**3GPP TSG-SA3 Meeting #81-LI-e-b *s3i210329r1***

**Online, , 19th May 2021 - 21st May 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **33.128** | **CR** | **0201** | **Rev** | **1** | **Current version:** | **17.0.0** |  |
|  |
| *For* [***HELP***](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 |  | Core Network | **X** |

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|  |
| ***Title:***  | Li for NEF Services including NIDD |
|  |  |
| ***Source to WG:*** | SA3-Li (Ministère Economie et Finances, Nokia, Nokia Shanghai Bell) |
| ***Source to TSG:*** | SA3 |
|  |  |
| ***Work item code:*** | LI17 |  | ***Date:*** | 2021-05-14 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *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:*** | NEF services including NIDD cannot be intercepted in 5GS |
|  |  |
| ***Summary of change:*** | Adds Stage 3 for NEF Services including NIDD in 5GS |
|  |  |
| ***Consequences if not approved:*** | LI for NEF Services including NIDD would continue to be missing in 5GS |
|  |  |
| ***Clauses affected:*** | 2, 7.X, Annex A |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS 33.127 CR 0127...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | s3i210329r1 |

First change

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.501: "System Architecture for the 5G System".

[3] 3GPP TS 33.126: "Lawful Interception Requirements".

[4] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[5] 3GPP TS 33.127: "Lawful Interception (LI) Architecture and Functions".

[6] ETSI TS 103 120: " Lawful Interception (LI); Interface for warrant information".

[7] ETSI TS 103 221-1: "Lawful Interception (LI); Internal Network Interfaces; Part 1: X1".

[8] ETSI TS 103 221-2: "Lawful Interception (LI); Internal Network Interfaces; Part 2: X2/X3".

 [9] ETSI TS 102 232-1: "Lawful Interception (LI); Handover Interface and Service-Specific Details (SSD) for IP delivery; Part 1: Handover specification for IP delivery".

[10] ETSI TS 102 232-7: "Lawful Interception (LI); Handover Interface and Service-Specific Details (SSD) for IP delivery; Part 7: Service-specific details for Mobile Services".

[11] 3GPP TS 33.501: "Security Architecture and Procedures for the 5G System".

[12] 3GPP TS 33.108: "3G security; Handover interface for Lawful Interception (LI)".

[13] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS)".

[14] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General Aspects".

[15] 3GPP TS 29.244: "Interface between the Control Plane and the User Plane nodes".

[16] 3GPP TS 29.502: "5G System; Session Management Services; Stage 3".

[17] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[18] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".

[19] 3GPP TS 23.003: "Numbering, addressing and identification ".

[20] OMA-TS-MLP-V3\_5-20181211-C: "Open Mobile Alliance; Mobile Location Protocol, Candidate Version 3.5", <https://www.openmobilealliance.org/release/MLS/V1_4-20181211-C/OMA-TS-MLP-V3_5-20181211-C.pdf>.

[21] 3GPP TS 29.540: "5G System; SMS Services; Stage 3".

[22] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[23] 3GPP TS 38.413: "NG Application Protocol (NGAP)".

[24] 3GPP TS 29.572: "Location Management Services; Stage 3".

[25] 3GPP TS 29.503: "5G System; Unified Data Management Services".

[26] IETF RFC 815: "IP datagram reassembly algorithms".

[27] IETF RFC 2460: "Internet Protocol, Version 6 (IPv6) Specification".

[28] IETF RFC 793: "Transmission Control Protocol".

[29] IETF RFC 768: "User Datagram Protocol".

[30] IETF RFC 4340: "Datagram Congestion Control Protocol (DCCP)".

[31] IETF RFC 4960: "Stream Control Transmission Protocol".

[32] IANA (www.iana.org): Assigned Internet Protocol Numbers, "Protocol Numbers".

[33] IETF RFC 6437: "IPv6 Flow Label Specification".

[34] IETF RFC 791: "Internet Protocol".

[35] Open Geospatial Consortium OGC 05-010: "URNs of definitions in ogc namespace".

[36] 3GPP TS 33.107: "3G security; Lawful interception architecture and functions".

[37] 3GPP TS 37.340: "Evolved Universal Radio Access (E-UTRA) and NR-Multi-connectivity; Stage 2".

[38] 3GPP TS 36.413: "S1 Application Protocol (S1AP)".

[39] OMA-TS-MMS\_ENC-V1\_3-20110913-A: "Multimedia Messaging Service Encapsulation Protocol".

[40] 3GPP TS 23.140: "Multimedia Messaging Protocol. Functional Description. Stage 2".

[41] 3GPP TS 38.415: "NG-RAN; PDU Session User Plane Protocol".

[42] 3GPP TS 23.273: "5G System (5GS) Location Services (LCS); Stage 2".

[43] IETF RFC 4566: "SDP: Session Description Protocol".

[44] 3GPP TS 24.193: "Stage 3: Access Traffic Steering, Switching and Splitting (ATSSS)".

[45] 3GPP TS 29.509: "5G System; Authentication Server Services; Stage 3".

[46] 3GPP TS 24.011: "Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[47] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[48] 3GPP TS 29.504: "5G System; Unified Data Repository Services; Stage 3".

[49] 3GPP TS 29.505: "5G System; Usage of the Unified Data Repository services for Subscription Data; Stage 3"

[XX] 3GPP TS 29.541: "5G System; Network Exposure (NE) function services for Non-IP Data Delivery (NIDD); Stage 3"

[XY] 3GPP TS 29.522: "5G System; Network Exposure Function Northbound APIs; Stage 3".

[XZ] 3GPP TS 29.338: "Diameter based protocols to support Short Message Service (SMS) capable Mobile Management Entities (MMEs); Stage 3".

[XA] 3GPP TS 29.337: "Diameter-based T4 interface for communications with packet data networks and applications".

[XB] 3GPP TS 24.250: "Protocol for Reliable Data Service; Stage 3".

Second change

## 7.Y LI at NEF

### 7.Y.1 Provisioning over LI\_X1

#### 7.Y.1.1 General

For NIDD using NEF:

- If delivery type for the warrant is "IRI and CC", then the IRI-POI and the CC-POI in the NEF, the MDF2 and MDF3 shall be provisioned.

- If delivery type for the warrant is "IRI", then the IRI-POI in the NEF and the MDF2 shall be provisioned.

- Delivery type "CC" is not applicable to the warrant.

For device triggering, MSISDN-less MO SMS and Parameter Provisioning:

- the delivery type for the warrant is "IRI"; the IRI-POI in the NEF and the MDF2 shall be provisioned.

#### 7.Y.1.2 Provisioning of the IRI-POI and CC-POI in NEF

The IRI-POI and CC-POI present in the NEF are provisioned over LI\_X1 by the LIPF using the X1 protocol as described in clause 5.2.2.

The POI in the NEF shall support the following target identifier formats in the ETSI TS 103 221-1 [7] messages (or equivalent if ETSI TS 103 221-1 [7] is not used):

- SUPIIMSI.

- SUPINAI.

- GPSIMSISDN.

- GPSINAI.

NOTE: For Parameter Provisioning, only GPSIMSISDN and GPSINAI are applicable.

### 7.Y.2 LI for NIDD using NEF

#### 7.Y.2.1 Generation of xIRI at IRI-POI in NEF over LI\_X2

##### 7.Y.2.1.1 General

The IRI-POI present in the NEF shall send the xIRIs over LI\_X2 for each of the events listed in TS 33.127 [5] clause 7.Y.2.3, the details of which are described in the following sub-clauses. Each event will be based on PDU session between NEF and target UE, except for Unsuccessful Procedure event.

##### 7.Y.2.1.2 PDU session establishment

The IRI-POI in the NEF shall generate an xIRI containing an NEFPDUSessionEstablishment record when the IRI-POI present in the NEF detects that an unstructured PDU session using NEF has been established for the target UE. The IRI-POI present in the NEF shall generate the xIRI for the following event:

- NEF returns Nnef\_SMContext\_Create Response towards the SMF confirming the establishment of the unstructured PDU session to the NEF for the target UE (as defined in TS 29.541 [XX] clause 5.2.2.2) and connection to the AF is established.

**Table 7.Y.2-1: NEFPDUSessionEstablishment record**

|  |  |  |
| --- | --- | --- |
| **Field name** | **Value** | **M/C/O** |
| sUPI | SUPI associated with the PDU session (e.g., as provided by the SMF in the associated Nnef\_SMContext\_Create Request) | M |
| gPSI | GPSI associated with the PDU session | M |
| pDUSessionID | PDU Session ID | M |
| sNSSAI | Slice identifier associated with the PDU session | C |
| nEFID | NEF identity handling the PDU session | M |
| dNN | Data Network Name associated with the target traffic | M |
| rDSSupport | True if Reliable Data Service is supported in the PDU session, otherwise False | M |
| sMFID | Identifier of the SMF associated with the target UE for that that PDU Session | M |
| aFID | Identifier of the AF | M |

##### 7.Y.2.1.3 PDU session modification

The IRI-POI in the NEF shall generate an xIRI containing an NEFPDUSessionModification record when the IRI-POI present in the NEF detects that an unstructured PDU session using NEF has been modified for the target UE. The IRI-POI present in the NEF shall generate the xIRI for the following events:

- NEF returns Nnef\_SMContext\_Update Response to SMF to confirm the modification of the connection between SMF and NEF (see TS 29.541 [XX] clause 5.2.2.5).

- NEF returns a RDS MANAGE PORT Response to a UE with a "Status" field set to "Success" in response to a RDS MANAGE PORT command sent by UE with an "Action" field set to "Reserve port" to confirm the reservation of a combination of source and destination port numbers for use for a traffic to be sent by the UE to a specific application on an AF (see TS 24.250 [XB] clause 5.4.2.6.2).

- NEF receives a RDS MANAGE PORT Response from a UE with a "Status" field set to "Success" in response to a RDS MANAGE PORT command sent by the NEF with an "Action" field set to "Reserve port” to confirm the reservation of a combination of source and destination port numbers for use for a traffic to be sent by an AF to a specific application on the UE (see TS 24.250 [XB] clause 5.4.2.6.2).

- NEF returns a RDS MANAGE PORT Response to a UE with a "Status" field set to "Success" in response to a RDS MANAGE PORT command sent by UE with an "Action" field set to "Release port" to confirm the release of a combination of source and destination port numbers for an application on an AF (see TS 24.250 [XB] clause 5.4.2.6.3).

- NEF receives a RDS MANAGE PORT Response from a UE with a "Status" field set to "Success” in response to a RDS MANAGE PORT command sent by the NEF with an "Action" field set to "Release port" to confirm the release of a combination of source and destination port numbers for an application on the UE (see TS 24.250 [XB] clause 5.4.2.6.3).

**Table 7.Y.2-2: NEFPDUSessionModification record**

|  |  |  |
| --- | --- | --- |
| **Field name** | **Value** | **M/C/O** |
| sUPI | SUPI associated with the PDU session  | M |
| gPSI | GPSI associated with the PDU session | M |
| sNSSAI | Slice identifier associated with the PDU session | M |
| Initiator | Initiator of the modification of the PDU session, UE, SMF or NEF | M |
| rDSSourcePortNumber | RDS source port number | C |
| rDSDestinationPortNumber | RDS destination port number | C |
| applicationID | Application identifier on the UE or on the AF if RDS is used | C |
| aFID | Identifier of the AF if RDS is used | C |
| rDSAction | Action if RDS is used. Possible values: “ReservePort”, “ReleasePort” | C |
| serializationFormat | Data format exchanged between UE and AF if RDS is used | C |

##### 7.Y.2.1.4 PDU session release

The IRI-POI in the NEF shall generate an xIRI containing an NEFPDUSessionRelease record when the IRI-POI present in the NEF detects that an unstructured PDU session using NEF related to the target UE needs to be released. The IRI-POI present in the NEF shall generate the xIRI for the following events:

- NEF notifies the SMF that the SMF-NEF Connection for NIDD via NEF is no longer valid using Nnef\_SMContext\_DeleteNotify service operation when NEF receives a notification from the UDM that the NIDD authorization has ended. NEF releases the SM Context for NIDD on NEF as described in TS 29.541 [XX] clause 5.2.2.4. This corresponds to NEF Initiated SMF-NEF Connection Release procedure.

- NEF returns Nnef\_SMContext\_Delete Response towards SMF confirming release of the SMF-NEF session for the target UE. In this scenario, SMF releases the SM Context for NIDD on NEF as specified in TS 29.541 [XX] clause 5.2.2.3).

**Table 7.Y.2-3: NEFPDUSessionRelease record**

|  |  |  |
| --- | --- | --- |
| Field name | Value | M/C/O |
| sUPI | SUPI associated with the PDU session  | M |
| gPSI | GPSI associated with the PDU session | M |
| pDUSessionID | PDU Session ID as assigned by the AMF | M |
| timeOfFirstPacket | Time of first packet for the PDU session | C |
| timeOfLastPacket | Time of last packet for the PDU session | C |
| uplinkVolume | Number of uplink octets for the PDU session | C |
| downlinkVolume | Number of downlink octets for the PDU session | C |
| releaseCause | Cause of PDU Session Release | M |

##### 7.Y.2.1.5 Unsuccessful procedure

The IRI-POI in the NEF shall generate an xIRI containing an NEFUnsuccessfulProcedure record when the IRI-POI present in the NEF detects an unsuccessful procedure or error condition for a UE matching one of the target identifiers provided via LI\_X1.

Accordingly, the IRI-POI in the NEF generates the xIRI when one of the following events are detected as described in TS 29.541 [XX] clause 6.1.7.3 and TS 24.250 [XB] clause 5.4.2.6:

- NEF sends a Nnef\_SMContext\_Create Reject message to the SMF with a reject cause set to "USER\_UNKNOWN" or "NIDD\_CONFIGURATION\_NOT\_AVAILABLE".

- NEF sends a Nnef\_SMContext\_Update Reject message to the SMF with a reject cause set to "CONTEXT\_NOT\_FOUND".

- NEF sends a Nnef\_SMContext\_Delete Reject message to the SMF with a reject cause set to "CONTEXT\_NOT\_FOUND".

- NEF returns a RDS MANAGE PORT Response to a UE with a "Status" field set to "Port not free" in response to a RDS MANAGE PORT command sent by UE with an "Action" field set to "Reserve port".

- NEF receives a RDS MANAGE PORT Response from a UE with a "Status" field set to "Port not free" in response to a RDS MANAGE PORT command sent by NEF with an "Action" field set to "Reserve port".

- NEF returns a RDS MANAGE PORT Response to a UE with a "Status" field set to "Port not associated with specified application" in response to a RDS MANAGE PORT command sent by UE with an "Action" field set to "Release port".

- NEF receives a RDS MANAGE PORT Response from a UE with a "Status" field set to "Port not associated with specified application" in response to a RDS MANAGE PORT command sent by NEF with an "Action" field set to "Release port".

**Table 7.Y.2-4: NEFUnsuccessfulProcedure record**

|  |  |  |
| --- | --- | --- |
| **Field name** | **Value** | **M/C/O** |
| failureCause | Provides the value of the failure cause. | M |
| sUPI | SUPI associated with the procedure | M |
| gPSI | GPSI used in the procedure, if available | C |
| pDUSessionID | PDU Session ID | C |
| dNN | Data Network Name associated with the target traffic, if available | C |
| sNSSAI | Slice requested for the procedure, if available | C |
| rDSDestionationPortNumber | RDS destination port number  | C |
| applicationID | Application associated with the RDS destination port number | C |
| aFID | Application Function identifier | C |

##### 7.Y.2.1.6 Start of interception with established PDU session

The IRI-POI in the NEF shall generate an xIRI containing an NEFStartOfInterceptionWithEstablishedPDUSession record when the IRI-POI present in the NEF detects that an unstructured PDU session using NEF has already been established, at the time the POI on NEF is provisioned with a new target ID.

The IRI-POI in the NEF shall generate the xIRI containing the NEFStartOfInterceptionWithEstablishedPDUSession record for each of the PDU sessions for NIDD using NEF associated with the target UE with a different value of correlation information.

**Table 7.Y.2-5: NEFStartOfInterceptionWithEstablishedPDUSession record**

|  |  |  |
| --- | --- | --- |
| **Field name** | **Value** | **M/C/O** |
| sUPI | SUPI associated with the PDU session (e.g., as provided by the SMF in the associated Nnef\_SMContext\_Create Request) | M |
| gPSI | GPSI associated with the PDU session | M |
| pDUSessionID | PDU Session ID | M |
| sNSSAI | Slice identifier associated with the PDU session | M |
| dNN | Data Network Name associated with the target traffic | M |
| nEFID | NEF identity handling the PDU session | M |
| rDSSupport | True if Reliable Data Service is supported in the PDU session, otherwise False | M |
| sMFID | Identifier of the SMF associated with the target UE for that that PDU Session | M |
| aFID | String Identifying the AF the traffic will be delivered to | M |

The IRI-POI present in the SMF generating an xIRI containing a NEFStartOfInterceptionWithEstablishedPDUSession record shall set the Payload Direction field in the PDU header to *not applicable* (see ETSI TS 103 221-2 [8] clause 5.2.6).

#### 7.Y.2.2 Generation of xCC at CC-POI in NEF over LI\_X3

The CC-POI present in the NEF shall send xCC over LI\_X3 for each NIDD packet.

Each X3 PDU shall contain the contents of the user plane packet (i.e.,NIDD) using an unstructured payload format.

The CC-POI present in the NEF shall set the payload format to indicate the appropriate payload type(i.e., unstructured payload) as described in ETSI TS 103 221-2 clause 5.4.

#### 7.Y.2.3 Generation of IRI over LI\_HI2

When an xIRI is received over LI\_X2 from the IRI-POI in the NEF, the MDF2 shall send the IRI message over LI\_HI2 without undue delay. The IRI message shall contain a copy of the relevant record received from LI\_X2. The record may be enriched by other information available at the MDF (e.g., additional location information).

The timestamp field of the ETSI TS 102 232-1 [9] PSHeader structure shall be set to the time at which the NEF event was observed (i.e., the timestamp field of the xIRI).

