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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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Introduction

The present document has been produced by the 3GPP TSG SA to standardise Lawful Interception of telecommunications. The present document describes protocols and procedures for Lawful Interception based on 3GPP specifications. These protocols and procedures cover both internal 3GPP interfaces (those required to intercept communications and manage interception within a 3GPP network) and external handover interfaces (those used for delivery of intercepted communications to Law Enforcement, or handling of warrants).

Lawful Interception needs to be done in accordance with the applicable national or regional laws and technical regulations. Such national laws and regulations define the extent to which capabilities in the present document are applicable in specific jurisdictions.

1 Scope

The present document specifies the protocols and procedures required to perform Lawful Interception within a 3GPP network. The present document addresses both internal interfaces used internally with a 3GPP network and external handover interfaces used to handover intercepted communications to law enforcement.

The present document describes the detailed targeting of communications in each point of interception within a 3GPP network and the information that a point of interception needs to be able to capture. Furthermore, the detailed data formats for both the internal and external interfaces are also defined.

National regulations determine the applicable set of information that needs to be handed over or excluded from handover to law enforcement for a given 3GPP operator service.

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".

[50] 3GPP TS 29.598: "5G System; Unstructured Data Storage Services; Stage3".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

3.2 Symbols

For the purposes of the present document, the following symbols apply:

<symbol> <Explanation>

3.3 Abbreviations

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

ADMF	LI Administration Function
CC	Content of Communication
CSP	Communication Service Provider
CUPS	Control and User Plane Separation
ICF	Identifier Caching Function
IEF	Identifier Event Function
IQF	Identifier Query Function
IRI	Intercept Related Information
LALS	Lawful Access Location Services
LEA	Law Enforcement Agency
LEMF	Law Enforcement Monitoring Facility
LI	Lawful Interception
LICF	Lawful Interception Control Function
LI_HI1	LI_Handover Interface 1
LI_HI2	LI_Handover Interface 2
LI_HI3	LI_Handover Interface 3
LI_HI4	LI_Handover Interface 4
LI_HIQR	Lawful Interception Handover Interface Query Response
LIPF	Lawful Interception Provisioning Function
LIR	Location Immediate Request
LI_SI	Lawful Interception System Information Interface
LISSF	Lawful Interception State Storage Function
LI_ST	Lawful Interception State Transfer Interface
LI_X1	Lawful Interception Internal Interface 1
LI_X2	Lawful Interception Internal Interface 2
LI_X3	Lawful Interception Internal Interface 3
LI_XEM1	Lawful Interception Internal Interface Event Management Interface 1
LI_XER	Lawful Interception Internal Interface Event Record

LI_XQR	Lawful Interception Internal Interface Query Response
LTF	Location Triggering Function
MDF	Mediation and Delivery Function
MDF2	Mediation and Delivery Function 2
MDF3	Mediation and Delivery Function 3
MM	Multimedia Message
MMS	Multimedia Message Service
NPLI	Network Provided Location Information
O&M	Operations and Management
POI	Point Of Interception
SDP	Session Description Protocol
SIRF	System Information Retrieval Function
SOI	Start Of Interception
TF	Triggering Function
TNGF	Trusted Non-3GPP Gateway Function
TWIF	Trusted WLAN Interworking Function
xCC	LI_X3 Communications Content.
xIRI	LI_X2 Intercept Related Information

4 General

4.1 Introduction

The present document provides details of the internal and external interfaces required for a network operator, access provider and/or service provider to provide the necessary information to a Law Enforcement Agency (LEA) required to meet LI requirements. LI requirements for 3GPP networks and services are given in TS 33.126 [3].

The high-level architecture that defines the necessary interfaces is specified in TS 33.127 [5]. The generic high-level architecture is as follows:

