarding proposed", it may include the *DL Forwarding UP TNL Information* IE in the *Handover Request Acknowledge Transfer* IE as forwarding tunnel for the QoS flows listed in the *QoS Flow Setup Response List* IE of the HANDOVER REQUEST ACKNOWLEDGE message.

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

In case of intra-system handover, for each PDU session for which the *Additional DL UP TNL Information for HO List* IE is included in the *Handover Request Acknowledge Transfer* IE of the HANDOVER REQUEST ACKNOWLEDGE message, the SMF shall consider the included *Additional DL NG-U UP TNL Information* IE as the downlink termination point for the associated flows indicated in the *Additional QoS Flow Setup Response List* IE for this PDU session split in different tunnels and shall consider the *Additional DL Forwarding UP TNL Information* IE, if included, as the forwarding tunnel associated to these QoS flows.

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

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

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

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

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

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

- determine a target for subsequent mobility action for which the target NG-RAN node provides information about the target of the mobility action towards the UE;

- select a proper SCG during dual connectivity operation;

- assign proper RNA(s) for the UE when moving the UE to RRC\_INACTIVE state.

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

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

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

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

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

If the *CN Assisted RAN Parameters Tuning* IE is included in the HANDOVER REQUEST message, the NG-RAN node may use it as described in TS 23.501 [9].

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

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

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

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

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

If the *DAPS Information* IE is included for a given DRB in the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE within the HANDOVER REUQEST message, the target NG-RAN shall consider that the request concerns a DAPS HO and shall, if supported, include the *DAPS Response information* IE in the *Target NG-RAN Node to Source NG-RAN Node Transparent Container* IE within the HANDOVER REQUEST ACKNOWLEDGE message.

**Interactions with RRC Inactive Transition Report procedure:**

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

///////////////////////////////////////////////////////////////////////1st Change/////////////////////////////////////////////////////////////////////

8.2.A Handover Success

8.2.A.1 General

The Handover Success procedure is used during a DAPS handover, to enable a target NG-RAN node to inform the source NG-RAN node that the UE has successfully accessed the target NG-RAN node via AMF.

The procedure uses UE-associated signalling.

8.2.A.2 Successful Operation



**Figure 8.2.A.2-1: Handover Success, successful operation**



**Figure 8.2.A.2-2: Handover Success, successful operation**

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

8.2.A.3 Unsuccessful Operation

Not applicable.

8.2.A.4 Abnormal Conditions

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

9.2.3.AA HANDOVER SUCCESS

This message is sent by the target NG-RAN node to the AMF, and then the AMF to the source NG-RAN node, to indicate the successful access of the UE toward the target NG-RAN node.

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

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

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

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

This IE is transparent to the 5GC.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| RRC Container | M |  | OCTET STRING | Includes the RRC *HandoverCommand* message as defined in TS 38.331 [18] if the target is a gNB.Includes the RRC *HandoverCommand* message as defined in TS 36.331 [21] if the target is an ng-eNB. | - |  |
| DAPS Reponse Information  | O |  | 9.3.1..y |  | YES | Reject |

/////////////////////////////////////////////////////////////// unchange skipped /////////////////////////////////////////////////////////////////////

#### 9.3.1.34 DRBs to QoS Flows Mapping List

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| **DRBs to QoS Flows Mapping Item** |  | *1..<maxnoofDRBs>* |  |  |  |  |
| >DRB ID | M |  | 9.3.1.53 |  |  |  |
| >Associated QoS Flow List | M |  | 9.3.1.99 | Contains information of the QoS flows mapped to the DRB |  |  |
| >DAPS Information | O |  | 9.3.1.x |  | YES | ignore |

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

*Editor’s note: FFS whether the DAPS Information IE can be standardized in other forms. E.g, Top-level indication + lists of DAPS DRB or other？*

/////////////////////////////////////////////////////////////unchange skipped/////////////////////////////////////////////////////////////////////

### 9.3.1.y DAPS Response Information

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| DAPS Response Indicator | M |  | ENUMERATED (DAPS HO accepted, fallback to legacy HO, …) | Indicates if the DAPS Handover is accepted |

*Editor’s note: FFS whether it is sufficient to contain just the value“DAPS HO accepted”, or to contain the other values“fallback to legacy HO”?*

/////////////////////////////////////////////////////////////unchange skipped/////////////////////////////////////////////////////////////////////

### 9.3.1.y DAPS Response Information

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| DAPS Response Indicator | M |  | ENUMERATED (DAPS HO accepted, fallback to legacy HO, …) | Indicates if the DAPS Handover is accepted |

*Editor’s note: FFS whether it is sufficient to contain just the value“DAPS HO accepted”, or to contain the other values“fallback to legacy HO”?*

//////////////////////////////////////////////////////////////// 2nd Change /////////////////////////////////////////////////////////////////////

9.4.3 Elementary Procedure Definitions

-- ASN1START

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

--

-- Elementary Procedure definitions

--

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

NGAP-PDU-Descriptions {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

ngran-Access (22) modules (3) ngap (1) version1 (1) ngap-PDU-Descriptions (0)}

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

--

-- IE parameter types from other modules.