Table 7.Y.2-6 shows the IRI type (see ETSI TS 102 232-1 [9] clause 5.2.10) to be used for each record type.

Table 7.Y.2-6: IRI type for messages

|  |  |
| --- | --- |
| Record type | IRI Type |
| NEFPDUSessionEstablishment | BEGIN |
| NEFPDUSessionRelease | END |
| NEFPDUSessionModification | CONTINUE |
| NEFStartOfInterceptionWithEstablishedPDUSession | BEGIN |
| NEFUnsuccessfulProcedure | REPORT or CONTINUE |

IRI messages associated with the same PDU Session shall be assigned the same CIN (see ETSI TS 102 232-1 [9] clause 5.2.4).

The threeGPP33128DefinedIRI field (see ETSI TS 102 232-7 [10] clause 15) shall be populated with the BER-encoded IRIPayload.

#### 7.Y.2.4 Generation of CC over LI\_HI3

When xCC is received over LI\_X3 from the CC-POI in the NEF, the MDF3 shall populate the threeGPP33128DefinedCC field with a CCPayload structure containing NIDDCCPDU and send it over LI-HI3 interface to LEMF without undue delay.

The timestamp field of the ETSI TS 102 232-1 [9] PSHeader structure shall be set to the time that the NEF observed the data (i.e. the timestamp field of the xCC). The LIID and CID fields shall correctly reflect the target identity and communication session to which the CC belongs.

### 7.Y.3 LI for device triggering

#### 7.Y.3.1 Generation of xIRI LI\_X2 at IRI-POI in NEF over LI\_X2

##### 7.Y.3.1.1 General

The IRI-POI present in the NEF shall send the xIRIs over LI\_X2 for each of the events listed in TS 33.127 [5] clause 7.Y.3.4, the details of which are described in the following sub-clauses.

##### 7.Y.3.1.2 Device trigger

The IRI-POI in the NEF shall generate an xIRI containing a NEFDeviceTrigger record when the IRI-POI present in the NEF detects that an AF has sent a Device trigger to a target UE matching one of the target identifiers.

Accordingly, the IRI-POI in the NEF generates the xIRI when any of the following events is detected:

- NEF sends a Nnef\_Trigger\_Delivery Response to the AF to acknowledge the reception of Nnef\_Trigger\_Delivery Request with GPSI matching the target identifier (see TS 23.502 [4] clause 4.13.2.1 and TS 29.522 [XY] clause 4.4.3).

- NEF sends a T4 Device-Trigger-Request (DTR) to SMS-SC with Trigger-Action AVP set to TRIGGER and User-Identifier AVP matching the SUPI of the target UE as described in TS 29.337 [XA] clause 5.2.1.

**Table 7.Y.3-1: NEFDeviceTrigger record**

|  |  |  |
| --- | --- | --- |
| **Field name** | **Value** | **M/C/O** |
| sUPI | SUPI associated with the UE | M |
| gPSI | GPSI used with the UE | M |
| triggerId | Identity of the Device trigger that should be provided in the deviceTriggeringDeliveryReportNotification IRI, Device trigger replacement IRI and Device trigger cancellation IRI | M |
| aFID | The AF sending the Device trigger | M |
| triggerPayload | The Device triggering payload | C |
| validityPeriod | The validity time in seconds for the specific action requested | C |
| priorityDT | The priority indication for a trigger payload | C |
| sourcePortId | Application identity on the AF which delivers the Device trigger | C |
| destinationPortId | Used to uniquely identify the triggering application addressed in the device. | C |

##### 7.Y.3.1.3 Device trigger replace

The IRI-POI in the NEF shall generate an xIRI containing a NEFDeviceTriggerReplace record when the IRI-POI present in the NEF detects that an AF has sent a Device trigger replacement for a previously sent Device trigger to a UE matching one of the target identifiers provided via LI\_X1 to the IRI POI in the NEF. It replaces a previously submitted Device trigger message which has not yet been delivered to the UE.

Accordingly, the IRI-POI in the NEF generates the xIRI when any of the following events is detected:

- NEF receives a Nnef\_Trigger\_Delivery Request (for a device trigger replacement) from an AF as described in TS 29.522 [XZ] clause 4.4.3 with GPSI matching the target identifier.

- NEF sends a T4 Device-Trigger-Request (DTR) to SMS-SC with Trigger-Action AVP set to REPLACE and User-Identifier AVP matching the SUPI of the target UE as specified in 29.337 [XA] clause 5.2.1.

**Table 7.Y.3-2: NEFDeviceTriggerReplace record**

|  |  |  |
| --- | --- | --- |
| **Field name** | **Value** | **M/C/O** |
| sUPI | SUPI associated with the target UE | M |
| gPSI | GPSI used with the taget UE | M |
| triggerId | Identity of the corresponding Device trigger to be replaced | M |
| aFID | The AF replacing an existing Device trigger which has not been delivered yet to the device (e.g., because the device is unreachable) by a new Device trigger | M |
| triggerPayload | The device triggering payload | C |
| validityPeriod | The validity time in seconds for the specific action requested | C |
| priorityDT | Priority indication for a trigger payload | C |
| sourcePortId | Port on the AF which delivers the device trigger | C |
| destinationPortId | Port on the device which is the recipient of the device trigger | C |

##### 7.Y.3.1.4 Device trigger cancellation

The IRI-POI in the NEF shall generate an xIRI containing a NEFDeviceTriggerCancellation record when the IRI-POI present in the NEF detects that an AF has sent a Device trigger cancellation for a previously sent Device trigger to a UE matching one of the target identifiers provided via LI\_X1 to the IRI-POI in the NEF. It cancels previously submitted Device trigger message which has not yet been delivered to the target UE.

Accordingly, the IRI-POI in the NEF generates the xIRI when any of the following events is detected:

- NEF receives a Nnef\_Trigger\_Delivery Request (for a device trigger cancellation) with GPSI matching the target identifier as described in TS 29.522 [XZ] clause 4.4.3.

- NEF sends a T4 Device-Trigger-Request DTR) to SMS-SC with Trigger-Action AVP set to RECALL and User-Identifier AVP matching the SUPI of the target UE as specified in 29.337 [XA] clause 5.2.1.

**Table 7.Y.3-3: NEFDeviceTriggerCancellation record**

|  |  |  |
| --- | --- | --- |
| **Field name** | **Value** | **M/C/O** |
| sUPI | SUPI associated with the target UE | M |
| gPSI | GPSI used with the target UE | M |
| triggerId | Identity of the corresponding device trigger to be cancelled | M |

##### 7.Y.3.1.5 Device trigger report notification

The IRI-POI in the NEF shall generate an xIRI containing a NEFDeviceTriggerReportNotify record when the IRI-POI present in the NEF detects that the NEF has returned a Device trigger report to the AF with a cause value indicating the trigger delivery outcome (e.g., succeeded, unknown or failed).

Accordingly, the IRI-POI in the NEF generates the xIRI when any of the following events is detected:

- NEF sends a Nnef\_Trigger\_DeliveryNotify service operation with the GPSI of the target UE to inform the AF on the delivery outcome of the device trigger as described in TS 29.522 [XZ] clause 4.4.3.

- SMS-SC sends a T4 Delivery-Report-Request (DRR) to the NEF with User-Identifier matching the SUPI of the target UE as specified in 29.337 [XA] clause 5.2.2.

|  |  |  |
| --- | --- | --- |
| **Table 7.Y.3-4: NEFDeviceTriggerReportNotify record**Field name | Value | M/C/O |
| sUPI | SUPI associated with the target UE | M |
| gPSI | GPSI used with the target UE | M |
| triggerId | Identity of the corresponding Device trigger | M |
| deviceTriggerDeliveryResult | Delivery result represents the result of the delivery of a device triggering request:- SUCCESS: The value indicates that the device action request was successfully completed. - UNKNOWN: The value indicates any unspecified errors. - FAILURE: The value indicates that this trigger encountered a delivery error and is deemed permanently undeliverable.- TRIGGERED: The value indicates that Device triggering request is accepted by the NEF.- EXPIRED: The value indicates that the validity period expired before the trigger could be delivered.- UNCONFIRMED: The value indicates that the delivery of the device action request is not confirmed.- REPLACED: The value indicates that the device triggering replacement request is accepted by the NEF.- TERMINATE: The NEF includes this value in the response for a successful device triggering cancellation request. The value indicates that the delivery of the device action request is terminated by the AF. | M |

#### 7.Y.3.2 Generation of IRI over LI\_HI2

When an xIRI is received over LI\_X2 from the IRI-POI in the NEF, the MDF2 shall send the IRI message over LI\_HI2 without undue delay. The IRI message shall contain a copy of the relevant record received from LI\_X2. The record may be enriched by other information available at the MDF (e.g., additional location information).

The timestamp field of the ETSI TS 102 232-1 [9] PSHeader structure shall be set to the time at which the NEF event was observed (i.e., the timestamp field of the xIRI).

Table 7.Y.3-5 shows the IRI type (see ETSI TS 102 232-1 [9] clause 5.2.10) to be used for each record type.

Table 7.Y.3-5: IRI type for messages

|  |  |
| --- | --- |
| Record type | IRI Type |
| NEFDeviceTrigger | REPORT |
| NEFDeviceTriggerReplace | REPORT |
| NEFDeviceTriggerCancellation | REPORT |
| NEFDeviceTriggerReportNotify | REPORT |

### 7.Y.4 LI for MSISDN-less MO SMS

#### 7.Y.4.1 Generation of xIRI LI\_X2 at IRI-POI in NEF over LI\_X2

##### 7.Y.4.1.1 General

The IRI-POI present in the NEF shall send the xIRIs over LI\_X2 for each of the events listed in TS 33.127 [5] clause 7.Y.4.4, the details of which are described in the following sub-clauses.

##### 7.Y.4.1.2 MSISDN-less MO SMS

The IRI-POI in the NEF shall generate an xIRI containing a NEFMSISDNLessMOSMS record when the IRI-POI present in the NEF detects that a target UE has sent a MSISDN-less MO SMS to an AF.

Accordingly, the IRI-POI in the NEF generates the xIRI when any of the following events is detected:

- NEF receives a SGd MO-Forward-Short-Message-Request (OFR) from an SMS-SC with SUPI matching the target identifier (see TS 29.338 [XZ] clause 6.2.1).

- NEF sends a Nnef\_MSISDN-less\_MO\_SMSNotify service operation to the AF with the GPSI of the target UE sending the MSISDN-less SMS as described in TS 29.522 [XZ] clause 4.4.10.

**Table 7.Y.4-1: NEFMSISDNLessMOSMS record**

|  |  |  |
| --- | --- | --- |
| **Field name** | **Value** | **M/C/O** |
| sUPI | SUPI associated with the target UE | M |
| gPSI | GPSI in the form of an external identifier as username@realm and corresponding to the identity of the originating SMS party | M |
| terminatingSMSParty | Identity of the AF receiving the SMS | M |
| sMS | SMS TPDU | C |
| sourcePort | port identifying the application of the target UE sending the MSISN-less MO SMS | C |
| destinationPort | port identifying the application of the AF which is the recipient of the MSISN-less MO SMS | C |

#### 7.Y.4.2 Generation of IRI over LI\_HI2

When an xIRI is received over LI\_X2 from the IRI-POI in the NEF, the MDF2 shall send the IRI message over LI\_HI2 without undue delay. The IRI message shall contain a copy of the relevant record received from LI\_X2. The record may be enriched by other information available at the MDF (e.g., additional location information).

The timestamp field of the ETSI TS 102 232-1 [9] PSHeader structure shall be set to the time at which the NEF event was observed (i.e., the timestamp field of the xIRI).

Table 7.Y.4-2 shows the IRI type (see ETSI TS 102 232-1 [9] clause 5.2.10) to be used for each record type.

Table 7.Y.4-2: IRI type for messages

|  |  |
| --- | --- |
| Record type | IRI Type |
| NEFMSISDNLessMOSMS | REPORT |

### 7.Y.5 LI for parameter provisioning

#### 7.Y.5.1 Generation of xIRI LI\_X2 at IRI-POI in NEF over LI\_X2

##### 7.Y.5.1.1 General

The IRI-POI present in the NEF shall send the xIRIs over LI\_X2 for each of the events listed in TS 33.127 [5] clause 7.Y.5.4, the details of which are described in the following sub-clauses.

##### 7.Y.5.1.2 Expected UE behavior update

The IRI-POI in the NEF shall generate an xIRI containing an NEFExpectedUEBehaviorUpdate record when the IRI-POI present in the NEF detects that an AF has updated the UE Expected behavior data.

Accordingly, the IRI-POI in the NEF generates the xIRI when any of the following events is detected (see TS 29.503 [25] clauses 5.6.2.1 and 6.1.6.2.49):

- NEF receives a NEF\_ParameterProvision\_Create Request or NEF\_ParameterProvision\_Update Request from an AF, related to the target UE.

- NEF receives a NEF\_ParameterProvision\_Delete Request from an AF to delete the existing UE Expected Behaviour parameters related to the target UE.

- NEF returns a NEF\_ParameterProvision\_Get Response containing the UE Expected Behavior of the target UE to the querying AF.

**Table 7.Y-5-1: NEFExpectedUEBehaviorUpdate record**

|  |  |  |
| --- | --- | --- |
| **Field name** | **Value** | **M/C/O** |
| gPSI | GPSI of the target UE to which the expected UE behavior applies | M |
| expectedUEMovingTrajectory | Identifies the UE's expected geographical movement | O |
| stationaryIndication | Identifies whether the UE is stationary or mobile | O |
| communicationDurationTime | Indicates for how long the UE will normally stay in CM-Connected for data transmission expressed in seconds | O |
| periodicTime  | Interval Time of periodic communication in seconds | O |
| scheduledCommunicationTime | Time and day of the week when the UE is available for communication, as defined in TS 29.571. | O |
| batteryIndication | Identifies power consumption criticality for the UE: if theUE is battery powered but the battery is not rechargeable/notreplaceable, battery powered withrechargeable/replaceable battery, or not battery powered. | O |
| trafficProfile | Identifies the type of data transmission: single packet transmission (UL or DL), dual packet transmission (UL with subsequent DL or DL with subsequent UL), multiple packets transmission  | O |
| scheduledCommunicationType | Indicates that the Scheduled Communication Type is Downlink only or Uplink only or Bi-directional | O |
| expectedTimeAndDayOfWeekInTrajectory | Identifies the time and day of week when the UE is expected to be at each location included in the Expected UE Moving Trajectory | O |
| aFID | AF identity requesting expected UE behavior update | M |
| validityTime | Identifies when the expected UE behavior parameter set expires and shall be deleted. If absent, it indicates that there is no expiration time for this parameter set | O |

#### 7.Y.5.2 Generation of IRI over LI\_HI2

When an xIRI is received over LI\_X2 from the IRI-POI in the NEF, the MDF2 shall send the IRI message over LI\_HI2 without undue delay. The IRI message shall contain a copy of the relevant record received from LI\_X2. The record may be enriched by other information available at the MDF (e.g., additional location information).

The timestamp field of the ETSI TS 102 232-1 [9] PSHeader structure shall be set to the time at which the NEF event was observed (i.e., the timestamp field of the xIRI).

Table 7.Y.5-2 shows the IRI type (see ETSI TS 102 232-1 [9] clause 5.2.10) to be used for each record type.

Table 7.Y.5-2: IRI type for messages

|  |  |
| --- | --- |
| Record type | IRI Type |
| NEFExpectedUEBehaviorUpdate | REPORT |

Third change

Annex A (normative):
Structure of both the Internal and External Interfaces

TS33128Payloads

{itu-t(0) identified-organization(4) etsi(0) securityDomain(2) lawfulIntercept(2) threeGPP(4) ts33128(19) r17(17) version0(0)}

DEFINITIONS IMPLICIT TAGS EXTENSIBILITY IMPLIED ::=

BEGIN

-- =============

-- Relative OIDs

-- =============

tS33128PayloadsOID RELATIVE-OID ::= {threeGPP(4) ts33128(19) r17(17) version0(0)}

xIRIPayloadOID RELATIVE-OID ::= {tS33128PayloadsOID xIRI(1)}

xCCPayloadOID RELATIVE-OID ::= {tS33128PayloadsOID xCC(2)}

iRIPayloadOID RELATIVE-OID ::= {tS33128PayloadsOID iRI(3)}

cCPayloadOID RELATIVE-OID ::= {tS33128PayloadsOID cC(4)}

lINotificationPayloadOID RELATIVE-OID ::= {tS33128PayloadsOID lINotification(5)}

-- ===============

-- X2 xIRI payload

-- ===============

XIRIPayload ::= SEQUENCE

{

 xIRIPayloadOID [1] RELATIVE-OID,

 event [2] XIRIEvent

}

XIRIEvent ::= CHOICE

{

 -- Access and mobility related events, see clause 6.2.2

 registration [1] AMFRegistration,

 deregistration [2] AMFDeregistration,

 locationUpdate [3] AMFLocationUpdate,

 startOfInterceptionWithRegisteredUE [4] AMFStartOfInterceptionWithRegisteredUE,

 unsuccessfulAMProcedure [5] AMFUnsuccessfulProcedure,

 -- PDU session-related events, see clause 6.2.3

 pDUSessionEstablishment [6] SMFPDUSessionEstablishment,

 pDUSessionModification [7] SMFPDUSessionModification,

 pDUSessionRelease [8] SMFPDUSessionRelease,

 startOfInterceptionWithEstablishedPDUSession [9] SMFStartOfInterceptionWithEstablishedPDUSession,

 unsuccessfulSMProcedure [10] SMFUnsuccessfulProcedure,

 -- Subscriber-management related events, see clause 7.2.2

 servingSystemMessage [11] UDMServingSystemMessage,

 -- SMS-related events, see clause 6.2.5, see also sMSReport ([56] below)

 sMSMessage [12] SMSMessage,

 -- LALS-related events, see clause 7.3.3

 lALSReport [13] LALSReport,

 -- PDHR/PDSR-related events, see clause 6.2.3.4.1

 pDHeaderReport [14] PDHeaderReport,

 pDSummaryReport [15] PDSummaryReport,

 -- tag 16 is reserved because there is no equivalent mDFCellSiteReport in XIRIEvent