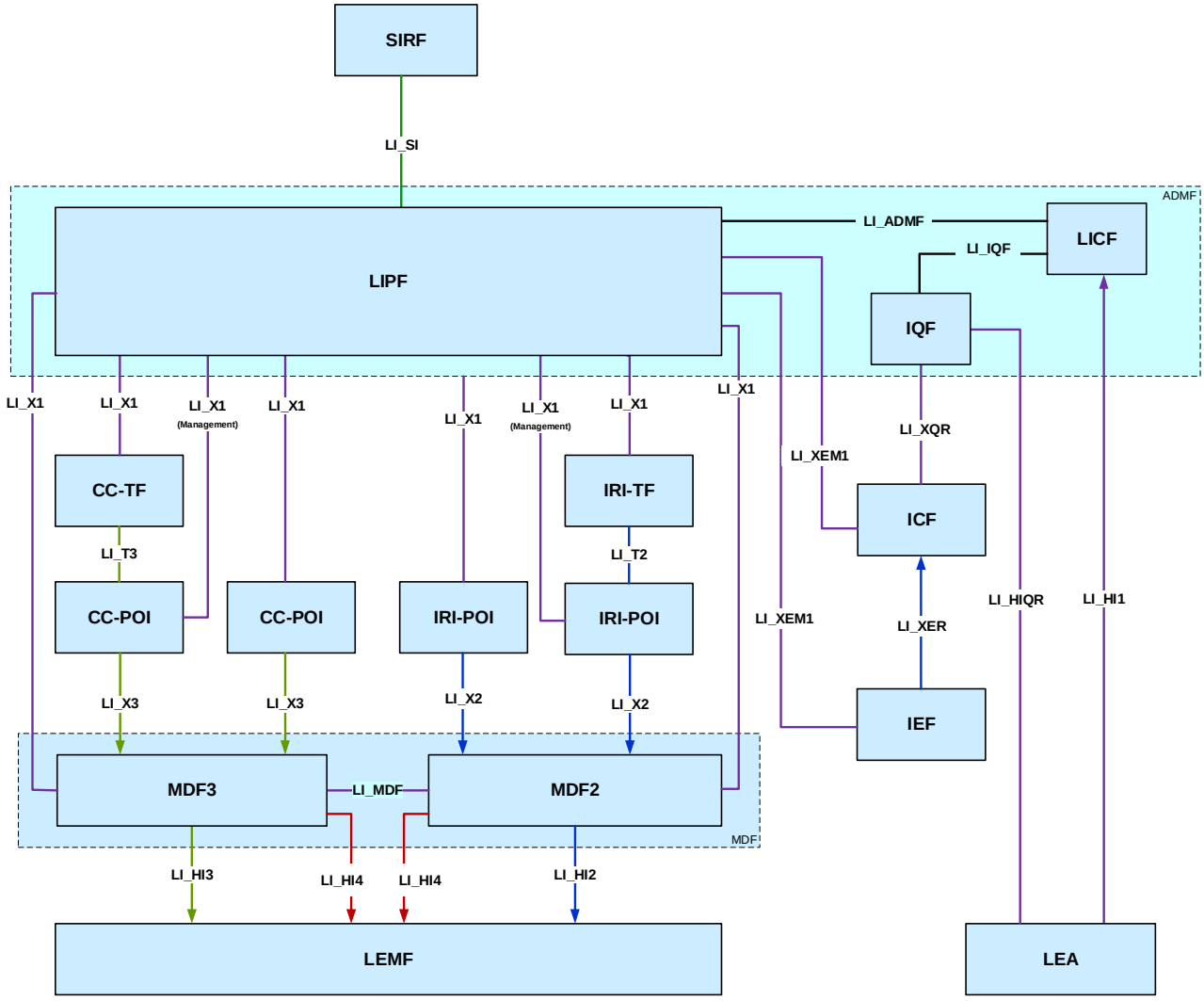

Figure 4.1-1: High-level architecture diagram with key point-to-point LI interfaces

The specification of the interfaces is split into two parts:

- Internal interfaces used between an operator's network functions are described in clause 4.2.
- External interfaces used in communicating with a LEA are described in clause 4.3.

4.2 Basic principles for internal interfaces

This clause lists the internal interfaces shown in clause 4.1, indicates the protocol used to realise each interface, and gives a reference to the relevant clauses of the present document that specify how the protocol is to be used for the given interface.

Table 4.2-1: Internal interfaces and related protocols

Interface	Description	Protocol used to realise interface	Usage
LI_SI	Used to provide system information to the LIPF from the SIRF.	Out of scope of the present document.	
LI_X1	Used to configure and audit Directly-provisioned POIs, TFs and MDFs.	ETSI TS 103 221-1 [7].	See clause 5.2.2
LI_X1 (Management)	Used to audit Triggered POIs.	ETSI TS 103 221-1 [7].	See clause 5.2.3
LI_X2	Used to pass xIRI from IRI-POIs to the MDF2.	ETSI TS 103 221-2 [8].	See clause 5.3.2
LI_X3	Used to pass xCC from CC-POIs to the MDF3.	ETSI TS 103 221-2 [8].	See clause 5.3.3
LI_T2	Used to pass triggering information from the IRI-TF to a Triggered IRI-POI.	ETSI TS 103 221-1 [7].	See clause 5.2.4
LI_T3	Used to pass triggering information from a CC-TF to a Triggered CC-POI.	ETSI TS 103 221-1 [7].	See clause 5.2.4
LI_XQR	Used to pass queries from IQF to ICF and responses from ICF to IQF.	ETSI TS 103 221-1 [7].	See clause 5.8
LI_XER	Used to pass identifier association event records from IEFs to ICF.	See Clause 5.9.	See clause 5.9
LI_XEM1	Used by the LICF/LIPF to manage IEFs and ICF.	ETSI TS 103 221-1 [7].	See clause 5.2.7
LI_ADMF	Used to pass intercept provisioning information form the LICF to the LIPF.	Out of scope of the present document.	
LI_MDF	Used by MDF2 and MDF3 in interactions necessary to correctly generate CC and IRI from xCC and xIRI.	Out of scope of the present document.	
LI_IQF	Used to pass information related to IEFs and ICF to IQF.	Out of scope of the present document.	
LI_ST	Used to transfer LI state information to and from the LISSF.	3GPP TS 29.598 [50].	See clauses 5.10 and 6.2.3.10

4.3 Basic principles for external handover interfaces

This clause lists the external handover interfaces shown in clause 4.1, indicates the protocol used to realise each interface, and gives a reference to the relevant clauses of the present document that specify how the protocol is to be used for the given interface.

Table 4.3-1: External handover interfaces and related protocols

Interface	Description	Protocol used to realise interface	Usage
LI_HI1	Used to send warrant and other interception request information from LEA to operator.	ETSI TS 103 120 [6] shall be supported. Other methods (e.g. manual exchange) may be used depending on national regulatory requirements.	See clause 5.4
LI_HI2	Used to send IRI from the MDF2 to the LEMF.	ETSI TS 102 232-1 [9] and ETSI TS 102 232-7 [10] shall be supported.	See clause 5.5
LI_HI3	Used to send CC from the MDF3 to the LEMF.	ETSI TS 102 232-1 [9] and ETSI TS 102 232-7 [10] shall be supported.	See clause 5.5
LI_HI4	Used to send LI notification information from MDF2/3 to LEMF.	ETSI TS 102 232-1 [9] and ETSI TS 102 232-7 [10] shall be supported.	See clause 5.6
LI_HIQR	Used to send warrant and other identifier association query information from LEA to CSP and used by the CSP to send query responses to the LEA.	ETSI TS 103 120 [6] shall be supported.	See clause 5.7

4.4 Service scoping

4.4.1 General

The interception product shall be delivered to the LEMF over LI_HI2 and LI_HI3, observing the service scoping described in the following clauses.