--

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

IMPORTS

 Criticality,

 ProcedureCode

FROM NGAP-CommonDataTypes

 AMFConfigurationUpdate,

 AMFConfigurationUpdateAcknowledge,

 AMFConfigurationUpdateFailure,

 AMFStatusIndication,

 CellTrafficTrace,

 DeactivateTrace,

 DownlinkNASTransport,

 DownlinkNonUEAssociatedNRPPaTransport,

 DownlinkRANConfigurationTransfer,

 DownlinkRANStatusTransfer,

 DownlinkUEAssociatedNRPPaTransport,

 ErrorIndication,

 HandoverCancel,

 HandoverCancelAcknowledge,

 HandoverCommand,

 HandoverFailure,

 HandoverNotify,

 HandoverPreparationFailure,

 HandoverRequest,

 HandoverRequestAcknowledge,

 HandoverRequired,

 InitialContextSetupFailure,

 InitialContextSetupRequest,

 InitialContextSetupResponse,

 InitialUEMessage,

 LocationReport,

 LocationReportingControl,

 LocationReportingFailureIndication,

 NASNonDeliveryIndication,

 NGReset,

 NGResetAcknowledge,

 NGSetupFailure,

 NGSetupRequest,

 NGSetupResponse,

 OverloadStart,

 OverloadStop,

 Paging,

 PathSwitchRequest,

 PathSwitchRequestAcknowledge,

 PathSwitchRequestFailure,

 PDUSessionResourceModifyConfirm,

 PDUSessionResourceModifyIndication,

 PDUSessionResourceModifyRequest,

 PDUSessionResourceModifyResponse,

 PDUSessionResourceNotify,

 PDUSessionResourceReleaseCommand,

 PDUSessionResourceReleaseResponse,

 PDUSessionResourceSetupRequest,

 PDUSessionResourceSetupResponse,

 PrivateMessage,

 PWSCancelRequest,

 PWSCancelResponse,

 PWSFailureIndication,

 PWSRestartIndication,

 RANConfigurationUpdate,

 RANConfigurationUpdateAcknowledge,

 RANConfigurationUpdateFailure,

 RerouteNASRequest,

 RRCInactiveTransitionReport,

 SecondaryRATDataUsageReport,

 TraceFailureIndication,

 TraceStart,

 UEContextModificationFailure,

 UEContextModificationRequest,

 UEContextModificationResponse,

 UEContextReleaseCommand,

 UEContextReleaseComplete,

 UEContextReleaseRequest,

 UERadioCapabilityCheckRequest,

 UERadioCapabilityCheckResponse,

 UERadioCapabilityInfoIndication,

 UETNLABindingReleaseRequest,

 UplinkNASTransport,

 UplinkNonUEAssociatedNRPPaTransport,

 UplinkRANConfigurationTransfer,

 UplinkRANStatusTransfer,

 UplinkUEAssociatedNRPPaTransport,

 WriteReplaceWarningRequest,

 WriteReplaceWarningResponse,

 UplinkRIMInformationTransfer,

 DownlinkRIMInformationTransfer,

 HandoverSuccess

FROM NGAP-PDU-Contents

 id-AMFConfigurationUpdate,

 id-AMFStatusIndication,

 id-CellTrafficTrace,

 id-DeactivateTrace,

 id-DownlinkNASTransport,

 id-DownlinkNonUEAssociatedNRPPaTransport,

 id-DownlinkRANConfigurationTransfer,

 id-DownlinkRANStatusTransfer,

 id-DownlinkUEAssociatedNRPPaTransport,

 id-ErrorIndication,

 id-HandoverCancel,

 id-HandoverNotification,

 id-HandoverPreparation,

 id-HandoverResourceAllocation,

 id-InitialContextSetup,

 id-InitialUEMessage,

 id-LocationReport,

 id-LocationReportingControl,

 id-LocationReportingFailureIndication,

 id-NASNonDeliveryIndication,

 id-NGReset,

 id-NGSetup,

 id-OverloadStart,

 id-OverloadStop,

 id-Paging,

 id-PathSwitchRequest,

 id-PDUSessionResourceModify,

 id-PDUSessionResourceModifyIndication,

 id-PDUSessionResourceNotify,

 id-PDUSessionResourceRelease,

 id-PDUSessionResourceSetup,

 id-PrivateMessage,

 id-PWSCancel,

 id-PWSFailureIndication,

 id-PWSRestartIndication,

 id-RANConfigurationUpdate,

 id-RerouteNASRequest,

 id-RRCInactiveTransitionReport,

 id-SecondaryRATDataUsageReport,

 id-TraceFailureIndication,

 id-TraceStart,

 id-UEContextModification,

 id-UEContextRelease,

 id-UEContextReleaseRequest,

 id-UERadioCapabilityCheck,

 id-UERadioCapabilityInfoIndication,

 id-UETNLABindingRelease,

 id-UplinkNASTransport,

 id-UplinkNonUEAssociatedNRPPaTransport,

 id-UplinkRANConfigurationTransfer,

 id-UplinkRANStatusTransfer,

 id-UplinkUEAssociatedNRPPaTransport,

 id-WriteReplaceWarning,

 id-UplinkRIMInformationTransfer,

 id-DownlinkRIMInformationTransfer,

 id-HandoverSuccess

FROM NGAP-Constants;

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

--

-- Interface Elementary Procedure Class

--

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

NGAP-ELEMENTARY-PROCEDURE ::= CLASS {

 &InitiatingMessage ,

 &SuccessfulOutcome OPTIONAL,

 &UnsuccessfulOutcome OPTIONAL,

 &procedureCode ProcedureCode UNIQUE,

 &criticality Criticality DEFAULT ignore

}

WITH SYNTAX {

 INITIATING MESSAGE &InitiatingMessage

 [SUCCESSFUL OUTCOME &SuccessfulOutcome]

 [UNSUCCESSFUL OUTCOME &UnsuccessfulOutcome]

 PROCEDURE CODE &procedureCode

 [CRITICALITY &criticality]

}

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

--

-- Interface PDU Definition

--

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

NGAP-PDU ::= CHOICE {

 initiatingMessage InitiatingMessage,

 successfulOutcome SuccessfulOutcome,

 unsuccessfulOutcome UnsuccessfulOutcome,

 ...