 -- MMS-related events, see clause 7.4.2

 mMSSend [17] MMSSend,

 mMSSendByNonLocalTarget [18] MMSSendByNonLocalTarget,

 mMSNotification [19] MMSNotification,

 mMSSendToNonLocalTarget [20] MMSSendToNonLocalTarget,

 mMSNotificationResponse [21] MMSNotificationResponse,

 mMSRetrieval [22] MMSRetrieval,

 mMSDeliveryAck [23] MMSDeliveryAck,

 mMSForward [24] MMSForward,

 mMSDeleteFromRelay [25] MMSDeleteFromRelay,

 mMSDeliveryReport [26] MMSDeliveryReport,

 mMSDeliveryReportNonLocalTarget [27] MMSDeliveryReportNonLocalTarget,

 mMSReadReport [28] MMSReadReport,

 mMSReadReportNonLocalTarget [29] MMSReadReportNonLocalTarget,

 mMSCancel [30] MMSCancel,

 mMSMBoxStore [31] MMSMBoxStore,

 mMSMBoxUpload [32] MMSMBoxUpload,

 mMSMBoxDelete [33] MMSMBoxDelete,

 mMSMBoxViewRequest [34] MMSMBoxViewRequest,

 mMSMBoxViewResponse [35] MMSMBoxViewResponse,

 -- PTC-related events, see clause 7.5.2

 pTCRegistration [36] PTCRegistration,

 pTCSessionInitiation [37] PTCSessionInitiation,

 pTCSessionAbandon [38] PTCSessionAbandon,

 pTCSessionStart [39] PTCSessionStart,

 pTCSessionEnd [40] PTCSessionEnd,

 pTCStartOfInterception [41] PTCStartOfInterception,

 pTCPreEstablishedSession [42] PTCPreEstablishedSession,

 pTCInstantPersonalAlert [43] PTCInstantPersonalAlert,

 pTCPartyJoin [44] PTCPartyJoin,

 pTCPartyDrop [45] PTCPartyDrop,

 pTCPartyHold [46] PTCPartyHold,

 pTCMediaModification [47] PTCMediaModification,

 pTCGroupAdvertisement [48] PTCGroupAdvertisement,

 pTCFloorControl [49] PTCFloorControl,

 pTCTargetPresence [50] PTCTargetPresence,

 pTCParticipantPresence [51] PTCParticipantPresence,

 pTCListManagement [52] PTCListManagement,

 pTCAccessPolicy [53] PTCAccessPolicy,

 -- More Subscriber-management related events, see clause 7.2.2

 subscriberRecordChangeMessage [54] UDMSubscriberRecordChangeMessage,

 cancelLocationMessage [55] UDMCancelLocationMessage,

 -- SMS-related events continued from choice 12

 sMSReport [56] SMSReport,

 -- MA PDU session-related events, see clause 6.2.3.2.7

 sMFMAPDUSessionEstablishment [57] SMFMAPDUSessionEstablishment,

 sMFMAPDUSessionModification [58] SMFMAPDUSessionModification,

 sMFMAPDUSessionRelease [59] SMFMAPDUSessionRelease,

 startOfInterceptionWithEstablishedMAPDUSession [60] SMFStartOfInterceptionWithEstablishedMAPDUSession,

 unsuccessfulMASMProcedure [61] SMFMAUnsuccessfulProcedure,

 -- Identifier Association events, see clauses 6.2.2.2.7 and 6.3.2.2.2

 aMFIdentifierAssocation [62] AMFIdentifierAssocation,

 mMEIdentifierAssocation [63] MMEIdentifierAssocation,

 -- PDU to MA PDU session-related events, see clause 6.2.3.2.8

sMFPDUtoMAPDUSessionModification [64] SMFPDUtoMAPDUSessionModification,

 -- NEF services related events

 nEFPDUSessionEstablishment [70] NEFPDUSessionEstablishment,

 nEFPDUSessionModification [71] NEFPDUSessionModification,

 nEFPDUSessionRelease [72] NEFPDUSessionRelease,

 nEFUnsuccessfulProcedure [73] NEFUnsuccessfulProcedure,

 nEFStartOfInterceptionWithEstablishedPDUSession [74] NEFStartOfInterceptionWithEstablishedPDUSession,

 nEFdeviceTrigger [75] NEFDeviceTrigger,

 nEFdeviceTriggerReplace [76] NEFDeviceTriggerReplace,

 nEFdeviceTriggerCancellation [77] NEFDeviceTriggerCancellation,

 nEFdeviceTriggerReportNotify [78] NEFDeviceTriggerReportNotify,

 nEFMSISDNLessMOSMS [79] NEFMSISDNLessMOSMS,

 nEFExpectedUEBehaviourUpdate [80] NEFExpectedUEBehaviourUpdate

}

-- ==============

-- X3 xCC payload

-- ==============

-- No additional xCC payload definitions required in the present document.

-- ===============

-- HI2 IRI payload

-- ===============

IRIPayload ::= SEQUENCE

{

 iRIPayloadOID [1] RELATIVE-OID,

 event [2] IRIEvent,

 targetIdentifiers [3] SEQUENCE OF IRITargetIdentifier OPTIONAL

}

IRIEvent ::= CHOICE

{

 -- Registration-related events, see clause 6.2.2

 registration [1] AMFRegistration,

 deregistration [2] AMFDeregistration,

 locationUpdate [3] AMFLocationUpdate,

 startOfInterceptionWithRegisteredUE [4] AMFStartOfInterceptionWithRegisteredUE,

 unsuccessfulRegistrationProcedure [5] AMFUnsuccessfulProcedure,

 -- PDU session-related events, see clause 6.2.3

 pDUSessionEstablishment [6] SMFPDUSessionEstablishment,

 pDUSessionModification [7] SMFPDUSessionModification,

 pDUSessionRelease [8] SMFPDUSessionRelease,

 startOfInterceptionWithEstablishedPDUSession [9] SMFStartOfInterceptionWithEstablishedPDUSession,

 unsuccessfulSessionProcedure [10] SMFUnsuccessfulProcedure,

 -- Subscriber-management related events, see clause 7.2.2

 servingSystemMessage [11] UDMServingSystemMessage,

 -- SMS-related events, see clause 6.2.5, see also sMSReport ([56] below)

 sMSMessage [12] SMSMessage,

 -- LALS-related events, see clause 7.3.3

 lALSReport [13] LALSReport,

 -- PDHR/PDSR-related events, see clause 6.2.3.4.1

 pDHeaderReport [14] PDHeaderReport,

 pDSummaryReport [15] PDSummaryReport,

 -- MDF-related events, see clause 7.3.4

 mDFCellSiteReport [16] MDFCellSiteReport,

 -- MMS-related events, see clause 7.4.2

 mMSSend [17] MMSSend,

 mMSSendByNonLocalTarget [18] MMSSendByNonLocalTarget,

 mMSNotification [19] MMSNotification,

 mMSSendToNonLocalTarget [20] MMSSendToNonLocalTarget,

 mMSNotificationResponse [21] MMSNotificationResponse,

 mMSRetrieval [22] MMSRetrieval,

 mMSDeliveryAck [23] MMSDeliveryAck,

 mMSForward [24] MMSForward,

 mMSDeleteFromRelay [25] MMSDeleteFromRelay,

 mMSDeliveryReport [26] MMSDeliveryReport,

 mMSDeliveryReportNonLocalTarget [27] MMSDeliveryReportNonLocalTarget,

 mMSReadReport [28] MMSReadReport,

 mMSReadReportNonLocalTarget [29] MMSReadReportNonLocalTarget,

 mMSCancel [30] MMSCancel,

 mMSMBoxStore [31] MMSMBoxStore,

 mMSMBoxUpload [32] MMSMBoxUpload,

 mMSMBoxDelete [33] MMSMBoxDelete,

 mMSMBoxViewRequest [34] MMSMBoxViewRequest,

 mMSMBoxViewResponse [35] MMSMBoxViewResponse,

 -- PTC-related events, see clause 7.5.2

 pTCRegistration [36] PTCRegistration,

 pTCSessionInitiation [37] PTCSessionInitiation,

 pTCSessionAbandon [38] PTCSessionAbandon,

 pTCSessionStart [39] PTCSessionStart,

 pTCSessionEnd [40] PTCSessionEnd,

 pTCStartOfInterception [41] PTCStartOfInterception,

 pTCPreEstablishedSession [42] PTCPreEstablishedSession,

 pTCInstantPersonalAlert [43] PTCInstantPersonalAlert,

 pTCPartyJoin [44] PTCPartyJoin,

 pTCPartyDrop [45] PTCPartyDrop,

 pTCPartyHold [46] PTCPartyHold,

 pTCMediaModification [47] PTCMediaModification,

 pTCGroupAdvertisement [48] PTCGroupAdvertisement,

 pTCFloorControl [49] PTCFloorControl,

 pTCTargetPresence [50] PTCTargetPresence,

 pTCParticipantPresence [51] PTCParticipantPresence,

 pTCListManagement [52] PTCListManagement,

 pTCAccessPolicy [53] PTCAccessPolicy,

 -- More Subscriber-management related events, see clause 7.2.2

 subscriberRecordChangeMessage [54] UDMSubscriberRecordChangeMessage,

 cancelLocationMessage [55] UDMCancelLocationMessage,

 -- SMS-related events, continued from choice 12

 sMSReport [56] SMSReport,

 -- MA PDU session-related events, see clause 6.2.3.2.7

 sMFMAPDUSessionEstablishment [57] SMFMAPDUSessionEstablishment,

 sMFMAPDUSessionModification [58] SMFMAPDUSessionModification,

 sMFMAPDUSessionRelease [59] SMFMAPDUSessionRelease,

 startOfInterceptionWithEstablishedMAPDUSession [60] SMFStartOfInterceptionWithEstablishedMAPDUSession,

 unsuccessfulMASMProcedure [61] SMFMAUnsuccessfulProcedure,

 -- Identifier Association events, see clauses 6.2.2.2.7 and 6.3.2.2.2

 aMFIdentifierAssocation [62] AMFIdentifierAssocation,

 mMEIdentifierAssocation [63] MMEIdentifierAssocation,

 -- PDU to MA PDU session-related events, see clause 6.2.3.2.8

 sMFPDUtoMAPDUSessionModification [64] SMFPDUtoMAPDUSessionModification,

 -- NEF services related events

 nEFPDUSessionEstablishment [70] NEFPDUSessionEstablishment,

 nEFPDUSessionModification [71] NEFPDUSessionModification,

 nEFPDUSessionRelease [72] NEFPDUSessionRelease,

 nEFUnsuccessfulProcedure [73] NEFUnsuccessfulProcedure,

 nEFStartOfInterceptionWithEstablishedPDUSession [74] NEFStartOfInterceptionWithEstablishedPDUSession,

 nEFdeviceTrigger [75] NEFDeviceTrigger,

 nEFdeviceTriggerReplace [76] NEFDeviceTriggerReplace,

 nEFdeviceTriggerCancellation [77] NEFDeviceTriggerCancellation,

 nEFdeviceTriggerReportNotify [78] NEFDeviceTriggerReportNotify,

 nEFMSISDNLessMOSMS [79] NEFMSISDNLessMOSMS,

 nEFExpectedUEBehaviourUpdate [80] NEFExpectedUEBehaviourUpdate

}

IRITargetIdentifier ::= SEQUENCE

{

 identifier [1] TargetIdentifier,

 provenance [2] TargetIdentifierProvenance OPTIONAL

}

-- ==============

-- HI3 CC payload

-- ==============

CCPayload ::= SEQUENCE

{

 cCPayloadOID [1] RELATIVE-OID,

 pDU [2] CCPDU

}

CCPDU ::= CHOICE

{

 uPFCCPDU [1] UPFCCPDU,

 extendedUPFCCPDU [2] ExtendedUPFCCPDU,

 mMSCCPDU [3] MMSCCPDU,

 nIDDCCPDU [4] NIDDCCPDU

}

-- ===========================

-- HI4 LI notification payload

-- ===========================

LINotificationPayload ::= SEQUENCE

{

 lINotificationPayloadOID [1] RELATIVE-OID,

 notification [2] LINotificationMessage

}

LINotificationMessage ::= CHOICE

{

 lINotification [1] LINotification

}

-- ==================

-- 5G NEF definitions

-- ==================

-- See clause 7.Y.2.1.2 for details of this structure

NEFPDUSessionEstablishment ::= SEQUENCE

{

 sUPI [1] SUPI,

 gPSI [2] GPSI,

 pDUSessionID [3] PDUSessionID,

 sNSSAI [4] SNSSAI,

 nEFID [5] NEFID,

 dNN [6] DNN,

 rDSSupport [7] RDSSupport,

 sMFID [8] SMFID,

 aFID [9] AFID

}

-- See clause 7.Y.2.1.3 for details of this structure

NEFPDUSessionModification ::= SEQUENCE

{

 sUPI [1] SUPI,

 gPSI [2] GPSI,

 sNSSAI [3] SNSSAI,

 initiator [4] Initiator,

 rDSSourcePortNumber [5] RDSPortNumber OPTIONAL,

 rDSDestinationPortNumber [6] RDSPortNumber OPTIONAL,

 applicationID [7] ApplicationID OPTIONAL,

 aFID [8] AFID OPTIONAL,

 rDSAction [9] RDSAction OPTIONAL,

 serializationFormat [10] SerializationFormat OPTIONAL

}

-- See clause 7.Y.2.1.4 for details of this structure

NEFPDUSessionRelease ::= SEQUENCE

{

 sUPI [1] SUPI,

 gPSI [2] GPSI,

 pDUSessionID [3] PDUSessionID,

 timeOfFirstPacket [4] Timestamp OPTIONAL,

 timeOfLastPacket [5] Timestamp OPTIONAL,

 uplinkVolume [6] INTEGER OPTIONAL,

 downlinkVolume [7] INTEGER OPTIONAL,

 releaseCause [8] NEFReleaseCause

}

-- See clause 7.Y.2.1.5 for details of this structure

NEFUnsuccessfulProcedure ::= SEQUENCE

{

 failureCause [1] NEFFailureCause,

 sUPI [2] SUPI,

 gPSI [3] GPSI OPTIONAL,

 pDUSessionID [4] PDUSessionID,

 dNN [5] DNN OPTIONAL,

 sNSSAI [6] SNSSAI OPTIONAL,

 rDSDestinationPortNumber [7] RDSPortNumber,

 applicationID [8] ApplicationID,

 aFID [9] AFID

}

-- See clause 7.Y.2.1.6 for details of this structure

NEFStartOfInterceptionWithEstablishedPDUSession ::= SEQUENCE

{

 sUPI [1] SUPI,

 gPSI [2] GPSI,

 pDUSessionID [3] PDUSessionID,

 dNN [4] DNN,

 sNSSAI [5] SNSSAI,

 nEFID [6] NEFID,

 rDSSupport [7] RDSSupport,

 sMFID [8] SMFID,

 aFID [9] AFID

}

-- See clause 7.Y.3.1.1 for details of this structure

NEFDeviceTrigger ::= SEQUENCE

{

 sUPI [1] SUPI,

 gPSI [2] GPSI,

 triggerId [3] TriggerID,

 aFID [4] AFID,

 triggerPayload [5] TriggerPayload OPTIONAL,

 validityPeriod [6] INTEGER OPTIONAL,

 priorityDT [7] PriorityDT OPTIONAL,

 sourcePortId [8] PortNumber OPTIONAL,

 destinationPortId [9] PortNumber OPTIONAL

}

-- See clause 7.Y.3.1.2 for details of this structure

NEFDeviceTriggerReplace ::= SEQUENCE

{

 sUPI [1] SUPI,

 gPSI [2] GPSI,

 triggerId [3] TriggerID,

 aFID [4] AFID,

 triggerPayload [5] TriggerPayload OPTIONAL,

 validityPeriod [6] INTEGER OPTIONAL,

 priorityDT [7] PriorityDT OPTIONAL,

 sourcePortId [8] PortNumber OPTIONAL,

 destinationPortId [9] PortNumber OPTIONAL

}

-- See clause 7.Y.3.1.3 for details of this structure

NEFDeviceTriggerCancellation ::= SEQUENCE

{

 sUPI [1] SUPI,

 gPSI [2] GPSI,

 triggerId [3] TriggerID

}

-- See clause 7.Y.3.1.4 for details of this structure

NEFDeviceTriggerReportNotify ::= SEQUENCE

{

 sUPI [1] SUPI,

 gPSI [2] GPSI,

 triggerId [3] TriggerID,

 deviceTriggerDeliveryResult [4] DeviceTriggerDeliveryResult

}

-- See clause 7.Y.4.1.1 for details of this structure

NEFMSISDNLessMOSMS ::= SEQUENCE

{

 sUPI [1] SUPI,

 gPSI [2] GPSI,

 terminatingSMSParty [3] AFID,

 sMS [4] SMSTPDUData OPTIONAL,

 sourcePort [5] PortNumber OPTIONAL,

 destinationPort [6] PortNumber OPTIONAL

}

-- See clause 7.Y.5.1.1 for details of this structure

NEFExpectedUEBehaviourUpdate ::= SEQUENCE

{

 gPSI [1] GPSI,

 expectedUEMovingTrajectory [2] SEQUENCE OF UMTLocationArea5G OPTIONAL,

 stationaryIndication [3] StationaryIndication OPTIONAL,

 communicationDurationTime [4] INTEGER OPTIONAL,

 periodicTime [5] INTEGER OPTIONAL,

 scheduledCommunicationTime [6] ScheduledCommunicationTime OPTIONAL,

 scheduledCommunicationType [7] ScheduledCommunicationType OPTIONAL,

 batteryIndication [8] BatteryIndication OPTIONAL,

 trafficProfile [9] TrafficProfile OPTIONAL,

 expectedTimeAndDayOfWeekInTrajectory [10] SEQUENCE OF UMTLocationArea5G OPTIONAL,

 aFID [11] AFID,

 validityTime [12] Timestamp OPTIONAL

}

-- =================

-- Common SCEF/NEF parameters

-- =================

RDSSupport ::= BOOLEAN

RDSPortNumber ::= INTEGER (0..15)