4.4.2 CSP service type

- Voice.
- Data.
- Messaging (e.g. SMS/MMS).
- Push-to-Talk (including MCPTT).
- LALS (the Target Positioning service, per TS 33.127 [5], clause 7.3.3.2).

The LIPF shall be able to provision the POI, TFs and the MDF2/MDF3 according to the CSP service type(s) applicable to a warrant.

When multiple service types are applicable to a target due to multiple warrants, the MDF2/MDF3 shall be able to deliver interception product to each LEMF based on the CSP service type(s) of the respective warrant.

4.4.3 Delivery type

- IRI.
- CC.
- IRI and CC.

The LIPF shall be able to provision the POI, TF and the MDF2/MDF3 according the delivery type(s) applicable to a warrant.

When different delivery types are applicable to a target due to multiple warrants, the MDF2/MDF3 shall be able to deliver IRI/CC to each LEMF based on the delivery type(s) of the respective warrant.

4.4.4 Location Reporting

- Report location only at the beginning and end of a session.
- Report location every time the target location information is detected at the POI (including location update with no physical change of location).

The LIPF shall be able to provision the POI and the MDF2 with an indication of which location reporting type is applicable to a warrant.

When different location reporting types are applicable to a target due to multiple warrants, then POI may be provisioned as if the reporting of all location information occurrences at the POI is required, with MDF2 restricting the delivery of location to the LEMF as per the provisioned information for a warrant.

4.4.5 LALS Triggering

- This option is used to activate the LALS triggered location service (TS 33.127 [5], clause 7.3.3.3) for the target.

The LIPF shall be able to provision the LTF associated with a POI or MDF2 with the LALS triggered location service parameters provided in the warrant or use a default set of parameters.

4.4.6 Roaming Interception

- Stop interception when the target is roaming outbound internationally.

NOTE 1: The definition of international roaming for LI purposes could vary per jurisdiction.

NOTE 2: The method used to achieve the roaming related service scoping is not described in the present document.

5 Transport and Communications Protocol

5.1 General

This clause describes the protocols used for each of the interfaces at a level which is agnostic of the subject service or network. Additional specific fields or behaviours are given in the relevant parts of clauses 6 and 7.

5.2 Protocols for LI_X1 and LI_T interfaces

5.2.1 General usage of ETSI TS 103 221-1

Functions having an LI_X1, LI_T2 or LI_T3 interface shall support the use of ETSI TS 103 221-1 [7] to realise the interface.

In the event of a conflict between ETSI TS 103 221-1 [7] and the present document, the terms of the present document shall apply.

The LIPF and MDF2/3 shall maintain a mapping between internal interception identifiers (XIDs) and external interception identifiers (LIIDs), as defined by TS 103 221-1 [7] clause 5.1.2. In case of multiple interceptions for a single target identifier, it is an implementation decision for the LIPF/TF whether multiple XIDs are used (i.e. a one-to-one mapping between XID and LIID is maintained) or whether the single XID is used and mapped to multiple LIIDs at the MDF2/3. Clauses 6 and 7 give further details for specific networks or services (e.g. minimum supported target identifier formats).

In the event of a request issued over the interface fails, or an error is reported, the LIPF should raise an alert in the appropriate LI Operations and Management (O&M) system. Further procedures (e.g. retrying a failed request) are left to CSP policy to define.

A failure of LI shall not impact the target's or other users' services.

In general, and unless otherwise specified, the function playing the role of the NE (i.e IRI-POI, IRI-TF, CC-TF, CC-POI, MDF2 or MDF3) shall:

- Accept CreateDestination and ModifyDestination messages regardless of the DeliveryType.
- Reject ActivateTask/ModifyTask messages that contain DIDs that reference Destinations that have not been created via a CreateDestination message; Destinations shall be created before they are used.
- Reject ActivateTask/ModifyTask messages that do not result in at least one valid DID for their DeliveryType (e.g. at least one valid DID for an X2 delivery destination for an "X2Only" Task). Additional DIDs for Destinations of other DeliveryTypes (e.g. a DID for an X3 Destination for an "X2Only" Task) shall be accepted, but a ReportTaskIssue message may be sent to indicate the mismatch.

5.2.2 Usage for realising LI_X1

For the purposes of realising LI_X1 between the LIPF and a POI, MDF or TF, the LIPF plays the role of the ADMF as defined in ETSI TS 103 221-1 [7] reference model (clause 4.2), and the POI, MDF or TF plays the role of the NE.

In general, and unless otherwise specified, the ADMF shall:

- When the provisioning of an IRI-POI/IRI-TF/MDF2 is needed to meet the requirements of the warrant, send an ActivateTask (and subsequent ModifyTask if/as needed) with the DeliveryType set to "X2Only" and the ListOfDIDs containing at least one DID for an X2 or LI_HI2 delivery destination over LI_X1 to each of the relevant functions.
- When the provisioning of a CC-POI/CC-TF/MDF3 is needed to meet the requirements of the warrant, send an ActivateTask (and subsequent ModifyTask if/as needed) with the DeliveryType set to "X3Only" and the ListOfDIDs containing at least one DID for X3 or LI_HI3 delivery destination over LI_X1 to each of the relevant functions.

When both the above are required to meet the requirements of the warrant, the ADMF shall send each independently to each relevant function.