}

InitiatingMessage ::= SEQUENCE {

 procedureCode NGAP-ELEMENTARY-PROCEDURE.&procedureCode ({NGAP-ELEMENTARY-PROCEDURES}),

 criticality NGAP-ELEMENTARY-PROCEDURE.&criticality ({NGAP-ELEMENTARY-PROCEDURES}{@procedureCode}),

 value NGAP-ELEMENTARY-PROCEDURE.&InitiatingMessage ({NGAP-ELEMENTARY-PROCEDURES}{@procedureCode})

}

SuccessfulOutcome ::= SEQUENCE {

 procedureCode NGAP-ELEMENTARY-PROCEDURE.&procedureCode ({NGAP-ELEMENTARY-PROCEDURES}),

 criticality NGAP-ELEMENTARY-PROCEDURE.&criticality ({NGAP-ELEMENTARY-PROCEDURES}{@procedureCode}),

 value NGAP-ELEMENTARY-PROCEDURE.&SuccessfulOutcome ({NGAP-ELEMENTARY-PROCEDURES}{@procedureCode})

}

UnsuccessfulOutcome ::= SEQUENCE {

 procedureCode NGAP-ELEMENTARY-PROCEDURE.&procedureCode ({NGAP-ELEMENTARY-PROCEDURES}),

 criticality NGAP-ELEMENTARY-PROCEDURE.&criticality ({NGAP-ELEMENTARY-PROCEDURES}{@procedureCode}),

 value NGAP-ELEMENTARY-PROCEDURE.&UnsuccessfulOutcome ({NGAP-ELEMENTARY-PROCEDURES}{@procedureCode})

}

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

--

-- Interface Elementary Procedure List

--

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

NGAP-ELEMENTARY-PROCEDURES NGAP-ELEMENTARY-PROCEDURE ::= {

 NGAP-ELEMENTARY-PROCEDURES-CLASS-1 |

 NGAP-ELEMENTARY-PROCEDURES-CLASS-2,

 ...

}

NGAP-ELEMENTARY-PROCEDURES-CLASS-1 NGAP-ELEMENTARY-PROCEDURE ::= {

 aMFConfigurationUpdate |

 handoverCancel |

 handoverPreparation |

 handoverResourceAllocation |

 initialContextSetup |

 nGReset |

 nGSetup |

 pathSwitchRequest |

 pDUSessionResourceModify |

 pDUSessionResourceModifyIndication |

 pDUSessionResourceRelease |

 pDUSessionResourceSetup |

 pWSCancel |

 rANConfigurationUpdate |

 uEContextModification |

 uEContextRelease |

 uERadioCapabilityCheck |

 writeReplaceWarning

}

NGAP-ELEMENTARY-PROCEDURES-CLASS-2 NGAP-ELEMENTARY-PROCEDURE ::= {

 aMFStatusIndication |

 cellTrafficTrace |

 deactivateTrace |

 downlinkNASTransport |

 downlinkNonUEAssociatedNRPPaTransport |

 downlinkRANConfigurationTransfer |

 downlinkRANStatusTransfer |

 downlinkUEAssociatedNRPPaTransport |

 errorIndication |

 handoverNotification |

 initialUEMessage |

 locationReport |

 locationReportingControl |

 locationReportingFailureIndication |

 nASNonDeliveryIndication |

 overloadStart |

 overloadStop |

 paging |

 pDUSessionResourceNotify |

 privateMessage |

 pWSFailureIndication |

 pWSRestartIndication |

 rerouteNASRequest |

 rRCInactiveTransitionReport |

 secondaryRATDataUsageReport |

 traceFailureIndication |

 traceStart |

 uEContextReleaseRequest |

 uERadioCapabilityInfoIndication |

 uETNLABindingRelease |

 uplinkNASTransport |

 uplinkNonUEAssociatedNRPPaTransport |

 uplinkRANConfigurationTransfer |

 uplinkRANStatusTransfer |

 uplinkUEAssociatedNRPPaTransport |

 uplinkRIMInformationTransfer |

 downlinkRIMInformationTransfer |

 handoverSuccess

}

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

--

-- Interface Elementary Procedures

--

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

aMFConfigurationUpdate NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE AMFConfigurationUpdate

 SUCCESSFUL OUTCOME AMFConfigurationUpdateAcknowledge

 UNSUCCESSFUL OUTCOME AMFConfigurationUpdateFailure

 PROCEDURE CODE id-AMFConfigurationUpdate

 CRITICALITY reject

}

aMFStatusIndication NGAP-ELEMENTARY-PROCEDURE ::={

 INITIATING MESSAGE AMFStatusIndication

 PROCEDURE CODE id-AMFStatusIndication

 CRITICALITY ignore

}

cellTrafficTrace NGAP-ELEMENTARY-PROCEDURE ::={

 INITIATING MESSAGE CellTrafficTrace

 PROCEDURE CODE id-CellTrafficTrace

 CRITICALITY ignore

}

deactivateTrace NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE DeactivateTrace

 PROCEDURE CODE id-DeactivateTrace

 CRITICALITY ignore

}

downlinkNASTransport NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE DownlinkNASTransport

 PROCEDURE CODE id-DownlinkNASTransport

 CRITICALITY ignore

}

downlinkNonUEAssociatedNRPPaTransport NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE DownlinkNonUEAssociatedNRPPaTransport

 PROCEDURE CODE id-DownlinkNonUEAssociatedNRPPaTransport

 CRITICALITY ignore

}

downlinkRANConfigurationTransfer NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE DownlinkRANConfigurationTransfer

 PROCEDURE CODE id-DownlinkRANConfigurationTransfer

 CRITICALITY ignore

}

downlinkRANStatusTransfer NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE DownlinkRANStatusTransfer

 PROCEDURE CODE id-DownlinkRANStatusTransfer

 CRITICALITY ignore

}

downlinkUEAssociatedNRPPaTransport NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE DownlinkUEAssociatedNRPPaTransport