RDSAction ::= ENUMERATED

{

 reservePort (1),

 releasePort (2)

}

SerializationFormat ::= ENUMERATED

{

 xml (1),

 json (2),

 cbor (3)

}

ApplicationID ::= OCTET STRING

NIDDCCPDU ::= OCTET STRING

TriggerID ::= UTF8String

PriorityDT ::= ENUMERATED

{

 noPriority (1),

 priority (2)

}

TriggerPayload ::= OCTET STRING

DeviceTriggerDeliveryResult ::= ENUMERATED

{

 success (1),

 unknown (2),

 failure (3),

 triggered (4),

 expired (5),

 unconfirmed (6),

 replaced (7),

 terminate (8)

}

StationaryIndication ::= ENUMERATED

{

 stationary (1),

 mobile (2)

}

BatteryIndication ::= ENUMERATED

{

 batteryRecharge (1),

 batteryReplace (2),

 batteryNoRecharge (3),

 batteryNoReplace (4),

 noBattery (5)

}

ScheduledCommunicationTime ::= SEQUENCE

{

 days [1] SEQUENCE OF Daytime

}

UMTLocationArea5G ::= SEQUENCE

{

 timeOfDay [1] Daytime,

 durationSec [2] INTEGER,

 location [3] NRLocation

}

Daytime ::= SEQUENCE

{

 daysOfWeek [1] Day OPTIONAL,

 timeOfDayStart [2] Timestamp OPTIONAL,

 timeOfDayEnd [3] Timestamp OPTIONAL

}

Day ::= ENUMERATED

{

 monday (1),

 tuesday (2),

 wednesday (3),

 thursday (4),

 friday (5),

 saturday (6),

 sunday (7)

}

TrafficProfile ::= ENUMERATED

{

 singleTransUL (1),

 singleTransDL (2),

 dualTransULFirst (3),

 dualTransDLFirst (4),

 multiTrans (5)

}

ScheduledCommunicationType ::= ENUMERATED

{

 downlinkOnly (1),

 uplinkOnly (2),

 bidirectional (3)

}

-- =================

-- 5G NEF parameters

-- =================

NEFFailureCause ::= ENUMERATED

{

 userUnknown(1),

 niddConfigurationNotAvailable(2),

 contextNotFound(3),

 portNotFree(4),

 PortNotAssociatedWithSpecifiedApplication(5)

}

NEFReleaseCause ::= ENUMERATED

{

 sMFRelease(1),

 dNRelease(2),

 uDMRelease(3),

 cHFRelease(4),

 localConfigurationPolicy(5),

 unknownCause(6)

}

AFID ::= UTF8String

NEFID ::= UTF8String

-- ==================

-- 5G AMF definitions

-- ==================

-- See clause 6.2.2.2.2 for details of this structure

AMFRegistration ::= SEQUENCE

{

 registrationType [1] AMFRegistrationType,

 registrationResult [2] AMFRegistrationResult,

 slice [3] Slice OPTIONAL,

 sUPI [4] SUPI,

 sUCI [5] SUCI OPTIONAL,

 pEI [6] PEI OPTIONAL,

 gPSI [7] GPSI OPTIONAL,

 gUTI [8] FiveGGUTI,

 location [9] Location OPTIONAL,

 non3GPPAccessEndpoint [10] UEEndpointAddress OPTIONAL,

 fiveGSTAIList [11] TAIList OPTIONAL

}

-- See clause 6.2.2.2.3 for details of this structure

AMFDeregistration ::= SEQUENCE

{

 deregistrationDirection [1] AMFDirection,

 accessType [2] AccessType,

 sUPI [3] SUPI OPTIONAL,

 sUCI [4] SUCI OPTIONAL,

 pEI [5] PEI OPTIONAL,

 gPSI [6] GPSI OPTIONAL,

 gUTI [7] FiveGGUTI OPTIONAL,

 cause [8] FiveGMMCause OPTIONAL,

 location [9] Location OPTIONAL

}

-- See clause 6.2.2.2.4 for details of this structure

AMFLocationUpdate ::= SEQUENCE

{

 sUPI [1] SUPI,

 sUCI [2] SUCI OPTIONAL,

 pEI [3] PEI OPTIONAL,

 gPSI [4] GPSI OPTIONAL,

 gUTI [5] FiveGGUTI OPTIONAL,

 location [6] Location

}

-- See clause 6.2.2.2.5 for details of this structure

AMFStartOfInterceptionWithRegisteredUE ::= SEQUENCE

{

 registrationResult [1] AMFRegistrationResult,

 registrationType [2] AMFRegistrationType OPTIONAL,

 slice [3] Slice OPTIONAL,

 sUPI [4] SUPI,

 sUCI [5] SUCI OPTIONAL,

 pEI [6] PEI OPTIONAL,

 gPSI [7] GPSI OPTIONAL,

 gUTI [8] FiveGGUTI,

 location [9] Location OPTIONAL,

 non3GPPAccessEndpoint [10] UEEndpointAddress OPTIONAL,

 timeOfRegistration [11] Timestamp OPTIONAL,

 fiveGSTAIList [12] TAIList OPTIONAL

}

-- See clause 6.2.2.2.6 for details of this structure

AMFUnsuccessfulProcedure ::= SEQUENCE

{

 failedProcedureType [1] AMFFailedProcedureType,

 failureCause [2] AMFFailureCause,

 requestedSlice [3] NSSAI OPTIONAL,

 sUPI [4] SUPI OPTIONAL,

 sUCI [5] SUCI OPTIONAL,

 pEI [6] PEI OPTIONAL,

 gPSI [7] GPSI OPTIONAL,

 gUTI [8] FiveGGUTI OPTIONAL,

 location [9] Location OPTIONAL

}

-- =================

-- 5G AMF parameters

-- =================

AMFID ::= SEQUENCE

{

 aMFRegionID [1] AMFRegionID,

 aMFSetID [2] AMFSetID,

 aMFPointer [3] AMFPointer

}

AMFDirection ::= ENUMERATED

{

 networkInitiated(1),

 uEInitiated(2)

}

AMFFailedProcedureType ::= ENUMERATED

{

 registration(1),

 sMS(2),

 pDUSessionEstablishment(3)

}

AMFFailureCause ::= CHOICE

{

 fiveGMMCause [1] FiveGMMCause,

 fiveGSMCause [2] FiveGSMCause

}

AMFPointer ::= INTEGER (0..63)

AMFRegistrationResult ::= ENUMERATED

{

 threeGPPAccess(1),

 nonThreeGPPAccess(2),

 threeGPPAndNonThreeGPPAccess(3)

}

AMFRegionID ::= INTEGER (0..255)

AMFRegistrationType ::= ENUMERATED

{

 initial(1),

 mobility(2),

 periodic(3),

 emergency(4)

}

AMFSetID ::= INTEGER (0..1023)

-- ==================

-- 5G SMF definitions

-- ==================

-- See clause 6.2.3.2.2 for details of this structure

SMFPDUSessionEstablishment ::= SEQUENCE

{

 sUPI [1] SUPI OPTIONAL,

 sUPIUnauthenticated [2] SUPIUnauthenticatedIndication OPTIONAL,

 pEI [3] PEI OPTIONAL,

 gPSI [4] GPSI OPTIONAL,

 pDUSessionID [5] PDUSessionID,

 gTPTunnelID [6] FTEID,

 pDUSessionType [7] PDUSessionType,

 sNSSAI [8] SNSSAI OPTIONAL,

 uEEndpoint [9] SEQUENCE OF UEEndpointAddress OPTIONAL,

 non3GPPAccessEndpoint [10] UEEndpointAddress OPTIONAL,

 location [11] Location OPTIONAL,

 dNN [12] DNN,

 aMFID [13] AMFID OPTIONAL,

 hSMFURI [14] HSMFURI OPTIONAL,

 requestType [15] FiveGSMRequestType,

 accessType [16] AccessType OPTIONAL,

 rATType [17] RATType OPTIONAL,

 sMPDUDNRequest [18] SMPDUDNRequest OPTIONAL,

 uEEPSPDNConnection [19] UEEPSPDNConnection OPTIONAL

}

-- See clause 6.2.3.2.3 for details of this structure

SMFPDUSessionModification ::= SEQUENCE

{

 sUPI [1] SUPI OPTIONAL,

 sUPIUnauthenticated [2] SUPIUnauthenticatedIndication OPTIONAL,

 pEI [3] PEI OPTIONAL,

 gPSI [4] GPSI OPTIONAL,

 sNSSAI [5] SNSSAI OPTIONAL,

 non3GPPAccessEndpoint [6] UEEndpointAddress OPTIONAL,

 location [7] Location OPTIONAL,

 requestType [8] FiveGSMRequestType,

 accessType [9] AccessType OPTIONAL,

 rATType [10] RATType OPTIONAL,

 pDUSessionID [11] PDUSessionID OPTIONAL

}

-- See clause 6.2.3.2.4 for details of this structure

SMFPDUSessionRelease ::= SEQUENCE

{

 sUPI [1] SUPI,

 pEI [2] PEI OPTIONAL,

 gPSI [3] GPSI OPTIONAL,

 pDUSessionID [4] PDUSessionID,

 timeOfFirstPacket [5] Timestamp OPTIONAL,

 timeOfLastPacket [6] Timestamp OPTIONAL,

 uplinkVolume [7] INTEGER OPTIONAL,

 downlinkVolume [8] INTEGER OPTIONAL,

 location [9] Location OPTIONAL,

 cause [10] SMFErrorCodes OPTIONAL

}

-- See clause 6.2.3.2.5 for details of this structure

SMFStartOfInterceptionWithEstablishedPDUSession ::= SEQUENCE

{

 sUPI [1] SUPI OPTIONAL,

 sUPIUnauthenticated [2] SUPIUnauthenticatedIndication OPTIONAL,

 pEI [3] PEI OPTIONAL,

 gPSI [4] GPSI OPTIONAL,

 pDUSessionID [5] PDUSessionID,

 gTPTunnelID [6] FTEID,

 pDUSessionType [7] PDUSessionType,

 sNSSAI [8] SNSSAI OPTIONAL,

 uEEndpoint [9] SEQUENCE OF UEEndpointAddress,

 non3GPPAccessEndpoint [10] UEEndpointAddress OPTIONAL,

 location [11] Location OPTIONAL,

 dNN [12] DNN,

 aMFID [13] AMFID OPTIONAL,

 hSMFURI [14] HSMFURI OPTIONAL,

 requestType [15] FiveGSMRequestType,

 accessType [16] AccessType OPTIONAL,

 rATType [17] RATType OPTIONAL,

 sMPDUDNRequest [18] SMPDUDNRequest OPTIONAL,

 timeOfSessionEstablishment [19] Timestamp OPTIONAL

}

-- See clause 6.2.3.2.6 for details of this structure

SMFUnsuccessfulProcedure ::= SEQUENCE

{

 failedProcedureType [1] SMFFailedProcedureType,

 failureCause [2] FiveGSMCause,

 initiator [3] Initiator,

 requestedSlice [4] NSSAI OPTIONAL,

 sUPI [5] SUPI OPTIONAL,

 sUPIUnauthenticated [6] SUPIUnauthenticatedIndication OPTIONAL,

 pEI [7] PEI OPTIONAL,

 gPSI [8] GPSI OPTIONAL,

 pDUSessionID [9] PDUSessionID OPTIONAL,

 uEEndpoint [10] SEQUENCE OF UEEndpointAddress OPTIONAL,

 non3GPPAccessEndpoint [11] UEEndpointAddress OPTIONAL,

 dNN [12] DNN OPTIONAL,

 aMFID [13] AMFID OPTIONAL,

 hSMFURI [14] HSMFURI OPTIONAL,

 requestType [15] FiveGSMRequestType OPTIONAL,

 accessType [16] AccessType OPTIONAL,

 rATType [17] RATType OPTIONAL,

 sMPDUDNRequest [18] SMPDUDNRequest OPTIONAL,

 location [19] Location OPTIONAL

}

-- See clause 6.2.3.2.8 for details of this structure

SMFPDUtoMAPDUSessionModification ::= SEQUENCE

{

 sUPI [1] SUPI OPTIONAL,

 sUPIUnauthenticated [2] SUPIUnauthenticatedIndication OPTIONAL,

 pEI [3] PEI OPTIONAL,

 gPSI [4] GPSI OPTIONAL,

 sNSSAI [5] SNSSAI OPTIONAL,

 non3GPPAccessEndpoint [6] UEEndpointAddress OPTIONAL,

 location [7] Location OPTIONAL,

 requestType [8] FiveGSMRequestType,

 accessType [9] AccessType OPTIONAL,

 rATType [10] RATType OPTIONAL,

 pDUSessionID [11] PDUSessionID,

 requestIndication [12] RequestIndication,

 aTSSSContainer [13] ATSSSContainer

}

-- See clause 6.2.3.2.7.1 for details of this structure

SMFMAPDUSessionEstablishment ::= SEQUENCE

{

 sUPI [1] SUPI OPTIONAL,

 sUPIUnauthenticated [2] SUPIUnauthenticatedIndication OPTIONAL,

 pEI [3] PEI OPTIONAL,

 gPSI [4] GPSI OPTIONAL,

 pDUSessionID [5] PDUSessionID,

 pDUSessionType [6] PDUSessionType,

 accessInfo [7] SEQUENCE OF AccessInfo,

 sNSSAI [8] SNSSAI OPTIONAL,

 uEEndpoint [9] SEQUENCE OF UEEndpointAddress OPTIONAL,

 location [10] Location OPTIONAL,

 dNN [11] DNN,

 aMFID [12] AMFID OPTIONAL,

 hSMFURI [13] HSMFURI OPTIONAL,

 requestType [14] FiveGSMRequestType,

 sMPDUDNRequest [15] SMPDUDNRequest OPTIONAL,

 servingNetwork [16] SMFServingNetwork,

 oldPDUSessionID [17] PDUSessionID OPTIONAL,

 mAUpgradeIndication [18] SMFMAUpgradeIndication OPTIONAL,

 ePSPDNCnxInfo [19] SMFEPSPDNCnxInfo OPTIONAL,

 mAAcceptedIndication [20] SMFMAAcceptedIndication,

 aTSSSContainer [21] ATSSSContainer OPTIONAL

}

-- See clause 6.2.3.2.7.2 for details of this structure

SMFMAPDUSessionModification ::= SEQUENCE

{

 sUPI [1] SUPI OPTIONAL,

 sUPIUnauthenticated [2] SUPIUnauthenticatedIndication OPTIONAL,

 pEI [3] PEI OPTIONAL,

 gPSI [4] GPSI OPTIONAL,

 pDUSessionID [5] PDUSessionID,

 accessInfo [6] SEQUENCE OF AccessInfo OPTIONAL,

 sNSSAI [7] SNSSAI OPTIONAL,

 location [8] Location OPTIONAL,

 requestType [9] FiveGSMRequestType OPTIONAL,

 servingNetwork [10] SMFServingNetwork,

 oldPDUSessionID [11] PDUSessionID OPTIONAL,

 mAUpgradeIndication [12] SMFMAUpgradeIndication OPTIONAL,

 ePSPDNCnxInfo [13] SMFEPSPDNCnxInfo OPTIONAL,

 mAAcceptedIndication [14] SMFMAAcceptedIndication,

 aTSSSContainer [15] ATSSSContainer OPTIONAL

}

-- See clause 6.2.3.2.7.3 for details of this structure

SMFMAPDUSessionRelease ::= SEQUENCE

{

 sUPI [1] SUPI,

 pEI [2] PEI OPTIONAL,

 gPSI [3] GPSI OPTIONAL,

 pDUSessionID [4] PDUSessionID,

 timeOfFirstPacket [5] Timestamp OPTIONAL,

 timeOfLastPacket [6] Timestamp OPTIONAL,

 uplinkVolume [7] INTEGER OPTIONAL,

 downlinkVolume [8] INTEGER OPTIONAL,

 location [9] Location OPTIONAL,

 cause [10] SMFErrorCodes OPTIONAL

}

-- See clause 6.2.3.2.7.4 for details of this structure

SMFStartOfInterceptionWithEstablishedMAPDUSession ::= SEQUENCE

{

 sUPI [1] SUPI OPTIONAL,

 sUPIUnauthenticated [2] SUPIUnauthenticatedIndication OPTIONAL,

 pEI [3] PEI OPTIONAL,

 gPSI [4] GPSI OPTIONAL,

 pDUSessionID [5] PDUSessionID,

 pDUSessionType [6] PDUSessionType,

 accessInfo [7] SEQUENCE OF AccessInfo,

 sNSSAI [8] SNSSAI OPTIONAL,

 uEEndpoint [9] SEQUENCE OF UEEndpointAddress OPTIONAL,

 location [10] Location OPTIONAL,

 dNN [11] DNN,

 aMFID [12] AMFID OPTIONAL,

 hSMFURI [13] HSMFURI OPTIONAL,

 requestType [14] FiveGSMRequestType OPTIONAL,

 sMPDUDNRequest [15] SMPDUDNRequest OPTIONAL,

 servingNetwork [16] SMFServingNetwork,

 oldPDUSessionID [17] PDUSessionID OPTIONAL,

 mAUpgradeIndication [18] SMFMAUpgradeIndication OPTIONAL,

 ePSPDNCnxInfo [19] SMFEPSPDNCnxInfo OPTIONAL,

 mAAcceptedIndication [20] SMFMAAcceptedIndication,

 aTSSSContainer [21] ATSSSContainer OPTIONAL

}

-- See clause 6.2.3.2.7.5 for details of this structure

SMFMAUnsuccessfulProcedure ::= SEQUENCE

{

 failedProcedureType [1] SMFFailedProcedureType,

 failureCause [2] FiveGSMCause,

 requestedSlice [3] NSSAI OPTIONAL,

 initiator [4] Initiator,

 sUPI [5] SUPI OPTIONAL,

 sUPIUnauthenticated [6] SUPIUnauthenticatedIndication OPTIONAL,

 pEI [7] PEI OPTIONAL,

 gPSI [8] GPSI OPTIONAL,

 pDUSessionID [9] PDUSessionID OPTIONAL,

 accessInfo [10] SEQUENCE OF AccessInfo,

 uEEndpoint [11] SEQUENCE OF UEEndpointAddress OPTIONAL,

 location [12] Location OPTIONAL,

 dNN [13] DNN OPTIONAL,

 aMFID [14] AMFID OPTIONAL,

 hSMFURI [15] HSMFURI OPTIONAL,

 requestType [16] FiveGSMRequestType OPTIONAL,

 sMPDUDNRequest [17] SMPDUDNRequest OPTIONAL

}

-- =================

-- 5G SMF parameters

-- =================

SMFID ::= UTF8String

SMFFailedProcedureType ::= ENUMERATED

{

 pDUSessionEstablishment(1),

 pDUSessionModification(2),

 pDUSessionRelease(3)

}

SMFServingNetwork ::= SEQUENCE

{

 pLMNID [1] PLMNID,

 nID [2] NID OPTIONAL

}

AccessInfo ::= SEQUENCE

{

 accessType [1] AccessType,

 rATType [2] RATType OPTIONAL,

 gTPTunnelID [3] FTEID,

 non3GPPAccessEndpoint [4] UEEndpointAddress OPTIONAL,

 establishmentStatus [5] EstablishmentStatus,

 aNTypeToReactivate [6] AccessType OPTIONAL

}

-- see Clause 6.1.2 of TS 24.193[44] for the details of the ATSSS container contents.