Other deployments compliant with ETSI TS 103 221-1 [7] may be used subject to local agreement.

5.2.3 Usage for realising LI_X1 (management)

For the purposes of realising LI_X1 between the LIPF and a triggered POI, the LIPF plays the role of the “ADMF” as defined in ETSI TS 103 221-1 [7] reference model (clause 4.2), and the triggered POI plays the role of the “NE”.

5.2.4 Service scoping

The LIPF shall be able to provision the POI, TFs and the MDF2/MDF3 according to the service scoping (see clause 4.4) applicable to a warrant as described in Clause 6.2.1.2 and Annex C of ETSI TS 103 221-1 [7].

5.2.5 Usage for realising LI_T2

For the purposes of realising LI_T2 between an IRI-TF and a triggered IRI-POI, the IRI-TF plays the role of the "ADMF" as defined in the ETSI TS 103 221-1 [7] reference model (clause 4.2), and the triggered IRI-POI plays the role of the "NE".

In case the IRI-TF receives from the triggered IRI-POI an error in the answer to a triggering message, the IRI-TF shall send a ReportTaskIssue message to the LIPF. In such case, the failure of LI shall not impact the target's or other users' services.

Unless otherwise specified, an IRI-TF shall set the Product ID field in any ActivateTask or ModifyTask message issued to a triggered IRI-POI (see ETSI TS 103 221-1 [7] clause 6.2.1.2). The IRI-TF shall set the Product ID to the XID of the Task object associated with the interception at the IRI-TF in order to allow correlation of LI product at the MDF2.

Unless otherwise specified, the TF shall include the MDF2 as the X2 delivery destination in the trigger sent using the ActivateTask/ModifyTask with "X2Only".

When the IRI-TF receives a DeactivateTask message or ModifyTask message from the LIPF, the IRI-TF shall send DeactivateTask or ModifyTask messages to all applicable triggered IRI-POIs for all tasks associated to the Task object in the message from the LIPF.

5.2.6 Usage for realising LI_T3

For the purposes of realising LI_T3 between a CC-TF and a triggered CC-POI, the CC-TF plays the role of the "ADMF" as defined in the ETSI TS 103 221-1 [7] reference model (clause 4.2), and the triggered CC-POI plays the role of the "NE".

In case the CC-TF receives from the triggered CC-POI an error in the answer to a triggering message, the CC-TF shall send a ReportTaskIssue message to the LIPF. In such case, the failure of LI shall not impact the target's or other users' services.

Unless otherwise specified, a CC-TF shall set the Product ID field in any ActivateTask or ModifyTask message issued to a triggered CC-POI (see ETSI TS 103 221-1 [7] clause 6.2.1.2). The CC-TF shall set the Product ID to the XID of the Task object associated with the interception at the CC-TF in order to allow correlation of LI product at the MDF3.

Unless otherwise specified, the TF shall include MDF3 as the X3 delivery destination in the trigger sent using the ActivateTask/ModifyTask with "X3Only".

When the CC-TF receives a DeactivateTask message or ModifyTask message from the LIPF, the CC-TF shall send DeactivateTask or ModifyTask messages to all applicable triggered CC-POIs for all tasks associated to the Task object in the message from the LIPF.

5.2.7 Usage for realising LI_XEM1

For the purposes of realising LI_XEM1 between the LIPF and an IEF, the LIPF plays the role of the ADMF as defined in ETSI TS 103 221-1 [7] reference model (clause 4.2), and the IEF plays the role of the NE.

The IEF shall be enabled by sending the following ActivateTask message from the LIPF.

Table 5.2.7-1: ActivateTask message for activating an IEF

ETSI TS 103 221-1 field name	Description	M/C/O
XID	Shall be set to a value assigned by the LIPF.	M
TargetIdentifiers	Shall contain a single Target Identifier of type "IdentityAssociation" (see table 5.2.7-2)	M
DeliveryType	Set to "X2Only".	M
ListOfDIDs	Shall give the DID of the delivery endpoint of the ICF(s) to which identity association events should be delivered. These delivery endpoints are configured using the CreateDestination message as described in ETSI TS 103 221-1 [7] clause 6.3.1 prior to the task activation.	M

The following Target Identifier Type is defined for the use of LI_XEM1. Unless otherwise specified, use of any other Target Identifier Type (including adding a target identifier more than once) shall result in the ActivateTask message being rejected with the appropriate error.

Table 5.2.7-2: Target Identifier Type for LI_XEM1

Identifier type	ETSI TS 103 221-1 [7] TargetIdentifier type	Definition
IdentityAssociationTargetIdentifier	TargetIdentifierExtension / IdentityAssociationTargetIdentifier	Empty tag (see XSD schema)

The IEF may be reconfigured to send identity associations to a different ICF using a ModifyTask message to modify the delivery destinations.

The IEF shall be disabled by sending the following DeactivateTask message from the LIPF.

Table 5.2.7-3: DeactivateTask message for de-activating an IEF

ETSI TS 103 221-1 field name	Description	M/C/O
XID	Shall be set to the value assigned by the LIPF	M

The LIPF should send one ActivateTask command to each IEF.

NOTE: The IEF may receive multiple ActivateTask messages conforming to Table 5.2.7-1, each of which can be independently deactivated. The IEF shall remain active as long as at least one valid Task remains active.

5.3 Protocols for LI_X2 and LI_X3

5.3.1 General usage of ETSI TS 103 221-2

Functions having an LI_X2 or LI_X3 interface shall support the use of ETSI TS 103 221-2 [8] to realise the interface.

In the event of a conflict between ETSI TS 103 221-2 [8] and the present document, the terms of the present document shall apply.