 PROCEDURE CODE id-DownlinkUEAssociatedNRPPaTransport

 CRITICALITY ignore

}

errorIndication NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE ErrorIndication

 PROCEDURE CODE id-ErrorIndication

 CRITICALITY ignore

}

handoverCancel NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE HandoverCancel

 SUCCESSFUL OUTCOME HandoverCancelAcknowledge

 PROCEDURE CODE id-HandoverCancel

 CRITICALITY reject

}

handoverNotification NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE HandoverNotify

 PROCEDURE CODE id-HandoverNotification

 CRITICALITY ignore

}

handoverPreparation NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE HandoverRequired

 SUCCESSFUL OUTCOME HandoverCommand

 UNSUCCESSFUL OUTCOME HandoverPreparationFailure

 PROCEDURE CODE id-HandoverPreparation

 CRITICALITY reject

}

handoverResourceAllocation NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE HandoverRequest

 SUCCESSFUL OUTCOME HandoverRequestAcknowledge

 UNSUCCESSFUL OUTCOME HandoverFailure

 PROCEDURE CODE id-HandoverResourceAllocation

 CRITICALITY reject

}

initialContextSetup NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE InitialContextSetupRequest

 SUCCESSFUL OUTCOME InitialContextSetupResponse

 UNSUCCESSFUL OUTCOME InitialContextSetupFailure

 PROCEDURE CODE id-InitialContextSetup

 CRITICALITY reject

}

initialUEMessage NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE InitialUEMessage

 PROCEDURE CODE id-InitialUEMessage

 CRITICALITY ignore

}

locationReport NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE LocationReport

 PROCEDURE CODE id-LocationReport

 CRITICALITY ignore

}

locationReportingControl NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE LocationReportingControl

 PROCEDURE CODE id-LocationReportingControl

 CRITICALITY ignore

}

locationReportingFailureIndication NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE LocationReportingFailureIndication

 PROCEDURE CODE id-LocationReportingFailureIndication

 CRITICALITY ignore

}

nASNonDeliveryIndication NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE NASNonDeliveryIndication

 PROCEDURE CODE id-NASNonDeliveryIndication

 CRITICALITY ignore

}

nGReset NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE NGReset

 SUCCESSFUL OUTCOME NGResetAcknowledge

 PROCEDURE CODE id-NGReset

 CRITICALITY reject

}

nGSetup NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE NGSetupRequest

 SUCCESSFUL OUTCOME NGSetupResponse

 UNSUCCESSFUL OUTCOME NGSetupFailure

 PROCEDURE CODE id-NGSetup

 CRITICALITY reject

}

overloadStart NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE OverloadStart

 PROCEDURE CODE id-OverloadStart

 CRITICALITY ignore

}

overloadStop NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE OverloadStop

 PROCEDURE CODE id-OverloadStop

 CRITICALITY reject

}

paging NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE Paging

 PROCEDURE CODE id-Paging

 CRITICALITY ignore

}

pathSwitchRequest NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE PathSwitchRequest

 SUCCESSFUL OUTCOME PathSwitchRequestAcknowledge

 UNSUCCESSFUL OUTCOME PathSwitchRequestFailure

 PROCEDURE CODE id-PathSwitchRequest

 CRITICALITY reject

}

pDUSessionResourceModify NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE PDUSessionResourceModifyRequest

 SUCCESSFUL OUTCOME PDUSessionResourceModifyResponse

 PROCEDURE CODE id-PDUSessionResourceModify

 CRITICALITY reject

}

pDUSessionResourceModifyIndication NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE PDUSessionResourceModifyIndication

 SUCCESSFUL OUTCOME PDUSessionResourceModifyConfirm

 PROCEDURE CODE id-PDUSessionResourceModifyIndication

 CRITICALITY reject

}

pDUSessionResourceNotify NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE PDUSessionResourceNotify

 PROCEDURE CODE id-PDUSessionResourceNotify

 CRITICALITY ignore

}

pDUSessionResourceRelease NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE PDUSessionResourceReleaseCommand

 SUCCESSFUL OUTCOME PDUSessionResourceReleaseResponse

 PROCEDURE CODE id-PDUSessionResourceRelease

 CRITICALITY reject

}

pDUSessionResourceSetup NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE PDUSessionResourceSetupRequest

 SUCCESSFUL OUTCOME PDUSessionResourceSetupResponse

 PROCEDURE CODE id-PDUSessionResourceSetup

 CRITICALITY reject

}

privateMessage NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE PrivateMessage

 PROCEDURE CODE id-PrivateMessage

 CRITICALITY ignore

}

pWSCancel NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE PWSCancelRequest

 SUCCESSFUL OUTCOME PWSCancelResponse

 PROCEDURE CODE id-PWSCancel

 CRITICALITY reject

}

pWSFailureIndication NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE PWSFailureIndication

 PROCEDURE CODE id-PWSFailureIndication

 CRITICALITY ignore

}

pWSRestartIndication NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE PWSRestartIndication

 PROCEDURE CODE id-PWSRestartIndication

 CRITICALITY ignore

}

rANConfigurationUpdate NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE RANConfigurationUpdate

 SUCCESSFUL OUTCOME RANConfigurationUpdateAcknowledge

 UNSUCCESSFUL OUTCOME RANConfigurationUpdateFailure

 PROCEDURE CODE id-RANConfigurationUpdate

 CRITICALITY reject

}

rerouteNASRequest NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE RerouteNASRequest

 PROCEDURE CODE id-RerouteNASRequest

 CRITICALITY reject

}

rRCInactiveTransitionReport NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE RRCInactiveTransitionReport

 PROCEDURE CODE id-RRCInactiveTransitionReport

 CRITICALITY ignore

}

secondaryRATDataUsageReport NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE SecondaryRATDataUsageReport