ATSSSContainer ::= OCTET STRING

EstablishmentStatus ::= ENUMERATED

{

 established(0),

 released(1)

}

SMFMAUpgradeIndication ::= BOOLEAN

-- Given in YAML encoding as defined in clause 6.1.6.2.31 of TS 29.502[16]

SMFEPSPDNCnxInfo ::= UTF8String

SMFMAAcceptedIndication ::= BOOLEAN

-- see Clause 6.1.6.3.8 of TS 29.502[16] for the details of this structure.

SMFErrorCodes ::= UTF8String

-- see Clause 6.1.6.3.2 of TS 29.502[16] for details of this structure.

UEEPSPDNConnection ::= OCTET STRING

-- see Clause 6.1.6.3.6 of TS 29.502[16] for the details of this structure.

RequestIndication ::= ENUMERATED

{

 uEREQPDUSESMOD(0),

 uEREQPDUSESREL(1),

 pDUSESMOB(2),

 nWREQPDUSESAUTH(3),

 nWREQPDUSESMOD(4),

 nWREQPDUSESREL(5),

 eBIASSIGNMENTREQ(6),

 rELDUETO5GANREQUEST(7)

}

-- ==================

-- 5G UPF definitions

-- ==================

UPFCCPDU ::= OCTET STRING

-- See clause 6.2.3.8 for the details of this structure

ExtendedUPFCCPDU ::= SEQUENCE

{

 payload [1] UPFCCPDUPayload,

 qFI [2] QFI OPTIONAL

}

-- =================

-- 5G UPF parameters

-- =================

UPFCCPDUPayload ::= CHOICE

{

 uPFIPCC [1] OCTET STRING,

 uPFEthernetCC [2] OCTET STRING,

 uPFUnstructuredCC [3] OCTET STRING

}

QFI ::= INTEGER (0..63)

-- ==================

-- 5G UDM definitions

-- ==================

UDMServingSystemMessage ::= SEQUENCE

{

 sUPI [1] SUPI,

 pEI [2] PEI OPTIONAL,

 gPSI [3] GPSI OPTIONAL,

 gUAMI [4] GUAMI OPTIONAL,

 gUMMEI [5] GUMMEI OPTIONAL,

 pLMNID [6] PLMNID OPTIONAL,

 servingSystemMethod [7] UDMServingSystemMethod,

 serviceID [8] ServiceID OPTIONAL

}

UDMSubscriberRecordChangeMessage ::= SEQUENCE

{

 sUPI [1] SUPI OPTIONAL,

 pEI [2] PEI OPTIONAL,

 gPSI [3] GPSI OPTIONAL,

 oldPEI [4] PEI OPTIONAL,

 oldSUPI [5] SUPI OPTIONAL,

 oldGPSI [6] GPSI OPTIONAL,

 oldserviceID [7] ServiceID OPTIONAL,

 subscriberRecordChangeMethod [8] UDMSubscriberRecordChangeMethod,

 serviceID [9] ServiceID OPTIONAL

}

UDMCancelLocationMessage ::= SEQUENCE

{

 sUPI [1] SUPI,

 pEI [2] PEI OPTIONAL,

 gPSI [3] GPSI OPTIONAL,

 gUAMI [4] GUAMI OPTIONAL,

 pLMNID [5] PLMNID OPTIONAL,

 cancelLocationMethod [6] UDMCancelLocationMethod

}

-- =================

-- 5G UDM parameters

-- =================

UDMServingSystemMethod ::= ENUMERATED

{

 amf3GPPAccessRegistration(0),

 amfNon3GPPAccessRegistration(1),

 unknown(2)

}

UDMSubscriberRecordChangeMethod ::= ENUMERATED

{

 pEIChange(1),

 sUPIChange(2),

 gPSIChange(3),

 uEDeprovisioning(4),

 unknown(5),

 serviceIDChange(6)

}

UDMCancelLocationMethod ::= ENUMERATED

{

 aMF3GPPAccessDeregistration(1),

 aMFNon3GPPAccessDeregistration(2),

 uDMDeregistration(3),

 unknown(4)

}

ServiceID ::= SEQUENCE

{

 nSSAI [1] NSSAI OPTIONAL,

 cAGID [2] SEQUENCE OF CAGID OPTIONAL

}

CAGID ::= UTF8String

-- ===================

-- 5G SMSF definitions

-- ===================

-- See clause 6.2.5.3 for details of this structure

SMSMessage ::= SEQUENCE

{

 originatingSMSParty [1] SMSParty,

 terminatingSMSParty [2] SMSParty,

 direction [3] Direction,

 linkTransferStatus [4] SMSTransferStatus,

 otherMessage [5] SMSOtherMessageIndication OPTIONAL,

 location [6] Location OPTIONAL,

 peerNFAddress [7] SMSNFAddress OPTIONAL,

 peerNFType [8] SMSNFType OPTIONAL,

 sMSTPDUData [9] SMSTPDUData OPTIONAL,

 messageType [10] SMSMessageType OPTIONAL,

 rPMessageReference [11] SMSRPMessageReference OPTIONAL

}

SMSReport ::= SEQUENCE

{

 location [1] Location OPTIONAL,

 sMSTPDUData [2] SMSTPDUData,

 messageType [3] SMSMessageType,

 rPMessageReference [4] SMSRPMessageReference

}

-- ==================

-- 5G SMSF parameters

-- ==================

SMSAddress ::= OCTET STRING(SIZE(2..12))

SMSMessageType ::= ENUMERATED

{

 deliver(1),

 deliverReportAck(2),

 deliverReportError(3),

 statusReport(4),

 command(5),

 submit(6),

 submitReportAck(7),

 submitReportError(8),

 reserved(9)

}

SMSParty ::= SEQUENCE

{

 sUPI [1] SUPI OPTIONAL,

 pEI [2] PEI OPTIONAL,

 gPSI [3] GPSI OPTIONAL,

 sMSAddress [4] SMSAddress OPTIONAL

}

SMSTransferStatus ::= ENUMERATED

{

 transferSucceeded(1),

 transferFailed(2),

 undefined(3)

}

SMSOtherMessageIndication ::= BOOLEAN

SMSNFAddress ::= CHOICE

{

 iPAddress [1] IPAddress,

 e164Number [2] E164Number

}

SMSNFType ::= ENUMERATED

{

 sMSGMSC(1),

 iWMSC(2),

 sMSRouter(3)

}

SMSRPMessageReference ::= INTEGER (0..255)

SMSTPDUData ::= CHOICE

{

 sMSTPDU [1] SMSTPDU,

 truncatedSMSTPDU [2] TruncatedSMSTPDU

}

SMSTPDU ::= OCTET STRING (SIZE(1..270))

TruncatedSMSTPDU ::= OCTET STRING (SIZE(1..130))