The xIRI and the xCC sent using ETSI TS 103 221-2 [8] shall contain the appropriate XID as received in the relevant LI_X1 provisioning message (or LI_T2/3 triggering message, as appropriate).

5.3.2 Usage for realising LI_X2

The POI sending xIRI over the LI_X2 interface shall set the PDU type field within the xIRI to "X2 PDU". (see ETSI TS 103 221-2 [8] clause 5.1).

Where a single xIRI is sent as a result of a network procedure (i.e. as result of several signaling messages exchanged between the target UE and the network), the POI sending the xIRI shall set the Payload Direction field (see ETSI TS 103 221-2 [8] clause 5.2.6) based on the initiator of the network procedure.

Unless otherwise specified by the relevant clause, the payload shall consist of a BER-encoded TS33128Payloads.XIRIPayload structure. The payload format (see ETSI TS 103 221-2 [8] clause 5.4) shall be set according to the relevant clause of the present document (the value 2 is used for TS 33128Payloads.XIRIPayload).The TLS transport profile (see ETSI TS 103 221-2 [8] clause 6) shall be supported and used by default.

Unless otherwise specified, xIRI shall include the timestamp and sequence number conditional attribute fields, with the timestamp value set to the time at which the event occurred.

Unless otherwise specified, the LI_X2 "Matched Target Identifier" conditional attribute shall be set to indicate what target identity was matched to generate the xIRI (see ETSI TS 103 221-2 [8] clause 5.3.18).

Unless otherwise specified, the LI_X2 "Other Target Identifier" conditional attribute shall be set with all other target identities present at the NF that contains the POI (see ETSI TS 103 221-2 [8] clause 5.3.19).

5.3.3 Usage for realising LI_X3

The POI sending xCC over the LI_X3 interface shall set the PDU type field in the xCC to "X3 PDU" (see ETSI TS 103 221-2 [8] clause 5.1).

The payload format shall be specified according to the relevant clause of the present document.

NOTE: ETSI TS 103 221-2 [8] specifies in clause 6 a default profile which is mandatory to support, but allows further profiles to be defined. In scenarios where it may not be possible to achieve the necessary LI data rates based on the default profile, alternative profiles may be considered (e.g. based on UDP, multi path TCP or other protocols). Any alternative profile needs to ensure that LI reliability, security and completeness requirements as specified in TS 33.126 [3] are met.

5.3.4 Service scoping

When applicable, the POIs shall deliver the xIRIs/xCC to MDF2/MDF3 over LI_X2/LI_X3 according to the service scoping as provisioned by the LIPF to them (see clause 4.4).

5.4 Protocols for LI_HI1

5.4.1 General

Functions having an LI_HI1 interface shall support the use of ETSI TS 103 120 [6] to realise the interface.

In the event of a conflict between ETSI TS 103 120 [6] and the present document, the terms of the present document shall apply.

5.4.2 Service scoping

LEAs shall be able to provide the service scoping as applicable to the warrant to the CSP over the LI_HI1 interface (see clause 4.4).

5.5 Protocols for LI_HI2 and LI_HI3

5.5.1 General

Functions having an LI_HI2 or LI_HI3 interface shall support the use of ETSI TS 102 232-1 [9] and ETSI TS 102 232-7 [10] to realise the interface.

In the event of a conflict between either specification and the present document, the terms of the present document shall apply.

5.5.2 Usage for realising LI_HI2

The IRI messages sent over LI_HI2 are structured as a header and a payload. The header contains general information like LIID, timestamp, correlation information (as for example defined in ETSI TS 102 232-1 [9]). The payload contains intercept related information based on information that the MDF2 has received from sources in the network, such as the IRI-POI as described in clauses 6 and 7 of the present document. Details of the IRI messages can be found in Annex A of the present document. Messages defined as passing over the LI_HI2 interface shall be passed as the payload of the threeGPP33128DefinedIRI field (see TS ETSI 102 232 -7 [10] clause 15).

5.5.3 Usage for realising LI_HI3

The CC sent over LI_HI3 is structured as a header and a payload. The header contains general information like LIID, timestamp, correlation information (as for example defined in ETSI TS 102 232-1 [9]). The payload contains content of communication based on information that the MDF3 has received from sources in the network, such as the CC-POI as described in clauses 6 and 7 of the present document. Details of the CC can be found in Annex A of the present document. CC defined as passing over the LI_HI3 interface shall be passed as the payload of the threeGPP33128DefinedCC field (see ETSI TS 102 232-7 [10] clause 15).

NOTE: ETSI TS 102 232-1 [9] specifies in clause 6.4 a transport layer based on TCP. However, based on agreement between network operator and LEA, in scenarios where it may not be possible to achieve the necessary LI data rates based on the transport layer based on single TCP connection, alternative profiles may be considered (e.g. based on UDP, multi path TCP or other protocols). Any alternative profile needs to ensure that LI reliability, security and completeness requirements as specified in TS 33.126 [3] are met.

5.5.4 Service scoping

The MDF2 and MDF3 shall be able to deliver the IRI messages and the CC to the LEMF over LI_HI2 and LI_HI3 respectively, according to the service scoping (see clause 4.4).

5.5.5 IRI Target Identifiers

The MDF shall populate the TargetIdentifiers field of the IRIPayload defined in Annex A with all Target Identifiers available at the MDF. For all Identifiers received in the LI_X2 "Matched Target Identifier" conditional attribute (see clause 5.3.2), the MDF shall include the relevant Identifier with the provenance set to "matchedOn". For all Identifiers received in the the LI_X2 "Other Target Identifier" conditional attribute (see clause 5.3.2), the MDF shall include the relevant Identifier with the provenance set to "other". For all Identifiers present in the xIRI payload, the MDF shall include the relevant Identifier with the provenance set to "observed". For all Identifiers present in the provisioning message received over X1, the MDF shall include the relevant Identifier with the provenance set to "lEAProvided". For all Identifiers present in the MDF that are not reported as other TargetIdentifiers, the MDF shall include the relevant Identifier with the provenance set to "other".