 PROCEDURE CODE id-SecondaryRATDataUsageReport

 CRITICALITY ignore

}

traceFailureIndication NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE TraceFailureIndication

 PROCEDURE CODE id-TraceFailureIndication

 CRITICALITY ignore

}

traceStart NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE TraceStart

 PROCEDURE CODE id-TraceStart

 CRITICALITY ignore

}

uEContextModification NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE UEContextModificationRequest

 SUCCESSFUL OUTCOME UEContextModificationResponse

 UNSUCCESSFUL OUTCOME UEContextModificationFailure

 PROCEDURE CODE id-UEContextModification

 CRITICALITY reject

}

uEContextRelease NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE UEContextReleaseCommand

 SUCCESSFUL OUTCOME UEContextReleaseComplete

 PROCEDURE CODE id-UEContextRelease

 CRITICALITY reject

}

uEContextReleaseRequest NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE UEContextReleaseRequest

 PROCEDURE CODE id-UEContextReleaseRequest

 CRITICALITY ignore

}

uERadioCapabilityCheck NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE UERadioCapabilityCheckRequest

 SUCCESSFUL OUTCOME UERadioCapabilityCheckResponse

 PROCEDURE CODE id-UERadioCapabilityCheck

 CRITICALITY reject

}

uERadioCapabilityInfoIndication NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE UERadioCapabilityInfoIndication

 PROCEDURE CODE id-UERadioCapabilityInfoIndication

 CRITICALITY ignore

}

uETNLABindingRelease NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE UETNLABindingReleaseRequest

 PROCEDURE CODE id-UETNLABindingRelease

 CRITICALITY ignore

}

uplinkNASTransport NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE UplinkNASTransport

 PROCEDURE CODE id-UplinkNASTransport

 CRITICALITY ignore

}

uplinkNonUEAssociatedNRPPaTransport NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE UplinkNonUEAssociatedNRPPaTransport

 PROCEDURE CODE id-UplinkNonUEAssociatedNRPPaTransport

 CRITICALITY ignore

}

uplinkRANConfigurationTransfer NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE UplinkRANConfigurationTransfer

 PROCEDURE CODE id-UplinkRANConfigurationTransfer

 CRITICALITY ignore

}

uplinkRANStatusTransfer NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE UplinkRANStatusTransfer

 PROCEDURE CODE id-UplinkRANStatusTransfer

 CRITICALITY ignore

}

uplinkUEAssociatedNRPPaTransport NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE UplinkUEAssociatedNRPPaTransport

 PROCEDURE CODE id-UplinkUEAssociatedNRPPaTransport

 CRITICALITY ignore

}

writeReplaceWarning NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE WriteReplaceWarningRequest

 SUCCESSFUL OUTCOME WriteReplaceWarningResponse

 PROCEDURE CODE id-WriteReplaceWarning

 CRITICALITY reject

}

uplinkRIMInformationTransfer NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE UplinkRIMInformationTransfer

 PROCEDURE CODE id-UplinkRIMInformationTransfer

 CRITICALITY ignore

}

downlinkRIMInformationTransfer NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE DownlinkRIMInformationTransfer

 PROCEDURE CODE id-DownlinkRIMInformationTransfer

 CRITICALITY ignore

}

handoverSuccess NGAP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE HandoverSuccess

 PROCEDURE CODE id-HandoverSuccess

 CRITICALITY ignore

}

END

-- ASN1STOP

9.4.4 PDU Definitions

-- ASN1START

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

--

-- PDU definitions for NGAP.

--

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

NGAP-PDU-Contents {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

ngran-Access (22) modules (3) ngap (1) version1 (1) ngap-PDU-Contents (1) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

--

-- IE parameter types from other modules.

--

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

///////////////////////////////////////////////////////////////////////unchange skiped /////////////////////////////////////////////////////////////////////

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

--

-- Handover Cancellation Elementary Procedure

--

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

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

--

-- HANDOVER CANCEL

--

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

HandoverCancel ::= SEQUENCE {

 protocolIEs ProtocolIE-Container { { HandoverCancelIEs} },

 ...

}

HandoverCancelIEs NGAP-PROTOCOL-IES ::= {

 { ID id-AMF-UE-NGAP-ID CRITICALITY reject TYPE AMF-UE-NGAP-ID PRESENCE mandatory }|

 { ID id-RAN-UE-NGAP-ID CRITICALITY reject TYPE RAN-UE-NGAP-ID PRESENCE mandatory }|

 { ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory },

 ...

}

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

--

-- HANDOVER CANCEL ACKNOWLEDGE

--

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

HandoverCancelAcknowledge ::= SEQUENCE {

 protocolIEs ProtocolIE-Container { { HandoverCancelAcknowledgeIEs} },

 ...

}

HandoverCancelAcknowledgeIEs NGAP-PROTOCOL-IES ::= {

 { ID id-AMF-UE-NGAP-ID CRITICALITY ignore TYPE AMF-UE-NGAP-ID PRESENCE mandatory }|

 { ID id-RAN-UE-NGAP-ID CRITICALITY ignore TYPE RAN-UE-NGAP-ID PRESENCE mandatory }|

 { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },

 ...

}

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

--

-- HANDOVER SUCCESS ELEMENTARY PROCEDURE

--

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

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

--

-- HANDOVER SUCCESS

--

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

HandoverSuccess ::= SEQUENCE {

 protocolIEs ProtocolIE-Container { { HandoverSuccessIEs} },

 ...

}

HandoverSuccessIEs S1AP-PROTOCOL-IES ::= {

 { ID id-AMF-UE-NGAP-ID CRITICALITY reject TYPE AMF-UE-NGAP-ID PRESENCE mandatory }|

 { ID id-RAN-UE-NGAP-ID CRITICALITY reject TYPE RAN-UE-NGAP-ID PRESENCE mandatory },

 ...