-- ===============

-- MMS definitions

-- ===============

MMSSend ::= SEQUENCE

{

 transactionID [1] UTF8String,

 version [2] MMSVersion,

 dateTime [3] Timestamp,

 originatingMMSParty [4] MMSParty,

 terminatingMMSParty [5] SEQUENCE OF MMSParty OPTIONAL,

 cCRecipients [6] SEQUENCE OF MMSParty OPTIONAL,

 bCCRecipients [7] SEQUENCE OF MMSParty OPTIONAL,

 direction [8] MMSDirection,

 subject [9] MMSSubject OPTIONAL,

 messageClass [10] MMSMessageClass OPTIONAL,

 expiry [11] MMSExpiry,

 desiredDeliveryTime [12] Timestamp OPTIONAL,

 priority [13] MMSPriority OPTIONAL,

 senderVisibility [14] BOOLEAN OPTIONAL,

 deliveryReport [15] BOOLEAN OPTIONAL,

 readReport [16] BOOLEAN OPTIONAL,

 store [17] BOOLEAN OPTIONAL,

 state [18] MMState OPTIONAL,

 flags [19] MMFlags OPTIONAL,

 replyCharging [20] MMSReplyCharging OPTIONAL,

 applicID [21] UTF8String OPTIONAL,

 replyApplicID [22] UTF8String OPTIONAL,

 auxApplicInfo [23] UTF8String OPTIONAL,

 contentClass [24] MMSContentClass OPTIONAL,

 dRMContent [25] BOOLEAN OPTIONAL,

 adaptationAllowed [26] MMSAdaptation OPTIONAL,

 contentType [27] MMSContentType,

 responseStatus [28] MMSResponseStatus,

 responseStatusText [29] UTF8String OPTIONAL,

 messageID [30] UTF8String

}

MMSSendByNonLocalTarget ::= SEQUENCE

{

 version [1] MMSVersion,

 transactionID [2] UTF8String,

 messageID [3] UTF8String,

 terminatingMMSParty [4] SEQUENCE OF MMSParty,

 originatingMMSParty [5] MMSParty,

 direction [6] MMSDirection,

 contentType [7] MMSContentType,

 messageClass [8] MMSMessageClass OPTIONAL,

 dateTime [9] Timestamp,

 expiry [10] MMSExpiry OPTIONAL,

 deliveryReport [11] BOOLEAN OPTIONAL,

 priority [12] MMSPriority OPTIONAL,

 senderVisibility [13] BOOLEAN OPTIONAL,

 readReport [14] BOOLEAN OPTIONAL,

 subject [15] MMSSubject OPTIONAL,

 forwardCount [16] INTEGER OPTIONAL,

 previouslySentBy [17] MMSPreviouslySentBy OPTIONAL,

 prevSentByDateTime [18] Timestamp OPTIONAL,

 applicID [19] UTF8String OPTIONAL,

 replyApplicID [20] UTF8String OPTIONAL,

 auxApplicInfo [21] UTF8String OPTIONAL,

 contentClass [22] MMSContentClass OPTIONAL,

 dRMContent [23] BOOLEAN OPTIONAL,

 adaptationAllowed [24] MMSAdaptation OPTIONAL

}

MMSNotification ::= SEQUENCE

{

 transactionID [1] UTF8String,

 version [2] MMSVersion,

 originatingMMSParty [3] MMSParty OPTIONAL,

 direction [4] MMSDirection,

 subject [5] MMSSubject OPTIONAL,

 deliveryReportRequested [6] BOOLEAN OPTIONAL,

 stored [7] BOOLEAN OPTIONAL,

 messageClass [8] MMSMessageClass,

 priority [9] MMSPriority OPTIONAL,

 messageSize [10] INTEGER,

 expiry [11] MMSExpiry,

 replyCharging [12] MMSReplyCharging OPTIONAL

}

MMSSendToNonLocalTarget ::= SEQUENCE

{

 version [1] MMSVersion,

 transactionID [2] UTF8String,

 messageID [3] UTF8String,

 terminatingMMSParty [4] SEQUENCE OF MMSParty,

 originatingMMSParty [5] MMSParty,

 direction [6] MMSDirection,

 contentType [7] MMSContentType,

 messageClass [8] MMSMessageClass OPTIONAL,

 dateTime [9] Timestamp,

 expiry [10] MMSExpiry OPTIONAL,

 deliveryReport [11] BOOLEAN OPTIONAL,

 priority [12] MMSPriority OPTIONAL,

 senderVisibility [13] BOOLEAN OPTIONAL,

 readReport [14] BOOLEAN OPTIONAL,

 subject [15] MMSSubject OPTIONAL,

 forwardCount [16] INTEGER OPTIONAL,

 previouslySentBy [17] MMSPreviouslySentBy OPTIONAL,

 prevSentByDateTime [18] Timestamp OPTIONAL,

 applicID [19] UTF8String OPTIONAL,

 replyApplicID [20] UTF8String OPTIONAL,

 auxApplicInfo [21] UTF8String OPTIONAL,

 contentClass [22] MMSContentClass OPTIONAL,

 dRMContent [23] BOOLEAN OPTIONAL,

 adaptationAllowed [24] MMSAdaptation OPTIONAL

}

MMSNotificationResponse ::= SEQUENCE

{

 transactionID [1] UTF8String,

 version [2] MMSVersion,

 direction [3] MMSDirection,

 status [4] MMStatus,

 reportAllowed [5] BOOLEAN OPTIONAL

}

MMSRetrieval ::= SEQUENCE

{

 transactionID [1] UTF8String,

 version [2] MMSVersion,

 messageID [3] UTF8String,

 dateTime [4] Timestamp,

 originatingMMSParty [5] MMSParty OPTIONAL,

 previouslySentBy [6] MMSPreviouslySentBy OPTIONAL,

 prevSentByDateTime [7] Timestamp OPTIONAL,

 terminatingMMSParty [8] SEQUENCE OF MMSParty OPTIONAL,

 cCRecipients [9] SEQUENCE OF MMSParty OPTIONAL,

 direction [10] MMSDirection,

 subject [11] MMSSubject OPTIONAL,

 state [12] MMState OPTIONAL,

 flags [13] MMFlags OPTIONAL,

 messageClass [14] MMSMessageClass OPTIONAL,

 priority [15] MMSPriority,

 deliveryReport [16] BOOLEAN OPTIONAL,

 readReport [17] BOOLEAN OPTIONAL,

 replyCharging [18] MMSReplyCharging OPTIONAL,

 retrieveStatus [19] MMSRetrieveStatus OPTIONAL,

 retrieveStatusText [20] UTF8String OPTIONAL,

 applicID [21] UTF8String OPTIONAL,

 replyApplicID [22] UTF8String OPTIONAL,

 auxApplicInfo [23] UTF8String OPTIONAL,

 contentClass [24] MMSContentClass OPTIONAL,

 dRMContent [25] BOOLEAN OPTIONAL,

 replaceID [26] UTF8String OPTIONAL,

 contentType [27] UTF8String OPTIONAL

}

MMSDeliveryAck ::= SEQUENCE

{

 transactionID [1] UTF8String,

 version [2] MMSVersion,

 reportAllowed [3] BOOLEAN OPTIONAL,

 status [4] MMStatus,

 direction [5] MMSDirection

}

MMSForward ::= SEQUENCE

{

 transactionID [1] UTF8String,

 version [2] MMSVersion,

 dateTime [3] Timestamp OPTIONAL,

 originatingMMSParty [4] MMSParty,

 terminatingMMSParty [5] SEQUENCE OF MMSParty OPTIONAL,

 cCRecipients [6] SEQUENCE OF MMSParty OPTIONAL,

 bCCRecipients [7] SEQUENCE OF MMSParty OPTIONAL,

 direction [8] MMSDirection,

 expiry [9] MMSExpiry OPTIONAL,

 desiredDeliveryTime [10] Timestamp OPTIONAL,

 deliveryReportAllowed [11] BOOLEAN OPTIONAL,

 deliveryReport [12] BOOLEAN OPTIONAL,

 store [13] BOOLEAN OPTIONAL,

 state [14] MMState OPTIONAL,

 flags [15] MMFlags OPTIONAL,

 contentLocationReq [16] UTF8String,

 replyCharging [17] MMSReplyCharging OPTIONAL,

 responseStatus [18] MMSResponseStatus,

 responseStatusText [19] UTF8String OPTIONAL,

 messageID [20] UTF8String OPTIONAL,

 contentLocationConf [21] UTF8String OPTIONAL,

 storeStatus [22] MMSStoreStatus OPTIONAL,

 storeStatusText [23] UTF8String OPTIONAL

}

MMSDeleteFromRelay ::= SEQUENCE

{

 transactionID [1] UTF8String,

 version [2] MMSVersion,

 direction [3] MMSDirection,

 contentLocationReq [4] SEQUENCE OF UTF8String,

 contentLocationConf [5] SEQUENCE OF UTF8String,

 deleteResponseStatus [6] MMSDeleteResponseStatus,

 deleteResponseText [7] SEQUENCE OF UTF8String

}

MMSMBoxStore ::= SEQUENCE

{

 transactionID [1] UTF8String,

 version [2] MMSVersion,

 direction [3] MMSDirection,

 contentLocationReq [4] UTF8String,

 state [5] MMState OPTIONAL,

 flags [6] MMFlags OPTIONAL,

 contentLocationConf [7] UTF8String OPTIONAL,

 storeStatus [8] MMSStoreStatus,

 storeStatusText [9] UTF8String OPTIONAL

}

MMSMBoxUpload ::= SEQUENCE

{

 transactionID [1] UTF8String,

 version [2] MMSVersion,

 direction [3] MMSDirection,

 state [4] MMState OPTIONAL,

 flags [5] MMFlags OPTIONAL,

 contentType [6] UTF8String,

 contentLocation [7] UTF8String OPTIONAL,

 storeStatus [8] MMSStoreStatus,

 storeStatusText [9] UTF8String OPTIONAL,

 mMessages [10] SEQUENCE OF MMBoxDescription

}

MMSMBoxDelete ::= SEQUENCE

{

 transactionID [1] UTF8String,

 version [2] MMSVersion,

 direction [3] MMSDirection,

 contentLocationReq [4] SEQUENCE OF UTF8String,

 contentLocationConf [5] SEQUENCE OF UTF8String OPTIONAL,

 responseStatus [6] MMSDeleteResponseStatus,

 responseStatusText [7] UTF8String OPTIONAL

}

MMSDeliveryReport ::= SEQUENCE

{

 version [1] MMSVersion,

 messageID [2] UTF8String,

 terminatingMMSParty [3] SEQUENCE OF MMSParty,

 mMSDateTime [4] Timestamp,

 responseStatus [5] MMSResponseStatus,

 responseStatusText [6] UTF8String OPTIONAL,

 applicID [7] UTF8String OPTIONAL,

 replyApplicID [8] UTF8String OPTIONAL,

 auxApplicInfo [9] UTF8String OPTIONAL

}

MMSDeliveryReportNonLocalTarget ::= SEQUENCE

{

 version [1] MMSVersion,

 transactionID [2] UTF8String,

 messageID [3] UTF8String,

 terminatingMMSParty [4] SEQUENCE OF MMSParty,

 originatingMMSParty [5] MMSParty,

 direction [6] MMSDirection,

 mMSDateTime [7] Timestamp,

 forwardToOriginator [8] BOOLEAN OPTIONAL,

 status [9] MMStatus,

 statusExtension [10] MMStatusExtension,

 statusText [11] MMStatusText,

 applicID [12] UTF8String OPTIONAL,

 replyApplicID [13] UTF8String OPTIONAL,

 auxApplicInfo [14] UTF8String OPTIONAL

}

MMSReadReport ::= SEQUENCE

{

 version [1] MMSVersion,

 messageID [2] UTF8String,

 terminatingMMSParty [3] SEQUENCE OF MMSParty,

 originatingMMSParty [4] SEQUENCE OF MMSParty,

 direction [5] MMSDirection,

 mMSDateTime [6] Timestamp,

 readStatus [7] MMSReadStatus,

 applicID [8] UTF8String OPTIONAL,

 replyApplicID [9] UTF8String OPTIONAL,

 auxApplicInfo [10] UTF8String OPTIONAL

}

MMSReadReportNonLocalTarget ::= SEQUENCE

{

 version [1] MMSVersion,

 transactionID [2] UTF8String,

 terminatingMMSParty [3] SEQUENCE OF MMSParty,

 originatingMMSParty [4] SEQUENCE OF MMSParty,

 direction [5] MMSDirection,

 messageID [6] UTF8String,

 mMSDateTime [7] Timestamp,

 readStatus [8] MMSReadStatus,

 readStatusText [9] MMSReadStatusText OPTIONAL,

 applicID [10] UTF8String OPTIONAL,

 replyApplicID [11] UTF8String OPTIONAL,

 auxApplicInfo [12] UTF8String OPTIONAL

}

MMSCancel ::= SEQUENCE

{

 transactionID [1] UTF8String,

 version [2] MMSVersion,

 cancelID [3] UTF8String,

 direction [4] MMSDirection

}

MMSMBoxViewRequest ::= SEQUENCE

{

 transactionID [1] UTF8String,

 version [2] MMSVersion,

 contentLocation [3] UTF8String OPTIONAL,

 state [4] SEQUENCE OF MMState OPTIONAL,

 flags [5] SEQUENCE OF MMFlags OPTIONAL,

 start [6] INTEGER OPTIONAL,

 limit [7] INTEGER OPTIONAL,

 attributes [8] SEQUENCE OF UTF8String OPTIONAL,

 totals [9] INTEGER OPTIONAL,

 quotas [10] MMSQuota OPTIONAL

}

MMSMBoxViewResponse ::= SEQUENCE

{

 transactionID [1] UTF8String,

 version [2] MMSVersion,

 contentLocation [3] UTF8String OPTIONAL,

 state [4] SEQUENCE OF MMState OPTIONAL,

 flags [5] SEQUENCE OF MMFlags OPTIONAL,

 start [6] INTEGER OPTIONAL,

 limit [7] INTEGER OPTIONAL,

 attributes [8] SEQUENCE OF UTF8String OPTIONAL,

 mMSTotals [9] BOOLEAN OPTIONAL,

 mMSQuotas [10] BOOLEAN OPTIONAL,

 mMessages [11] SEQUENCE OF MMBoxDescription

}

MMBoxDescription ::= SEQUENCE

{

 contentLocation [1] UTF8String OPTIONAL,

 messageID [2] UTF8String OPTIONAL,

 state [3] MMState OPTIONAL,

 flags [4] SEQUENCE OF MMFlags OPTIONAL,

 dateTime [5] Timestamp OPTIONAL,

 originatingMMSParty [6] MMSParty OPTIONAL,

 terminatingMMSParty [7] SEQUENCE OF MMSParty OPTIONAL,

 cCRecipients [8] SEQUENCE OF MMSParty OPTIONAL,

 bCCRecipients [9] SEQUENCE OF MMSParty OPTIONAL,

 messageClass [10] MMSMessageClass OPTIONAL,

 subject [11] MMSSubject OPTIONAL,

 priority [12] MMSPriority OPTIONAL,

 deliveryTime [13] Timestamp OPTIONAL,

 readReport [14] BOOLEAN OPTIONAL,

 messageSize [15] INTEGER OPTIONAL,

 replyCharging [16] MMSReplyCharging OPTIONAL,

 previouslySentBy [17] MMSPreviouslySentBy OPTIONAL,

 previouslySentByDateTime [18] Timestamp OPTIONAL,

 contentType [19] UTF8String OPTIONAL

}

-- =========

-- MMS CCPDU

-- =========

MMSCCPDU ::= SEQUENCE

{

 version [1] MMSVersion,

 transactionID [2] UTF8String,

 mMSContent [3] OCTET STRING

}

-- ==============

-- MMS parameters

-- ==============

MMSAdaptation ::= SEQUENCE

{

 allowed [1] BOOLEAN,

 overriden [2] BOOLEAN

}

MMSCancelStatus ::= ENUMERATED

{

 cancelRequestSuccessfullyReceived(1),

 cancelRequestCorrupted(2)

}

MMSContentClass ::= ENUMERATED

{

 text(1),

 imageBasic(2),

 imageRich(3),

 videoBasic(4),

 videoRich(5),

 megaPixel(6),

 contentBasic(7),

 contentRich(8)

}

MMSContentType ::= UTF8String

MMSDeleteResponseStatus ::= ENUMERATED

{

 ok(1),

 errorUnspecified(2),

 errorServiceDenied(3),

 errorMessageFormatCorrupt(4),

 errorSendingAddressUnresolved(5),

 errorMessageNotFound(6),

 errorNetworkProblem(7),

 errorContentNotAccepted(8),

 errorUnsupportedMessage(9),

 errorTransientFailure(10),

 errorTransientSendingAddressUnresolved(11),

 errorTransientMessageNotFound(12),

 errorTransientNetworkProblem(13),

 errorTransientPartialSuccess(14),

 errorPermanentFailure(15),

 errorPermanentServiceDenied(16),

 errorPermanentMessageFormatCorrupt(17),

 errorPermanentSendingAddressUnresolved(18),

 errorPermanentMessageNotFound(19),

 errorPermanentContentNotAccepted(20),

 errorPermanentReplyChargingLimitationsNotMet(21),

 errorPermanentReplyChargingRequestNotAccepted(22),

 errorPermanentReplyChargingForwardingDenied(23),

 errorPermanentReplyChargingNotSupported(24),

 errorPermanentAddressHidingNotSupported(25),

 errorPermanentLackOfPrepaid(26)

}

MMSDirection ::= ENUMERATED

{

 fromTarget(0),

 toTarget(1)

}

MMSElementDescriptor ::= SEQUENCE

{

 reference [1] UTF8String,

 parameter [2] UTF8String OPTIONAL,

 value [3] UTF8String OPTIONAL

}

MMSExpiry ::= SEQUENCE

{

 expiryPeriod [1] INTEGER,

 periodFormat [2] MMSPeriodFormat

}

MMFlags ::= SEQUENCE

{

 length [1] INTEGER,

 flag [2] MMStateFlag,

 flagString [3] UTF8String

}

MMSMessageClass ::= ENUMERATED

{

 personal(1),

 advertisement(2),

 informational(3),

 auto(4)

}

MMSParty ::= SEQUENCE

{

 mMSPartyIDs [1] SEQUENCE OF MMSPartyID,

 nonLocalID [2] NonLocalID

}

MMSPartyID ::= CHOICE

{

 e164Number [1] E164Number,

 emailAddress [2] EmailAddress,

 iMSI [3] IMSI,

 iMPU [4] IMPU,

 iMPI [5] IMPI,

 sUPI [6] SUPI,

 gPSI [7] GPSI

}

MMSPeriodFormat ::= ENUMERATED

{

 absolute(1),

 relative(2)

}

MMSPreviouslySent ::= SEQUENCE

{

 previouslySentByParty [1] MMSParty,

 sequenceNumber [2] INTEGER,

 previousSendDateTime [3] Timestamp

}

MMSPreviouslySentBy ::= SEQUENCE OF MMSPreviouslySent

MMSPriority ::= ENUMERATED

{

 low(1),

 normal(2),

 high(3)

}

MMSQuota ::= SEQUENCE

{

 quota [1] INTEGER,

 quotaUnit [2] MMSQuotaUnit

}

MMSQuotaUnit ::= ENUMERATED

{

 numMessages(1),

 bytes(2)

}

MMSReadStatus ::= ENUMERATED

{

 read(1),

 deletedWithoutBeingRead(2)

}

MMSReadStatusText ::= UTF8String

MMSReplyCharging ::= ENUMERATED

{

 requested(0),

 requestedTextOnly(1),

 accepted(2),

 acceptedTextOnly(3)

}

MMSResponseStatus ::= ENUMERATED

{

 ok(1),

 errorUnspecified(2),

 errorServiceDenied(3),

 errorMessageFormatCorrupt(4),

 errorSendingAddressUnresolved(5),

 errorMessageNotFound(6),

 errorNetworkProblem(7),

 errorContentNotAccepted(8),

 errorUnsupportedMessage(9),

 errorTransientFailure(10),

 errorTransientSendingAddressUnresolved(11),

 errorTransientMessageNotFound(12),

 errorTransientNetworkProblem(13),

 errorTransientPartialSuccess(14),

 errorPermanentFailure(15),

 errorPermanentServiceDenied(16),

 errorPermanentMessageFormatCorrupt(17),

 errorPermanentSendingAddressUnresolved(18),

 errorPermanentMessageNotFound(19),

 errorPermanentContentNotAccepted(20),

 errorPermanentReplyChargingLimitationsNotMet(21),

 errorPermanentReplyChargingRequestNotAccepted(22),

 errorPermanentReplyChargingForwardingDenied(23),

 errorPermanentReplyChargingNotSupported(24),

 errorPermanentAddressHidingNotSupported(25),

 errorPermanentLackOfPrepaid(26)

}

MMSRetrieveStatus ::= ENUMERATED

{

 success(1),

 errorTransientFailure(2),

 errorTransientMessageNotFound(3),

 errorTransientNetworkProblem(4),

 errorPermanentFailure(5),

 errorPermanentServiceDenied(6),

 errorPermanentMessageNotFound(7),

 errorPermanentContentUnsupported(8)

}

MMSStoreStatus ::= ENUMERATED

{

 success(1),

 errorTransientFailure(2),

 errorTransientNetworkProblem(3),

 errorPermanentFailure(4),

 errorPermanentServiceDenied(5),

 errorPermanentMessageFormatCorrupt(6),

 errorPermanentMessageNotFound(7),

 errorMMBoxFull(8)

}

MMState ::= ENUMERATED

{

 draft(1),

 sent(2),

 new(3),

 retrieved(4),

 forwarded(5)

}

MMStateFlag ::= ENUMERATED

{

 add(1),

 remove(2),

 filter(3)

}

MMStatus ::= ENUMERATED

{

 expired(1),

 retrieved(2),

 rejected(3),

 deferred(4),

 unrecognized(5),

 indeterminate(6),

 forwarded(7),

 unreachable(8)

}

MMStatusExtension ::= ENUMERATED

{

 rejectionByMMSRecipient(0),

 rejectionByOtherRS(1)

}

MMStatusText ::= UTF8String

MMSSubject ::= UTF8String

MMSVersion ::= SEQUENCE

{

 majorVersion [1] INTEGER,

 minorVersion [2] INTEGER

}

-- ==================

-- 5G PTC definitions

-- ==================

PTCRegistration ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCServerURI [2] UTF8String,

 pTCRegistrationRequest [3] PTCRegistrationRequest,

 pTCRegistrationOutcome [4] PTCRegistrationOutcome

}

PTCSessionInitiation ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCDirection [2] Direction,

 pTCServerURI [3] UTF8String,

 pTCSessionInfo [4] PTCSessionInfo,

 pTCOriginatingID [5] PTCTargetInformation,

 pTCParticipants [6] SEQUENCE OF PTCTargetInformation OPTIONAL,

 pTCParticipantPresenceStatus [7] MultipleParticipantPresenceStatus OPTIONAL,

 location [8] Location OPTIONAL,

 pTCBearerCapability [9] UTF8String OPTIONAL,

 pTCHost [10] PTCTargetInformation OPTIONAL

}

PTCSessionAbandon ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCDirection [2] Direction,

 pTCSessionInfo [3] PTCSessionInfo,

 location [4] Location OPTIONAL,

 pTCAbandonCause [5] INTEGER

}

PTCSessionStart ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCDirection [2] Direction,

 pTCServerURI [3] UTF8String,

 pTCSessionInfo [4] PTCSessionInfo,

 pTCOriginatingID [5] PTCTargetInformation,

 pTCParticipants [6] SEQUENCE OF PTCTargetInformation OPTIONAL,

 pTCParticipantPresenceStatus [7] MultipleParticipantPresenceStatus OPTIONAL,

 location [8] Location OPTIONAL,

 pTCHost [9] PTCTargetInformation OPTIONAL,

 pTCBearerCapability [10] UTF8String OPTIONAL

}

PTCSessionEnd ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCDirection [2] Direction,

 pTCServerURI [3] UTF8String,

 pTCSessionInfo [4] PTCSessionInfo,

 pTCParticipants [5] SEQUENCE OF PTCTargetInformation OPTIONAL,

 location [6] Location OPTIONAL,

 pTCSessionEndCause [7] PTCSessionEndCause

}

PTCStartOfInterception ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCDirection [2] Direction,

 preEstSessionID [3] PTCSessionInfo OPTIONAL,

 pTCOriginatingID [4] PTCTargetInformation,

 pTCSessionInfo [5] PTCSessionInfo OPTIONAL,

 pTCHost [6] PTCTargetInformation OPTIONAL,

 pTCParticipants [7] SEQUENCE OF PTCTargetInformation OPTIONAL,

 pTCMediaStreamAvail [8] BOOLEAN OPTIONAL,

 pTCBearerCapability [9] UTF8String OPTIONAL

}

PTCPreEstablishedSession ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCServerURI [2] UTF8String,

 rTPSetting [3] RTPSetting,

 pTCMediaCapability [4] UTF8String,

 pTCPreEstSessionID [5] PTCSessionInfo,

 pTCPreEstStatus [6] PTCPreEstStatus,

 pTCMediaStreamAvail [7] BOOLEAN OPTIONAL,

 location [8] Location OPTIONAL,

 pTCFailureCode [9] PTCFailureCode OPTIONAL

}

PTCInstantPersonalAlert ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCIPAPartyID [2] PTCTargetInformation,

 pTCIPADirection [3] Direction

}

PTCPartyJoin ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCDirection [2] Direction,

 pTCSessionInfo [3] PTCSessionInfo,

 pTCParticipants [4] SEQUENCE OF PTCTargetInformation OPTIONAL,

 pTCParticipantPresenceStatus [5] MultipleParticipantPresenceStatus OPTIONAL,

 pTCMediaStreamAvail [6] BOOLEAN OPTIONAL,

 pTCBearerCapability [7] UTF8String OPTIONAL

}

PTCPartyDrop ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCDirection [2] Direction,

 pTCSessionInfo [3] PTCSessionInfo,

 pTCPartyDrop [4] PTCTargetInformation,

 pTCParticipantPresenceStatus [5] PTCParticipantPresenceStatus OPTIONAL

}

PTCPartyHold ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCDirection [2] Direction,

 pTCSessionInfo [3] PTCSessionInfo,

 pTCParticipants [4] SEQUENCE OF PTCTargetInformation OPTIONAL,

 pTCHoldID [5] SEQUENCE OF PTCTargetInformation,

 pTCHoldRetrieveInd [6] BOOLEAN

}

PTCMediaModification ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCDirection [2] Direction,

 pTCSessionInfo [3] PTCSessionInfo,

 pTCMediaStreamAvail [4] BOOLEAN OPTIONAL,

 pTCBearerCapability [5] UTF8String

}

PTCGroupAdvertisement ::=SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCDirection [2] Direction,

 pTCIDList [3] SEQUENCE OF PTCTargetInformation OPTIONAL,

 pTCGroupAuthRule [4] PTCGroupAuthRule OPTIONAL,

 pTCGroupAdSender [5] PTCTargetInformation,

 pTCGroupNickname [6] UTF8String OPTIONAL

}

PTCFloorControl ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCDirection [2] Direction,

 pTCSessioninfo [3] PTCSessionInfo,

 pTCFloorActivity [4] SEQUENCE OF PTCFloorActivity,

 pTCFloorSpeakerID [5] PTCTargetInformation OPTIONAL,

 pTCMaxTBTime [6] INTEGER OPTIONAL,

 pTCQueuedFloorControl [7] BOOLEAN OPTIONAL,

 pTCQueuedPosition [8] INTEGER OPTIONAL,

 pTCTalkBurstPriority [9] PTCTBPriorityLevel OPTIONAL,

 pTCTalkBurstReason [10] PTCTBReasonCode OPTIONAL

}

PTCTargetPresence ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCTargetPresenceStatus [2] PTCParticipantPresenceStatus