5.6 Protocols for LI_HI4

5.6.1 General

Functions having an LI_HI4 shall support the use of ETSI TS 102 232-1 [9] to realise the interface.

In the event of a conflict between ETSI TS 102 232-1 [9] and the present document, the terms of the present document shall apply.

5.6.2 Usage for realising LI_HI4

The LI Notification messages sent over LI_HI4 are structured as a header and a payload. The header contains general information like LIID, timestamp (as for example defined in ETSI TS 102 232-1 [9]). The payload contains the administrative information such as notification. Details of the LI Notification messages can be found in Annex B of the present document.

Where the LI_HI4 interface is present alongside an LI_HI2 interface or LI_HI3 interface, the LI Notification messages shall be transmitted along the same connection as the IRI messages or CC. Where ETSI TS 102 232-1 [9] is used for LI_HI2 or LI_HI3, messages defined as passing over the LI_HI4 interface shall be passed as the contents of the operatorLeaMessage field.

The MDF2/3 shall support generation LI Notification messages for at least the following events:

- Activation of an interception at the MDF2/3 via LI_X1.
- Modification of an interception at the MDF2/3 via LI_X1.
- Deletion of an interception at the MDF2/3 via LI_X1.

5.7 Protocols for LI_HIQR

5.7.1 General

Functions having an LI_HIQR interface shall support the use of ETSI TS 103 120 [6] to realise the interface.

In the event of a conflict between ETSI TS 103 120 [6] and the present document, the terms of the present document shall apply.

5.7.2 Usage for realising LI_HIQR

5.7.2.1 Request structure

LI_HIQR requests are represented by issuing a CREATE request for an LDTaskObject (see ETSI TS 103 120 [6] clause 8.3), populated as follows:

Table 5.7.2-1: LDTaskObject representation of LI_HIQR request

Field	Value	M/C/O
Reference	Reference to the authorization under which the request is made. The format of this field, and any procedures for allocating or validating it, are for national agreement.	M
DesiredStatus	Shall be set to "AwaitingDisclosure".	M
RequestDetails	Set according to table 5.7.2-2 below.	M

The use of any other LDTaskObject parameter is outside the scope of the present document.

Table 5.7.2-2: RequestDetails structure

Field	Value	M/C/O
Type	Shall be set to one of the RequestType values as defined in Table 5.7.2-3.	M
ObservedTime	When the RequestValues provides a temporary identity, this field shall be set to the observation time of that temporary identity. When the requestValues provides a permanent identity, this is the time at which the LEA requires that the permanent to temporary association is applicable. Shall not be present for requests of type "OngoingIdentityAssociation".	C
RequestValues	Set to the target identifier plus additional information required (see clause 5.7.2.2).	M

NOTE: If the observed time is in the past, providing a successful query response is subject to associations still being available in the cache when the query is made to the ICF.

Table 5.7.2-3: RequestType Dictionary for LI_HIQR

Dictionary Owner	Dictionary Name
3GPP	RequestType
Defined DictionaryEntries	
Value	**Meaning**
IdentityAssociation	A request for a single IdentityResponseDetails response to the query provided
OngoingIdentityAssociation	A request for an ongoing series of IdentityResponseDetails responses matching the query provided. May only be used when the RequestValues contains a permanent identifier. The request shall be terminated by updating the LDTaskObject DesiredStatus to "Disclosed".

Table 5.7.2-3 is formatted in accordance with ETSI TS 103 120 [6] Annex F.

5.7.2.2 Request parameters

The RequestValues field shall contain one of the following:

- SUPI, given in either SUPIIMSI or SUPINAI formats as defined in ETSI TS 103 120 [6] clause C.2.
- SUCI, given as defined in Table 5.7.2-4 below.
- 5G-S-TMSI, given as defined in Table 5.7.2-4 below.
- 5G-GUTI, given as defined in Table 5.7.2-4 below.

If the RequestType is "OngoingIdentityAssociation" (see Table 5.7.2-3), SUPI is the only valid identity type in the RequestValues field. If the RequestType is “OngoingIdentityAssociation” and any other identity type is provided, the IQF shall signal the error by setting the LDTaskObject Status to "Invalid" (see TS 103 120 [6] clause 8.3.3).

If a temporary identity is provided, the following shall also be present as RequestValues:

- CellIdentity, given as defined in Table 5.7.2-4 below.
- TrackingAreaIdentity, given as defined in Table 5.7.2-4 below.

The following RequestValue FormatTypes (see ETSI TS 103 120 [6] clause 8.3.5.4) are defined (which are not otherwise defined elsewhere).