}

### 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-AdditionalUL-NGU-UP-TNLInformation,

 id-Cause,

 id-CNTypeRestrictionsForEquivalent,

 id-CNTypeRestrictionsForServing,

 id-CommonNetworkInstance,

 id-DataForwardingNotPossible,

 id-DL-NGU-UP-TNLInformation,

 id-EndpointIPAddressAndPort,

 id-LastEUTRAN-PLMNIdentity,

 id-LocationReportingAdditionalInfo,

 id-MaximumIntegrityProtectedDataRate-DL,

 id-NetworkInstance,

 id-OldAssociatedQosFlowList-ULendmarkerexpected,

 id-PDUSessionAggregateMaximumBitRate,

 id-PDUSessionResourceFailedToSetupListCxtFail,

 id-PDUSessionResourceReleaseResponseTransfer,

 id-PDUSessionType,

 id-PSCellInformation,

 id-QosFlowAddOrModifyRequestList,

 id-QosFlowSetupRequestList,

 id-QosFlowToReleaseList,

 id-SCTP-TLAs,

 id-SecondaryRATUsageInformation,

 id-SecurityIndication,

 id-SecurityResult,

 id-S-NSSAI,

 id-TNLAssociationTransportLayerAddressNGRAN,

 id-UL-NGU-UP-TNLInformation,

 id-UL-NGU-UP-TNLModifyList,

 id-ULForwarding,

 id-ULForwardingUP-TNLInformation,

 id-DAPSInfo,

 id-DAPSResponseInfo,

 maxnoofAllowedAreas,

 maxnoofAllowedS-NSSAIs,

 maxnoofBPLMNs,

 maxnoofCellIDforWarning,

 maxnoofCellinAoI,

 maxnoofCellinEAI,

 maxnoofCellsingNB,

 maxnoofCellsinngeNB,

 maxnoofCellinTAI,

 maxnoofCellsinUEHistoryInfo,

 maxnoofCellsUEMovingTrajectory,

 maxnoofDRBs,

 maxnoofEmergencyAreaID,

 maxnoofEAIforRestart,

 maxnoofEPLMNs,

 maxnoofEPLMNsPlusOne,

 maxnoofE-RABs,

 maxnoofErrors,

 maxnoofForbTACs,

 maxnoofMultiConnectivity,

 maxnoofMultiConnectivityMinusOne,

 maxnoofNGConnectionsToReset,

 maxnoofPDUSessions,

 maxnoofPLMNs,

 maxnoofQosFlows,

 maxnoofRANNodeinAoI,

 maxnoofRecommendedCells,

 maxnoofRecommendedRANNodes,

 maxnoofAoI,

 maxnoofServedGUAMIs,

 maxnoofSliceItems,

 maxnoofTACs,

 maxnoofTAIforInactive,

 maxnoofTAIforPaging,

 maxnoofTAIforRestart,

 maxnoofTAIforWarning,

 maxnoofTAIinAoI,

 maxnoofTimePeriods,

 maxnoofTNLAssociations,

 maxnoofXnExtTLAs,

 maxnoofXnGTP-TLAs,

 maxnoofXnTLAs

FROM NGAP-Constants

///////////////////////////////////////////////////////////////////////unchange skiped /////////////////////////////////////////////////////////////////////

-- D

DataCodingScheme ::= BIT STRING (SIZE(8))

DataForwardingAccepted ::= ENUMERATED {

 data-forwarding-accepted,

 ...

}

DataForwardingNotPossible ::= ENUMERATED {

 data-forwarding-not-possible,

 ...

}

DataForwardingResponseDRBList ::= SEQUENCE (SIZE(1..maxnoofDRBs)) OF DataForwardingResponseDRBItem

DataForwardingResponseDRBItem ::= SEQUENCE {

 dRB-ID DRB-ID,

 dLForwardingUP-TNLInformation UPTransportLayerInformation OPTIONAL,

 uLForwardingUP-TNLInformation UPTransportLayerInformation OPTIONAL,

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

 ...

}

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

 ...

}

DAPSInfo ::= SEQUENCE {

 DAPSIndicator ENUMERATED {DAPS-required, ...},

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

 ...

}

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

 ...

}

DAPSResponseInfo ::= SEQUENCE {

 dapsresponseindicator ENUMERATED {dapshoaccepted, fallback-to-legacy-HO,...},

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

 ...

}

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

 ...

}

DelayCritical ::= ENUMERATED {

 delay-critical,

 non-delay-critical,

 ...

}

DLForwarding ::= ENUMERATED {

 dl-forwarding-proposed,

 ...

}

DL-NGU-TNLInformationReused ::= ENUMERATED {

 true,

 ...

}

DirectForwardingPathAvailability ::= ENUMERATED {

 direct-path-available,

 ...

}

DRB-ID ::= INTEGER (1..32, ...)

DRBsSubjectToStatusTransferList ::= SEQUENCE (SIZE(1..maxnoofDRBs)) OF DRBsSubjectToStatusTransferItem

DRBsSubjectToStatusTransferItem ::= SEQUENCE {

 dRB-ID DRB-ID,

 dRBStatusUL DRBStatusUL,

 dRBStatusDL DRBStatusDL,

 iE-Extension ProtocolExtensionContainer { {DRBsSubjectToStatusTransferItem-ExtIEs} } OPTIONAL,

 ...

}

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

 { ID id-OldAssociatedQosFlowList-ULendmarkerexpected CRITICALITY reject EXTENSION AssociatedQosFlowList PRESENCE optional },

 ...