}

PTCParticipantPresence ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCParticipantPresenceStatus [2] PTCParticipantPresenceStatus

}

PTCListManagement ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCDirection [2] Direction,

 pTCListManagementType [3] PTCListManagementType OPTIONAL,

 pTCListManagementAction [4] PTCListManagementAction OPTIONAL,

 pTCListManagementFailure [5] PTCListManagementFailure OPTIONAL,

 pTCContactID [6] PTCTargetInformation OPTIONAL,

 pTCIDList [7] SEQUENCE OF PTCIDList OPTIONAL,

 pTCHost [8] PTCTargetInformation OPTIONAL

}

PTCAccessPolicy ::= SEQUENCE

{

 pTCTargetInformation [1] PTCTargetInformation,

 pTCDirection [2] Direction,

 pTCAccessPolicyType [3] PTCAccessPolicyType OPTIONAL,

 pTCUserAccessPolicy [4] PTCUserAccessPolicy OPTIONAL,

 pTCGroupAuthRule [5] PTCGroupAuthRule OPTIONAL,

 pTCContactID [6] PTCTargetInformation OPTIONAL,

 pTCAccessPolicyFailure [7] PTCAccessPolicyFailure OPTIONAL

}

-- =================

-- 5G PTC parameters

-- =================

PTCRegistrationRequest ::= ENUMERATED

{

 register(1),

 reRegister(2),

 deRegister(3)

}

PTCRegistrationOutcome ::= ENUMERATED

{

 success(1),

 failure(2)

}

PTCSessionEndCause ::= ENUMERATED

{

 initiaterLeavesSession(1),

 definedParticipantLeaves(2),

 numberOfParticipants(3),

 sessionTimerExpired(4),

 pTCSpeechInactive(5),

 allMediaTypesInactive(6)

}

PTCTargetInformation ::= SEQUENCE

{

 identifiers [1] SEQUENCE SIZE(1..MAX) OF PTCIdentifiers

}

PTCIdentifiers ::= CHOICE

{

 mCPTTID [1] UTF8String,

 instanceIdentifierURN [2] UTF8String,

 pTCChatGroupID [3] PTCChatGroupID,

 iMPU [4] IMPU,

 iMPI [5] IMPI

}

PTCSessionInfo ::= SEQUENCE

{

 pTCSessionURI [1] UTF8String,

 pTCSessionType [2] PTCSessionType

}

PTCSessionType ::= ENUMERATED

{

 ondemand(1),

 preEstablished(2),

 adhoc(3),

 prearranged(4),

 groupSession(5)

}

MultipleParticipantPresenceStatus ::= SEQUENCE OF PTCParticipantPresenceStatus

PTCParticipantPresenceStatus ::= SEQUENCE

{

 presenceID [1] PTCTargetInformation,

 presenceType [2] PTCPresenceType,

 presenceStatus [3] BOOLEAN

}

PTCPresenceType ::= ENUMERATED

{

 pTCClient(1),

 pTCGroup(2)

}

PTCPreEstStatus ::= ENUMERATED

{

 established(1),

 modified(2),

 released(3)

}

RTPSetting ::= SEQUENCE

{

 iPAddress [1] IPAddress,

 portNumber [2] PortNumber

}

PTCIDList ::= SEQUENCE

{

 pTCPartyID [1] PTCTargetInformation,

 pTCChatGroupID [2] PTCChatGroupID

}

PTCChatGroupID ::= SEQUENCE

{

 groupIdentity [1] UTF8String

}

PTCFloorActivity ::= ENUMERATED

{

 tBCPRequest(1),

 tBCPGranted(2),

 tBCPDeny(3),

 tBCPIdle(4),

 tBCPTaken(5),

 tBCPRevoke(6),

 tBCPQueued(7),

 tBCPRelease(8)

}

PTCTBPriorityLevel ::= ENUMERATED

{

 preEmptive(1),

 highPriority(2),

 normalPriority(3),

 listenOnly(4)

}

PTCTBReasonCode ::= ENUMERATED

{

 noQueuingAllowed(1),

 oneParticipantSession(2),

 listenOnly(3),

 exceededMaxDuration(4),

 tBPrevented(5)

}

PTCListManagementType ::= ENUMERATED

{

 contactListManagementAttempt(1),

 groupListManagementAttempt(2),

 contactListManagementResult(3),

 groupListManagementResult(4),

 requestUnsuccessful(5)

}

PTCListManagementAction ::= ENUMERATED

{

 create(1),

 modify(2),

 retrieve(3),

 delete(4),

 notify(5)

}

PTCAccessPolicyType ::= ENUMERATED

{

 pTCUserAccessPolicyAttempt(1),

 groupAuthorizationRulesAttempt(2),

 pTCUserAccessPolicyQuery(3),

 groupAuthorizationRulesQuery(4),

 pTCUserAccessPolicyResult(5),

 groupAuthorizationRulesResult(6),

 requestUnsuccessful(7)

}

PTCUserAccessPolicy ::= ENUMERATED

{

 allowIncomingPTCSessionRequest(1),

 blockIncomingPTCSessionRequest(2),

 allowAutoAnswerMode(3),

 allowOverrideManualAnswerMode(4)

}

PTCGroupAuthRule ::= ENUMERATED

{

 allowInitiatingPTCSession(1),

 blockInitiatingPTCSession(2),

 allowJoiningPTCSession(3),

 blockJoiningPTCSession(4),

 allowAddParticipants(5),

 blockAddParticipants(6),

 allowSubscriptionPTCSessionState(7),

 blockSubscriptionPTCSessionState(8),

 allowAnonymity(9),

 forbidAnonymity(10)

}

PTCFailureCode ::= ENUMERATED

{

 sessionCannotBeEstablished(1),

 sessionCannotBeModified(2)

}

PTCListManagementFailure ::= ENUMERATED

{

 requestUnsuccessful(1),

 requestUnknown(2)

}

PTCAccessPolicyFailure ::= ENUMERATED

{

 requestUnsuccessful(1),

 requestUnknown(2)

}

-- ===================

-- 5G LALS definitions

-- ===================

LALSReport ::= SEQUENCE

{

 sUPI [1] SUPI OPTIONAL,

 pEI [2] PEI OPTIONAL,

 gPSI [3] GPSI OPTIONAL,

 location [4] Location OPTIONAL

}

-- =====================

-- PDHR/PDSR definitions

-- =====================

PDHeaderReport ::= SEQUENCE

{

 pDUSessionID [1] PDUSessionID,

 sourceIPAddress [2] IPAddress,

 sourcePort [3] PortNumber OPTIONAL,

 destinationIPAddress [4] IPAddress,

 destinationPort [5] PortNumber OPTIONAL,

 nextLayerProtocol [6] NextLayerProtocol,

 iPv6flowLabel [7] IPv6FlowLabel OPTIONAL,

 direction [8] Direction,

 packetSize [9] INTEGER

}

PDSummaryReport ::= SEQUENCE

{

 pDUSessionID [1] PDUSessionID,

 sourceIPAddress [2] IPAddress,

 sourcePort [3] PortNumber OPTIONAL,

 destinationIPAddress [4] IPAddress,

 destinationPort [5] PortNumber OPTIONAL,

 nextLayerProtocol [6] NextLayerProtocol,

 iPv6flowLabel [7] IPv6FlowLabel OPTIONAL,

 direction [8] Direction,

 pDSRSummaryTrigger [9] PDSRSummaryTrigger,

 firstPacketTimestamp [10] Timestamp,

 lastPacketTimestamp [11] Timestamp,

 packetCount [12] INTEGER,

 byteCount [13] INTEGER

}

-- ====================

-- PDHR/PDSR parameters

-- ====================

PDSRSummaryTrigger ::= ENUMERATED

{

 timerExpiry(1),

 packetCount(2),

 byteCount(3),

 startOfFlow(4),

 endOfFlow(5)

}

-- ==================================

-- Identifier Association definitions

-- ==================================

AMFIdentifierAssocation ::= SEQUENCE

{

 sUPI [1] SUPI,

 sUCI [2] SUCI OPTIONAL,

 pEI [3] PEI OPTIONAL,

 gPSI [4] GPSI OPTIONAL,

 gUTI [5] FiveGGUTI,

 location [6] Location,

 fiveGSTAIList [7] TAIList OPTIONAL

}

MMEIdentifierAssocation ::= SEQUENCE

{

 iMSI [1] IMSI,

 iMEI [2] IMEI OPTIONAL,

 mSISDN [3] MSISDN OPTIONAL,

 gUTI [4] GUTI,

 location [5] Location,

 tAIList [6] TAIList OPTIONAL

}

-- =================================

-- Identifier Association parameters

-- =================================

GUTI ::= SEQUENCE

{

 mCC [1] MCC,

 mNC [2] MNC,

 mMEGroupID [3] MMEGroupID,

 mMECode [4] MMECode,

 mTMSI [5] TMSI

}

MMEGroupID ::= OCTET STRING (SIZE(2))

MMECode ::= OCTET STRING (SIZE(1))

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

-- ===========================

-- LI Notification definitions

-- ===========================

LINotification ::= SEQUENCE

{

 notificationType [1] LINotificationType,

 appliedTargetID [2] TargetIdentifier OPTIONAL,

 appliedDeliveryInformation [3] SEQUENCE OF LIAppliedDeliveryInformation OPTIONAL,

 appliedStartTime [4] Timestamp OPTIONAL,

 appliedEndTime [5] Timestamp OPTIONAL

}

-- ==========================

-- LI Notification parameters

-- ==========================

LINotificationType ::= ENUMERATED

{

 activation(1),

 deactivation(2),

 modification(3)

}

LIAppliedDeliveryInformation ::= SEQUENCE

{

 hI2DeliveryIPAddress [1] IPAddress OPTIONAL,

 hI2DeliveryPortNumber [2] PortNumber OPTIONAL,

 hI3DeliveryIPAddress [3] IPAddress OPTIONAL,

 hI3DeliveryPortNumber [4] PortNumber OPTIONAL

}

-- ===============

-- MDF definitions

-- ===============

MDFCellSiteReport ::= SEQUENCE OF CellInformation

-- =================

-- Common Parameters

-- =================

AccessType ::= ENUMERATED

{

 threeGPPAccess(1),

 nonThreeGPPAccess(2),

 threeGPPandNonThreeGPPAccess(3)

}

Direction ::= ENUMERATED

{

 fromTarget(1),

 toTarget(2)

}

DNN ::= UTF8String

E164Number ::= NumericString (SIZE(1..15))

EmailAddress ::= UTF8String

FiveGGUTI ::= SEQUENCE

{

 mCC [1] MCC,

 mNC [2] MNC,

 aMFRegionID [3] AMFRegionID,

 aMFSetID [4] AMFSetID,

 aMFPointer [5] AMFPointer,

 fiveGTMSI [6] FiveGTMSI

}

FiveGMMCause ::= INTEGER (0..255)

FiveGSMRequestType ::= ENUMERATED

{

 initialRequest(1),

 existingPDUSession(2),

 initialEmergencyRequest(3),

 existingEmergencyPDUSession(4),

 modificationRequest(5),

 reserved(6),

 mAPDURequest(7)

}

FiveGSMCause ::= INTEGER (0..255)

FiveGTMSI ::= INTEGER (0..4294967295)

FTEID ::= SEQUENCE

{

 tEID [1] INTEGER (0.. 4294967295),

 iPv4Address [2] IPv4Address OPTIONAL,

 iPv6Address [3] IPv6Address OPTIONAL

}

GPSI ::= CHOICE

{

 mSISDN [1] MSISDN,

 nAI [2] NAI

}

GUAMI ::= SEQUENCE

{

 aMFID [1] AMFID,

 pLMNID [2] PLMNID

}

GUMMEI ::= SEQUENCE

{

 mMEID [1] MMEID,

 mCC [2] MCC,

 mNC [3] MNC

}

HomeNetworkPublicKeyID ::= OCTET STRING

HSMFURI ::= UTF8String

IMEI ::= NumericString (SIZE(14))

IMEISV ::= NumericString (SIZE(16))

IMPI ::= NAI

IMPU ::= CHOICE

{

 sIPURI [1] SIPURI,

 tELURI [2] TELURI

}

IMSI ::= NumericString (SIZE(6..15))

Initiator ::= ENUMERATED

{

 uE(1),

 network(2),

 unknown(3)

}

IPAddress ::= CHOICE

{

 iPv4Address [1] IPv4Address,

 iPv6Address [2] IPv6Address

}

IPv4Address ::= OCTET STRING (SIZE(4))

IPv6Address ::= OCTET STRING (SIZE(16))

IPv6FlowLabel ::= INTEGER(0..1048575)

MACAddress ::= OCTET STRING (SIZE(6))

MCC ::= NumericString (SIZE(3))

MNC ::= NumericString (SIZE(2..3))

MMEID ::= SEQUENCE

{

 mMEGI [1] MMEGI,

 mMEC [2] MMEC

}

MMEC ::= NumericString

MMEGI ::= NumericString

MSISDN ::= NumericString (SIZE(1..15))

NAI ::= UTF8String

NextLayerProtocol ::= INTEGER(0..255)

NonLocalID ::= ENUMERATED

{

 local(1),

 nonLocal(2)

}

NSSAI ::= SEQUENCE OF SNSSAI

PLMNID ::= SEQUENCE

{

 mCC [1] MCC,

 mNC [2] MNC

}

PDUSessionID ::= INTEGER (0..255)

PDUSessionType ::= ENUMERATED

{

 iPv4(1),

 iPv6(2),

 iPv4v6(3),

 unstructured(4),

 ethernet(5)

}

PEI ::= CHOICE

{

 iMEI [1] IMEI,

 iMEISV [2] IMEISV

}

PortNumber ::= INTEGER(0..65535)

ProtectionSchemeID ::= INTEGER (0..15)

RATType ::= ENUMERATED

{

 nR(1),

 eUTRA(2),

 wLAN(3),

 virtual(4),

 nBIOT(5),

 wireline(6),

 wirelineCable(7),

 wirelineBBF(8),

 lTEM(9),

 nRU(10),

 eUTRAU(11),

 trustedN3GA(12),

 trustedWLAN(13),

 uTRA(14),

 gERA(15)

}

RejectedNSSAI ::= SEQUENCE OF RejectedSNSSAI

RejectedSNSSAI ::= SEQUENCE

{

 causeValue [1] RejectedSliceCauseValue,

 sNSSAI [2] SNSSAI

}

RejectedSliceCauseValue ::= INTEGER (0..255)

RoutingIndicator ::= INTEGER (0..9999)

SchemeOutput ::= OCTET STRING

SIPURI ::= UTF8String

Slice ::= SEQUENCE

{

 allowedNSSAI [1] NSSAI OPTIONAL,

 configuredNSSAI [2] NSSAI OPTIONAL,

 rejectedNSSAI [3] RejectedNSSAI OPTIONAL

}

SMPDUDNRequest ::= OCTET STRING

SNSSAI ::= SEQUENCE

{

 sliceServiceType [1] INTEGER (0..255),

 sliceDifferentiator [2] OCTET STRING (SIZE(3)) OPTIONAL

}

SUCI ::= SEQUENCE

{

 mCC [1] MCC,

 mNC [2] MNC,

 routingIndicator [3] RoutingIndicator,

 protectionSchemeID [4] ProtectionSchemeID,

 homeNetworkPublicKeyID [5] HomeNetworkPublicKeyID,

 schemeOutput [6] SchemeOutput

}

SUPI ::= CHOICE

{

 iMSI [1] IMSI,

 nAI [2] NAI

}

SUPIUnauthenticatedIndication ::= BOOLEAN

TargetIdentifier ::= CHOICE

{

 sUPI [1] SUPI,

 iMSI [2] IMSI,

 pEI [3] PEI,

 iMEI [4] IMEI,

 gPSI [5] GPSI,

 mSISDN [6] MSISDN,

 nAI [7] NAI,

 iPv4Address [8] IPv4Address,

 iPv6Address [9] IPv6Address,

 ethernetAddress [10] MACAddress

}

TargetIdentifierProvenance ::= ENUMERATED

{

 lEAProvided(1),

 observed(2),

 matchedOn(3),

 other(4)