Table 5.7.2-4: RequestValue FormatType extensions for LI_HIQR Requests

Format Owner	Format Name	Description	Format
3GPP	SUCI	Subscription Concealed Identifier as per TS 23.003 [19] clause 2.2B.	TS 29.509 [45] clause 6.1.6.3.2
3GPP	5GSTMSI	Shortened form of the 5G-GUTI as defined in TS 23.003 [19] clause 2.11. Given as a hyphen-separated concatenation of: - The string "5gstmsi". - The AMF Set ID given as three hexadecimal digits (10 bits). - The AMF Pointer given as two hexadecimal digits (6 bits). - The 5G-TMSI given as eight hexadecimal digits (32 bits)	Matches regular expression: ^(5gstmsi-([0-3][0-9A-Fa-f]{2})-([0-3][0-9A-Fa-f])-([0-9A-Fa-f]{8}))$
3GPP	5GGUTI	As defined in TS 23.003 [19] clause 2.10. Given as a hyphen separated concatenation of:	Matches regular expression:

Format Owner	Format Name	Description	Format
		- The string "5gguti". - MCC given as a three decimal digits. - MNC given as a two or three digit decimal digits - AMF Region ID given as two hexadecimal digits (8 bits). - The AMF Set ID, AMF Pointer and 5G-TMSI as defined above in 5GSTMSI	^(5gguti-([0-9]{3})-([0-9]{2,3})-([0-9A-Fa-f]{2})-([0-3][0-9A-Fa-f]{2})-([0-3][0-9A-Fa-f])-([0-9A-Fa-f]{8}))$
3GPP	NRCellIdentity	NR Cell ID (NCI), as defined in TS 23.003 [19] clause 19.6A	TS 29.571 [17] clause 5.4.2
3GPP	TrackingAreaCode	Tracking area code as defined in TS 23.003 [19] clause 19.4.2.3	TS 29.571 [17] clause 5.4.2

5.7.2.3 Response structure

The LI_HIQR request is used to generate a request to the ICF over LI_XQR (see clause 5.8). The response received over LI_XQR is then transformed into an LI_HIQR response.

LI_HIQR responses and updates are represented as XML following the IdentityResponseDetails type definition (see Annex E).

Responses and updates are delivered within a DELIVER request (see ETSI TS 103 120 [6] clause 6.4.10) containing a DELIVERY object (see ETSI TS 103 120 [6] clause 10).

IdentityResponseDetails contain IdentityAssociation records. The fields of each IdentityAssociationRecord shall be set as follows.

Table 5.7.2-5: IdentityAssociationRecord

Field	Value	M/C/O
SUPI	SUPI associated with the provided identity.	M
SUCI	SUCI associated with the provided identity, if available.	C
5G-GUTI	5G GUTI associated with the provided identity, provided in the form given in the request (see Table 5.7.2-4).	M
PEI	PEI associated with the provided identity during the association period, if known	C
AssociationStartTime	The time that the association between the SUPI and the temporary identity became valid. (See NOTE).	M
AssociationEndTime	The time that the association between the SUPI and the temporary identity ceased to be valid. Shall be omitted if the association is still valid (see NOTE).	C
FiveGSTAIList	List of tracking areas associated with the registration area within which the UE was or is registered in the lifetime of the reported association, if available. See clause 7.6.2.4 for details.	C
NOTE: The AssociationStartTime and AssociationEndTime represent the lifespan of the SUPI to 5G-GUTI association. When a SUCI is present, the AssociationStartTime also represents the time of the SUCI's validity.		

If no association is found which matches the criteria provided in the LI_XQR request, then the LI_XQR response contains zero IdentityAssocationRecords. Similarly, the LI_HIQR response contains zero IdentityAssociationRecords.

For responses or updates providing a currently valid SUPI to 5G-GUTI identity association, the AssociationEndTime shall be absent. The AssociationStartTime shall indicate when the 5G-GUTI became associated with the SUPI. The SUCI field shall be populated if it was present in the IEF record for the association (see clause 6.2.2A.2.1). The PEI and TAI List fields may be populated as well, see clause 7.6.2.4 for details.

In the case of ongoing updates, the presence of the AssociationEndTime indicates the SUPI to 5G-GUTI identity disassociation. Such updates shall only happen when no new association is replacing the outgoing one.

The DeliveryObject Reference field (see ETSI TS 103 120 [6] clause 10.2.1) shall be set to the Reference of the LDTaskObject used in the request, to provide correlation between request and response.

The content manifest (see ETSI TS 103 120 [6] clause 10.2.2) shall be set to indicate the present document, using the following Specification Dictionary extension.

Table 5.7.2-6: Specification Dictionary

Dictionary Owner	Dictionary Name
3GPP	ManifestSpecification.
Defined DictionaryEntries	
Value	**Meaning**
LIHIQRResponse	The delivery contains IdentityResponseDetails (see Annex E)

5.8 Protocols for LI_XQR

5.8.1 General

LI_XQR requests are realised using TS 103 221-1 [7] to transport the IdentityAssociationRequest and IdentityAssociationResponse messages (which are derived from the X1RequestMessage and X1ResponseMessage definitions in TS 103 221-1 [7]) as described in Annex E.

5.8.2 IdentityAssociation requests

For requests with RequestType "IdentityAssociation" (see Table 5.7.2-3), the IQF issues an IdentityAssociationRequest message populated with a RequestDetails structure as follows.

Table 5.8-1: RequestDetails structure for LI_XQR

ETSI TS 103 221-1 [7] field name	Description	M/C/O
Type	Shall be set to the RequestType value "IdentityAssociation" as defined in Table 5.7.2-3.	M
ObservedTime	Observation time as provided over LI_HIQR (see clause 5.7.2)	M
RequestValues	Set to the target identifier plus additional information specified in the LI_HIQR request (see clause 5.7.2)	M

Successful LI_XQR responses are returned using the IdentityAssociationResponse message. Error conditions are reported using the normal error reporting mechanisms described in TS 103 221-1 [7].

LI_XQR query responses are represented in XML following the IdentityAssociationResponse schema (see Annex E). The fields of the IdentityAssociationResponse record shall be populated as described in Table 5.7.2-5.