}

DRBStatusDL ::= CHOICE {

 dRBStatusDL12 DRBStatusDL12,

 dRBStatusDL18 DRBStatusDL18,

 choice-Extensions ProtocolIE-SingleContainer { {DRBStatusDL-ExtIEs} }

}

DRBStatusDL-ExtIEs NGAP-PROTOCOL-IES ::= {

 ...

}

DRBStatusDL12 ::= SEQUENCE {

 dL-COUNTValue COUNTValueForPDCP-SN12,

 iE-Extension ProtocolExtensionContainer { {DRBStatusDL12-ExtIEs} } OPTIONAL,

 ...

}

DRBStatusDL12-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 ...

}

DRBStatusDL18 ::= SEQUENCE {

 dL-COUNTValue COUNTValueForPDCP-SN18,

 iE-Extension ProtocolExtensionContainer { {DRBStatusDL18-ExtIEs} } OPTIONAL,

 ...

}

DRBStatusDL18-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 ...

}

DRBStatusUL ::= CHOICE {

 dRBStatusUL12 DRBStatusUL12,

 dRBStatusUL18 DRBStatusUL18,

 choice-Extensions ProtocolIE-SingleContainer { {DRBStatusUL-ExtIEs} }

}

DRBStatusUL-ExtIEs NGAP-PROTOCOL-IES ::= {

 ...

}

DRBStatusUL12 ::= SEQUENCE {

 uL-COUNTValue COUNTValueForPDCP-SN12,

 receiveStatusOfUL-PDCP-SDUs BIT STRING (SIZE(1..2048)) OPTIONAL,

 iE-Extension ProtocolExtensionContainer { {DRBStatusUL12-ExtIEs} } OPTIONAL,

 ...

}

DRBStatusUL12-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 ...

}

DRBStatusUL18 ::= SEQUENCE {

 uL-COUNTValue COUNTValueForPDCP-SN18,

 receiveStatusOfUL-PDCP-SDUs BIT STRING (SIZE(1..131072)) OPTIONAL,

 iE-Extension ProtocolExtensionContainer { {DRBStatusUL18-ExtIEs} } OPTIONAL,

 ...

}

DRBStatusUL18-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 ...

}

DRBsToQosFlowsMappingList ::= SEQUENCE (SIZE(1..maxnoofDRBs)) OF DRBsToQosFlowsMappingItem

DRBsToQosFlowsMappingItem ::= SEQUENCE {

 dRB-ID DRB-ID,

 associatedQosFlowList AssociatedQosFlowList,

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

 ...

}

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

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

 ...

}

Dynamic5QIDescriptor ::= SEQUENCE {

 priorityLevelQos PriorityLevelQos,

 packetDelayBudget PacketDelayBudget,

 packetErrorRate PacketErrorRate,

 fiveQI FiveQI OPTIONAL,

 delayCritical DelayCritical OPTIONAL,

-- The above IE shall be present in case of GBR QoS flow

 averagingWindow AveragingWindow OPTIONAL,

-- The above IE shall be present in case of GBR QoS flow

 maximumDataBurstVolume MaximumDataBurstVolume OPTIONAL,

 iE-Extensions ProtocolExtensionContainer { {Dynamic5QIDescriptor-ExtIEs} } OPTIONAL,

 ...

}

Dynamic5QIDescriptor-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 ...

}

-- E

//////////////////////////////////////////////////////////////// unchange skiped /////////////////////////////////////////////////////////////////

-- T

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

TAI ::= SEQUENCE {

 pLMNIdentity PLMNIdentity,

 tAC TAC,

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

 ...

}

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

 ...

}

TAIBroadcastEUTRA ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAIBroadcastEUTRA-Item

TAIBroadcastEUTRA-Item ::= SEQUENCE {

 tAI TAI,

 completedCellsInTAI-EUTRA CompletedCellsInTAI-EUTRA,

 iE-Extensions ProtocolExtensionContainer { {TAIBroadcastEUTRA-Item-ExtIEs} } OPTIONAL,

 ...

}

TAIBroadcastEUTRA-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 ...

}

TAIBroadcastNR ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAIBroadcastNR-Item

TAIBroadcastNR-Item ::= SEQUENCE {

 tAI TAI,

 completedCellsInTAI-NR CompletedCellsInTAI-NR,

 iE-Extensions ProtocolExtensionContainer { {TAIBroadcastNR-Item-ExtIEs} } OPTIONAL,

 ...

}

TAIBroadcastNR-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 ...

}

TAICancelledEUTRA ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAICancelledEUTRA-Item

TAICancelledEUTRA-Item ::= SEQUENCE {

 tAI TAI,

 cancelledCellsInTAI-EUTRA CancelledCellsInTAI-EUTRA,

 iE-Extensions ProtocolExtensionContainer { {TAICancelledEUTRA-Item-ExtIEs} } OPTIONAL,

 ...

}

TAICancelledEUTRA-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 ...

}

TAICancelledNR ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAICancelledNR-Item

TAICancelledNR-Item ::= SEQUENCE {

 tAI TAI,

 cancelledCellsInTAI-NR CancelledCellsInTAI-NR,

 iE-Extensions ProtocolExtensionContainer { {TAICancelledNR-Item-ExtIEs} } OPTIONAL,

 ...

}

TAICancelledNR-Item-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 ...

}

TAIListForInactive ::= SEQUENCE (SIZE(1..maxnoofTAIforInactive)) OF TAIListForInactiveItem

TAIListForInactiveItem ::= SEQUENCE {

 tAI TAI,

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

 ...

}

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

 ...

}

TAIListForPaging ::= SEQUENCE (SIZE(1..maxnoofTAIforPaging)) OF TAIListForPagingItem

TAIListForPagingItem ::= SEQUENCE {

 tAI TAI,

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

 ...

}

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

 ...