}

TELURI ::= UTF8String

Timestamp ::= GeneralizedTime

UEEndpointAddress ::= CHOICE

{

 iPv4Address [1] IPv4Address,

 iPv6Address [2] IPv6Address,

 ethernetAddress [3] MACAddress

}

-- ===================

-- Location parameters

-- ===================

Location ::= SEQUENCE

{

 locationInfo [1] LocationInfo OPTIONAL,

 positioningInfo [2] PositioningInfo OPTIONAL,

 locationPresenceReport [3] LocationPresenceReport OPTIONAL

}

CellSiteInformation ::= SEQUENCE

{

 geographicalCoordinates [1] GeographicalCoordinates,

 azimuth [2] INTEGER (0..359) OPTIONAL,

 operatorSpecificInformation [3] UTF8String OPTIONAL

}

-- TS 29.518 [22], clause 6.4.6.2.6

LocationInfo ::= SEQUENCE

{

 userLocation [1] UserLocation OPTIONAL,

 currentLoc [2] BOOLEAN OPTIONAL,

 geoInfo [3] GeographicArea OPTIONAL,

 rATType [4] RATType OPTIONAL,

 timeZone [5] TimeZone OPTIONAL,

 additionalCellIDs [6] SEQUENCE OF CellInformation OPTIONAL

}

-- TS 29.571 [17], clause 5.4.4.7

UserLocation ::= SEQUENCE

{

 eUTRALocation [1] EUTRALocation OPTIONAL,

 nRLocation [2] NRLocation OPTIONAL,

 n3GALocation [3] N3GALocation OPTIONAL

}

-- TS 29.571 [17], clause 5.4.4.8

EUTRALocation ::= SEQUENCE

{

 tAI [1] TAI,

 eCGI [2] ECGI,

 ageOfLocatonInfo [3] INTEGER OPTIONAL,

 uELocationTimestamp [4] Timestamp OPTIONAL,

 geographicalInformation [5] UTF8String OPTIONAL,

 geodeticInformation [6] UTF8String OPTIONAL,

 globalNGENbID [7] GlobalRANNodeID OPTIONAL,

 cellSiteInformation [8] CellSiteInformation OPTIONAL,

 globalENbID [9] GlobalRANNodeID OPTIONAL

}

-- TS 29.571 [17], clause 5.4.4.9

NRLocation ::= SEQUENCE

{

 tAI [1] TAI,

 nCGI [2] NCGI,

 ageOfLocatonInfo [3] INTEGER OPTIONAL,

 uELocationTimestamp [4] Timestamp OPTIONAL,

 geographicalInformation [5] UTF8String OPTIONAL,

 geodeticInformation [6] UTF8String OPTIONAL,

 globalGNbID [7] GlobalRANNodeID OPTIONAL,

 cellSiteInformation [8] CellSiteInformation OPTIONAL

}

-- TS 29.571 [17], clause 5.4.4.10

N3GALocation ::= SEQUENCE

{

 tAI [1] TAI OPTIONAL,

 n3IWFID [2] N3IWFIDNGAP OPTIONAL,

 uEIPAddr [3] IPAddr OPTIONAL,

 portNumber [4] INTEGER OPTIONAL

}

-- TS 38.413 [23], clause 9.3.2.4

IPAddr ::= SEQUENCE

{

 iPv4Addr [1] IPv4Address OPTIONAL,

 iPv6Addr [2] IPv6Address OPTIONAL

}

-- TS 29.571 [17], clause 5.4.4.28

GlobalRANNodeID ::= SEQUENCE

{

 pLMNID [1] PLMNID,

 aNNodeID [2] ANNodeID,

 nID [3] NID OPTIONAL

}

ANNodeID ::= CHOICE

{

 n3IWFID [1] N3IWFIDSBI,

 gNbID [2] GNbID,

 nGENbID [3] NGENbID,

 eNbID [4] ENbID

}

-- TS 38.413 [23], clause 9.3.1.6

GNbID ::= BIT STRING(SIZE(22..32))

-- TS 29.571 [17], clause 5.4.4.4

TAI ::= SEQUENCE

{

 pLMNID [1] PLMNID,

 tAC [2] TAC,

 nID [3] NID OPTIONAL

}

-- TS 29.571 [17], clause 5.4.4.5

ECGI ::= SEQUENCE

{

 pLMNID [1] PLMNID,

 eUTRACellID [2] EUTRACellID,

 nID [3] NID OPTIONAL

}

TAIList ::= SEQUENCE OF TAI

-- TS 29.571 [17], clause 5.4.4.6

NCGI ::= SEQUENCE

{

 pLMNID [1] PLMNID,

 nRCellID [2] NRCellID,

 nID [3] NID OPTIONAL

}

RANCGI ::= CHOICE

{

 eCGI [1] ECGI,

 nCGI [2] NCGI

}

CellInformation ::= SEQUENCE

{

 rANCGI [1] RANCGI,

 cellSiteinformation [2] CellSiteInformation OPTIONAL,

 timeOfLocation [3] Timestamp OPTIONAL

}

-- TS 38.413 [23], clause 9.3.1.57

N3IWFIDNGAP ::= BIT STRING (SIZE(16))

-- TS 29.571 [17], clause 5.4.4.28

N3IWFIDSBI ::= UTF8String

-- TS 29.571 [17], table 5.4.2-1

TAC ::= OCTET STRING (SIZE(2..3))

-- TS 38.413 [23], clause 9.3.1.9

EUTRACellID ::= BIT STRING (SIZE(28))

-- TS 38.413 [23], clause 9.3.1.7

NRCellID ::= BIT STRING (SIZE(36))

-- TS 38.413 [23], clause 9.3.1.8

NGENbID ::= CHOICE

{

 macroNGENbID [1] BIT STRING (SIZE(20)),

 shortMacroNGENbID [2] BIT STRING (SIZE(18)),

 longMacroNGENbID [3] BIT STRING (SIZE(21))

}

-- TS 23.003 [19], clause 12.7.1 encoded as per TS 29.571 [17], clause 5.4.2

NID ::= UTF8String (SIZE(11))

-- TS 36.413 [38], clause 9.2.1.37

ENbID ::= CHOICE

{

 macroENbID [1] BIT STRING (SIZE(20)),

 homeENbID [2] BIT STRING (SIZE(28)),

 shortMacroENbID [3] BIT STRING (SIZE(18)),

 longMacroENbID [4] BIT STRING (SIZE(21))

}

-- TS 29.518 [22], clause 6.4.6.2.3

PositioningInfo ::= SEQUENCE

{

 positionInfo [1] LocationData OPTIONAL,

 rawMLPResponse [2] RawMLPResponse OPTIONAL

}

RawMLPResponse ::= CHOICE

{

 -- The following parameter contains a copy of unparsed XML code of the

 -- MLP response message, i.e. the entire XML document containing

 -- a <slia> (described in OMA-TS-MLP-V3\_5-20181211-C [20], clause 5.2.3.2.2) or

 -- a <slirep> (described in OMA-TS-MLP-V3\_5-20181211-C [20], clause 5.2.3.2.3) MLP message.

 mLPPositionData [1] UTF8String,

 -- OMA MLP result id, defined in OMA-TS-MLP-V3\_5-20181211-C [20], Clause 5.4

 mLPErrorCode [2] INTEGER (1..699)

}

-- TS 29.572 [24], clause 6.1.6.2.3

LocationData ::= SEQUENCE

{

 locationEstimate [1] GeographicArea,

 accuracyFulfilmentIndicator [2] AccuracyFulfilmentIndicator OPTIONAL,

 ageOfLocationEstimate [3] AgeOfLocationEstimate OPTIONAL,

 velocityEstimate [4] VelocityEstimate OPTIONAL,

 civicAddress [5] CivicAddress OPTIONAL,

 positioningDataList [6] SET OF PositioningMethodAndUsage OPTIONAL,

 gNSSPositioningDataList [7] SET OF GNSSPositioningMethodAndUsage OPTIONAL,

 eCGI [8] ECGI OPTIONAL,

 nCGI [9] NCGI OPTIONAL,

 altitude [10] Altitude OPTIONAL,

 barometricPressure [11] BarometricPressure OPTIONAL

}

-- TS 29.518 [22], clause 6.2.6.2.5

LocationPresenceReport ::= SEQUENCE

{

 type [1] AMFEventType,

 timestamp [2] Timestamp,

 areaList [3] SET OF AMFEventArea OPTIONAL,

 timeZone [4] TimeZone OPTIONAL,

 accessTypes [5] SET OF AccessType OPTIONAL,

 rMInfoList [6] SET OF RMInfo OPTIONAL,

 cMInfoList [7] SET OF CMInfo OPTIONAL,

 reachability [8] UEReachability OPTIONAL,

 location [9] UserLocation OPTIONAL,

 additionalCellIDs [10] SEQUENCE OF CellInformation OPTIONAL

}

-- TS 29.518 [22], clause 6.2.6.3.3

AMFEventType ::= ENUMERATED

{

 locationReport(1),

 presenceInAOIReport(2)

}

-- TS 29.518 [22], clause 6.2.6.2.16

AMFEventArea ::= SEQUENCE

{

 presenceInfo [1] PresenceInfo OPTIONAL,

 lADNInfo [2] LADNInfo OPTIONAL

}

-- TS 29.571 [17], clause 5.4.4.27

PresenceInfo ::= SEQUENCE

{

 presenceState [1] PresenceState OPTIONAL,

 trackingAreaList [2] SET OF TAI OPTIONAL,

 eCGIList [3] SET OF ECGI OPTIONAL,

 nCGIList [4] SET OF NCGI OPTIONAL,

 globalRANNodeIDList [5] SET OF GlobalRANNodeID OPTIONAL,

 globalENbIDList [6] SET OF GlobalRANNodeID OPTIONAL

}

-- TS 29.518 [22], clause 6.2.6.2.17

LADNInfo ::= SEQUENCE

{

 lADN [1] UTF8String,

 presence [2] PresenceState OPTIONAL

}

-- TS 29.571 [17], clause 5.4.3.20

PresenceState ::= ENUMERATED

{

 inArea(1),

 outOfArea(2),

 unknown(3),

 inactive(4)

}

-- TS 29.518 [22], clause 6.2.6.2.8

RMInfo ::= SEQUENCE

{

 rMState [1] RMState,

 accessType [2] AccessType

}

-- TS 29.518 [22], clause 6.2.6.2.9

CMInfo ::= SEQUENCE

{

 cMState [1] CMState,

 accessType [2] AccessType

}

-- TS 29.518 [22], clause 6.2.6.3.7

UEReachability ::= ENUMERATED

{

 unreachable(1),

 reachable(2),

 regulatoryOnly(3)

}

-- TS 29.518 [22], clause 6.2.6.3.9

RMState ::= ENUMERATED

{

 registered(1),

 deregistered(2)

}

-- TS 29.518 [22], clause 6.2.6.3.10

CMState ::= ENUMERATED

{

 idle(1),

 connected(2)

}

-- TS 29.572 [24], clause 6.1.6.2.5

GeographicArea ::= CHOICE

{

 point [1] Point,

 pointUncertaintyCircle [2] PointUncertaintyCircle,

 pointUncertaintyEllipse [3] PointUncertaintyEllipse,

 polygon [4] Polygon,

 pointAltitude [5] PointAltitude,

 pointAltitudeUncertainty [6] PointAltitudeUncertainty,

 ellipsoidArc [7] EllipsoidArc

}

-- TS 29.572 [24], clause 6.1.6.3.12

AccuracyFulfilmentIndicator ::= ENUMERATED

{

 requestedAccuracyFulfilled(1),

 requestedAccuracyNotFulfilled(2)

}

-- TS 29.572 [24], clause 6.1.6.2.17

VelocityEstimate ::= CHOICE

{

 horVelocity [1] HorizontalVelocity,

 horWithVertVelocity [2] HorizontalWithVerticalVelocity,

 horVelocityWithUncertainty [3] HorizontalVelocityWithUncertainty,

 horWithVertVelocityAndUncertainty [4] HorizontalWithVerticalVelocityAndUncertainty

}

-- TS 29.572 [24], clause 6.1.6.2.14

CivicAddress ::= SEQUENCE

{

 country [1] UTF8String,

 a1 [2] UTF8String OPTIONAL,

 a2 [3] UTF8String OPTIONAL,

 a3 [4] UTF8String OPTIONAL,

 a4 [5] UTF8String OPTIONAL,

 a5 [6] UTF8String OPTIONAL,

 a6 [7] UTF8String OPTIONAL,

 prd [8] UTF8String OPTIONAL,

 pod [9] UTF8String OPTIONAL,

 sts [10] UTF8String OPTIONAL,

 hno [11] UTF8String OPTIONAL,

 hns [12] UTF8String OPTIONAL,

 lmk [13] UTF8String OPTIONAL,

 loc [14] UTF8String OPTIONAL,

 nam [15] UTF8String OPTIONAL,

 pc [16] UTF8String OPTIONAL,

 bld [17] UTF8String OPTIONAL,

 unit [18] UTF8String OPTIONAL,

 flr [19] UTF8String OPTIONAL,

 room [20] UTF8String OPTIONAL,

 plc [21] UTF8String OPTIONAL,

 pcn [22] UTF8String OPTIONAL,

 pobox [23] UTF8String OPTIONAL,

 addcode [24] UTF8String OPTIONAL,

 seat [25] UTF8String OPTIONAL,

 rd [26] UTF8String OPTIONAL,

 rdsec [27] UTF8String OPTIONAL,

 rdbr [28] UTF8String OPTIONAL,

 rdsubbr [29] UTF8String OPTIONAL,

 prm [30] UTF8String OPTIONAL,

 pom [31] UTF8String OPTIONAL

}

-- TS 29.572 [24], clause 6.1.6.2.15

PositioningMethodAndUsage ::= SEQUENCE

{

 method [1] PositioningMethod,

 mode [2] PositioningMode,

 usage [3] Usage,

 methodCode [4] MethodCode OPTIONAL

}

-- TS 29.572 [24], clause 6.1.6.2.16

GNSSPositioningMethodAndUsage ::= SEQUENCE

{

 mode [1] PositioningMode,

 gNSS [2] GNSSID,

 usage [3] Usage

}

-- TS 29.572 [24], clause 6.1.6.2.6

Point ::= SEQUENCE

{

 geographicalCoordinates [1] GeographicalCoordinates

}

-- TS 29.572 [24], clause 6.1.6.2.7

PointUncertaintyCircle ::= SEQUENCE

{

 geographicalCoordinates [1] GeographicalCoordinates,

 uncertainty [2] Uncertainty

}

-- TS 29.572 [24], clause 6.1.6.2.8

PointUncertaintyEllipse ::= SEQUENCE

{

 geographicalCoordinates [1] GeographicalCoordinates,

 uncertainty [2] UncertaintyEllipse,

 confidence [3] Confidence

}

-- TS 29.572 [24], clause 6.1.6.2.9

Polygon ::= SEQUENCE

{

 pointList [1] SET SIZE (3..15) OF GeographicalCoordinates

}

-- TS 29.572 [24], clause 6.1.6.2.10

PointAltitude ::= SEQUENCE

{

 point [1] GeographicalCoordinates,

 altitude [2] Altitude

}

-- TS 29.572 [24], clause 6.1.6.2.11

PointAltitudeUncertainty ::= SEQUENCE

{

 point [1] GeographicalCoordinates,

 altitude [2] Altitude,

 uncertaintyEllipse [3] UncertaintyEllipse,

 uncertaintyAltitude [4] Uncertainty,

 confidence [5] Confidence

}

-- TS 29.572 [24], clause 6.1.6.2.12

EllipsoidArc ::= SEQUENCE

{

 point [1] GeographicalCoordinates,

 innerRadius [2] InnerRadius,

 uncertaintyRadius [3] Uncertainty,

 offsetAngle [4] Angle,

 includedAngle [5] Angle,

 confidence [6] Confidence

}

-- TS 29.572 [24], clause 6.1.6.2.4

GeographicalCoordinates ::= SEQUENCE

{

 latitude [1] UTF8String,

 longitude [2] UTF8String,

 mapDatumInformation [3] OGCURN OPTIONAL

}

-- TS 29.572 [24], clause 6.1.6.2.22

UncertaintyEllipse ::= SEQUENCE

{

 semiMajor [1] Uncertainty,

 semiMinor [2] Uncertainty,

 orientationMajor [3] Orientation

}

-- TS 29.572 [24], clause 6.1.6.2.18

HorizontalVelocity ::= SEQUENCE

{

 hSpeed [1] HorizontalSpeed,

 bearing [2] Angle

}

-- TS 29.572 [24], clause 6.1.6.2.19

HorizontalWithVerticalVelocity ::= SEQUENCE

{

 hSpeed [1] HorizontalSpeed,

 bearing [2] Angle,

 vSpeed [3] VerticalSpeed,

 vDirection [4] VerticalDirection

}

-- TS 29.572 [24], clause 6.1.6.2.20

HorizontalVelocityWithUncertainty ::= SEQUENCE

{

 hSpeed [1] HorizontalSpeed,

 bearing [2] Angle,

 uncertainty [3] SpeedUncertainty

}

-- TS 29.572 [24], clause 6.1.6.2.21

HorizontalWithVerticalVelocityAndUncertainty ::= SEQUENCE

{

 hspeed [1] HorizontalSpeed,

 bearing [2] Angle,

 vSpeed [3] VerticalSpeed,

 vDirection [4] VerticalDirection,

 hUncertainty [5] SpeedUncertainty,

 vUncertainty [6] SpeedUncertainty

}

-- The following types are described in TS 29.572 [24], table 6.1.6.3.2-1

Altitude ::= UTF8String

Angle ::= INTEGER (0..360)

Uncertainty ::= INTEGER (0..127)

Orientation ::= INTEGER (0..180)

Confidence ::= INTEGER (0..100)

InnerRadius ::= INTEGER (0..65535)

AgeOfLocationEstimate ::= INTEGER (0..32767)

HorizontalSpeed ::= UTF8String

VerticalSpeed ::= UTF8String

SpeedUncertainty ::= UTF8String

BarometricPressure ::= INTEGER (30000..155000)

-- TS 29.572 [24], clause 6.1.6.3.13

VerticalDirection ::= ENUMERATED

{

 upward(1),

 downward(2)

}

-- TS 29.572 [24], clause 6.1.6.3.6

PositioningMethod ::= ENUMERATED

{

 cellID(1),

 eCID(2),

 oTDOA(3),

 barometricPressure(4),

 wLAN(5),

 bluetooth(6),

 mBS(7),

 motionSensor(8),

 dLTDOA(9),

 dLAOD(10),

 multiRTT(11),

 nRECID(12),

 uLTDOA(13),

 uLAOA(14),

 networkSpecific(15)

}

-- TS 29.572 [24], clause 6.1.6.3.7

PositioningMode ::= ENUMERATED

{

 uEBased(1),

 uEAssisted(2),

 conventional(3)

}

-- TS 29.572 [24], clause 6.1.6.3.8

GNSSID ::= ENUMERATED

{

 gPS(1),

 galileo(2),

 sBAS(3),

 modernizedGPS(4),

 qZSS(5),

 gLONASS(6),

 bDS(7),

 nAVIC(8)

}

-- TS 29.572 [24], clause 6.1.6.3.9

Usage ::= ENUMERATED

{

 unsuccess(1),

 successResultsNotUsed(2),

 successResultsUsedToVerifyLocation(3),

 successResultsUsedToGenerateLocation(4),

 successMethodNotDetermined(5)

}

-- TS 29.571 [17], table 5.2.2-1

TimeZone ::= UTF8String

-- Open Geospatial Consortium URN [35]

OGCURN ::= UTF8String

-- TS 29.572 [24], clause 6.1.6.2.15

MethodCode ::= INTEGER (16..31)

END