}

TAIListForRestart ::= SEQUENCE (SIZE(1..maxnoofTAIforRestart)) OF TAI

TAIListForWarning ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAI

TargeteNB-ID ::= SEQUENCE {

 globalENB-ID GlobalNgENB-ID,

 selected-EPS-TAI EPS-TAI,

 iE-Extensions ProtocolExtensionContainer { {TargeteNB-ID-ExtIEs} } OPTIONAL,

 ...

}

TargeteNB-ID-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 ...

}

TargetID ::= CHOICE {

 targetRANNodeID TargetRANNodeID,

 targeteNB-ID TargeteNB-ID,

 choice-Extensions ProtocolIE-SingleContainer { {TargetID-ExtIEs} }

}

TargetID-ExtIEs NGAP-PROTOCOL-IES ::= {

 ...

}

TargetNGRANNode-ToSourceNGRANNode-TransparentContainer ::= SEQUENCE {

 rRCContainer RRCContainer,

 iE-Extensions ProtocolExtensionContainer { {TargetNGRANNode-ToSourceNGRANNode-TransparentContainer-ExtIEs} } OPTIONAL,

 ...

}

TargetNGRANNode-ToSourceNGRANNode-TransparentContainer-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 { ID id-DAPSResponseInfo CRITICALITY reject EXTENSION DAPSResponseInfo PRESENCE optional},

 ...

}

TargetRANNodeID ::= SEQUENCE {

 globalRANNodeID GlobalRANNodeID,

 selectedTAI TAI,

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

 ...

}

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

 ...

}

TargetToSource-TransparentContainer ::= OCTET STRING

-- This IE includes a transparent container from the target RAN node to the source RAN node.

-- The octets of the OCTET STRING are encoded according to the specifications of the target system.

TimerApproachForGUAMIRemoval ::= ENUMERATED {

 apply-timer,

 ...

}

TimeStamp ::= OCTET STRING (SIZE(4))

TimeToWait ::= ENUMERATED {v1s, v2s, v5s, v10s, v20s, v60s, ...}

TimeUEStayedInCell ::= INTEGER (0..4095)

TimeUEStayedInCellEnhancedGranularity ::= INTEGER (0..40950)

TNLAddressWeightFactor ::= INTEGER (0..255)

TNLAssociationList ::= SEQUENCE (SIZE(1..maxnoofTNLAssociations)) OF TNLAssociationItem

TNLAssociationItem ::= SEQUENCE {

 tNLAssociationAddress CPTransportLayerInformation,

 cause Cause,

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

 ...

}

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

 ...

}

TNLAssociationUsage ::= ENUMERATED {

 ue,

 non-ue,

 both,

 ...

}

TraceActivation ::= SEQUENCE {

 nGRANTraceID NGRANTraceID,

 interfacesToTrace InterfacesToTrace,

traceDepth TraceDepth,

traceCollectionEntityIPAddress TransportLayerAddress,

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

 ...

}

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

 ...

}

TraceDepth ::= ENUMERATED {

 minimum,

 medium,

 maximum,

 minimumWithoutVendorSpecificExtension,

 mediumWithoutVendorSpecificExtension,

 maximumWithoutVendorSpecificExtension,

 ...

}

TrafficLoadReductionIndication ::= INTEGER (1..99)

TransportLayerAddress ::= BIT STRING (SIZE(1..160, ...))

TypeOfError ::= ENUMERATED {

 not-understood,

 missing,

 ...

}

-- U

/////////////////////////////////////////////////////////////// unchange skiped ////////////////////////////////////////////////////////////////////

 id-LastEUTRAN-PLMNIdentity ProtocolIE-ID ::= 150

 id-MaximumIntegrityProtectedDataRate-DL ProtocolIE-ID ::= 151

 id-AdditionalDLForwardingUPTNLInformation ProtocolIE-ID ::= 152

 id-AdditionalDLUPTNLInformationForHOList ProtocolIE-ID ::= 153

 id-AdditionalNGU-UP-TNLInformation ProtocolIE-ID ::= 154

 id-AdditionalDLQosFlowPerTNLInformation ProtocolIE-ID ::= 155

 id-SecurityResult ProtocolIE-ID ::= 156

 id-ENDC-SONConfigurationTransferDL ProtocolIE-ID ::= 157

 id-ENDC-SONConfigurationTransferUL ProtocolIE-ID ::= 158

 id-OldAssociatedQosFlowList-ULendmarkerexpected ProtocolIE-ID ::= 159

 id-CNTypeRestrictionsForEquivalent ProtocolIE-ID ::= 160

 id-CNTypeRestrictionsForServing ProtocolIE-ID ::= 161

 id-NewGUAMI ProtocolIE-ID ::= 162

 id-ULForwarding ProtocolIE-ID ::= 163

 id-ULForwardingUP-TNLInformation ProtocolIE-ID ::= 164

 id-CNAssistedRANTuning ProtocolIE-ID ::= 165

 id-CommonNetworkInstance ProtocolIE-ID ::= 166

 id-NGRAN-TNLAssociationToRemoveList ProtocolIE-ID ::= 167

 id-TNLAssociationTransportLayerAddressNGRAN ProtocolIE-ID ::= 168

 id-EndpointIPAddressAndPort ProtocolIE-ID ::= 169

 id-LocationReportingAdditionalInfo ProtocolIE-ID ::= 170

 id-SourceToTarget-AMFInformationReroute ProtocolIE-ID ::= 171

 id-AdditionalULForwardingUPTNLInformation ProtocolIE-ID ::= 172

 id-SCTP-TLAs ProtocolIE-ID ::= 173

 id-DAPSInfo ProtocolIE-ID ::= XXX

 id-DAPSResponseInfo ProtocolIE-ID ::= YYY

END

//////////////////////////////////////////////////////////////// End of Change /////////////////////////////////////////////////////////////////////