5.8.3 OngoingIdentityAssociation requests

For requests with RequestType "OngoingIdentityAssociation", the IQF shall activate a request for ongoing updates at the ICF by sending it an ActivateAssociationUpdates message populated as follows:

Table 5.8-2: ActivateAssociationUpdates message for LI_XQR

Field name	Description	M/C/O
OngoingAssociationTaskID	Unique identifier for this request allocated by the IQF	M
SUPI	Permanent identifier for which ongoing identity association updates shall be issued.	M

The ICF shall acknowledge receipt of the ActivateAssociationUpdates message by responding with a ActivateAssociationUpdatesAcknowledgement response (see Annex E) containing an IdentityAssociationRecord representing the association active at the time ICF receives the ActivateAssociationUpdates message. If no such active association exists, the ActivateAssociationUpdatesAcknowledgement response shall not contain an IdentityAssociationRecord. Error conditions are reported using the normal error reporting mechanisms described in ETSI TS 103 221-1 [7].

When a request with RequestType "OngoingIdentityAssociation" is terminated over LI_HIQR (see Table 5.7.2-3), the IQF shall issue a DeactivateAssociationUpdates message (see Annex E) with the appropriate OngoingAssociationTaskID populated. On termination of the request, the ICF shall respond with a DeactivateAssociationUpdatesAcknowledgement message.

While a request with RequestType "OngoingIdentityAssociation" is active, the ICF shall generate an IdentityAssociationUpdate message every time the ICF receives an IEFAssociationRecord or IEFDeassociationRecord over LI_IEF for the relevant identifier. The message shall contain an IdentityAssociationRecord as described in Table 5.7.2-5, and the relevant OngoingAssociationTaskID. The IdentityAssociationUpdate message is sent to the IQF over LI_XQR with the ICF becoming the "requester" as defined in ETSI TS 103 221-1 [7] clause 4.2. The IQF shall respond with an IdentityAssociationUpdateAcknowledgement message.

5.9 Protocols for LI_XER

LI_XER records are realised using a TLS connection as defined in clause 6.2.2A.2.3, with records BER-encoded as defined in Annex F.

5.10 Protocols for LI_ST interface

5.10.1 Overview

LI_ST shall be realised using a dedicated separate instance of the Nudsf_DataRepository service as defined in TS 29.598 [50] subject to the following terms.

The LISSF shall adopt the role of the NF Service Provider as described in TS 29.598 [50] clause 5.2.1. The LISSF may be realised as a standalone function or within the ADMF. In either case it shall meet the requirements set out in TS 33.127 [5] clause 6.2.3.8.

An LI function may only store state over LI_ST using an LISSF identified by the LIPF via LI_X0. The LIPF shall provide the necessary details for connection, including the relevant apiRoot, apiVersion, realmId and storageId values (see TS 29.598 [50] clause 6.1.3.1) and any necessary keys for authentication.

5.10.2 Storage

When an LI function wishes to store LI state in the LISSF, it shall perform the Record Create service operation as described in TS 29.598 [50] clause 5.2.2.3.1. Unless otherwise specified, the recordId shall be a randomly-assigned UUID. The record metadata shall include at least the following information as tag value pairs (see TS 29.598 [50] clause 6.1.6.2.3)

Table 5.10.2-1: Minimum information elements for RecordMeta structure

Field Name	Description	M/C/O
NFInstanceID	The NF instance ID associated with the NF in which the LI function is located, if applicable (see TS 29.571 [17] clause 5.3.2).	C
NEID	The LI_X1 identifier associated with the LI function.	M
XID	XID for the task that the state is associated with, if applicable.	C
DID	DID for the destination that the state is associated with, if applicable.	C

Further details on the contents of the Record Blocks is given in the relevant clauses.

The LIPF shall always be able to store records in the LISSF.

5.10.3 Retrieval

When an LI function wishes to retrieve records from the LISSF and knows the RecordID of the relevant state information, it shall perform a Record Retrieval operation as described in TS 29.598 [50] clause 5.2.2.2.2. If the LI function does not know the RecordID, it shall perform a search as described in TS 29.598 [50] clause 5.2.2.2.6 using appropriate search criteria. The details for choosing search criteria are specific to each LI function and are therefore given in later clauses specific to that LI function.

The LIPF shall always be able to retrieve records from the LISSF.

5.10.4 Removal

When an LI function wishes to remove records from the LISSF, it shall perform a Record Delete service operation as described in TS 29.598 [50] clause 5.2.2.5.

The LIPF shall always be able to remove records from the LISSF.

6 Network Layer Based Interception

6.1 Introduction

This clause describes any remaining fields, behaviours or details necessary to implement the required LI interfaces for specific 3GPP-defined network deployments which are not described in clauses 4 and 5.

6.2 5G

6.2.1 General

This clause describes the LI interfaces specific to LI for 5G networks.

6.2.2 LI at AMF

6.2.2.1 Provisioning over LI_X1

The IRI-POI present in the AMF is provisioned over LI_X1 by the LIPF using the X1 protocol as described in clause 5.2.2.

The POI in the AMF 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.
- PEIIMEI.
- PEIIMEISV.
- GPSIMSISDN.
- GPSINAI.

Table 6.2.2-0A shows the minimum details of the LI_X1 ActivateTask message used for provisioning the IRI-POI in the AMF.

Table 6.2.2-0A: ActivateTask message for the IRI-POI in the AMF

ETSI TS 103 221-1 [7] field name	Description	M/C/O
XID	XID assigned by LIPF.	M
TargetIdentifiers	One of the target identifiers listed in the paragraph above.	M
DeliveryType	Set to "X2Only".	M
ListOfDIDs	Delivery endpoints for LI_X2 for the IRI-POI in the AMF. These delivery endpoints are configured using the CreateDestination message as described in ETSI TS 103 221-1 [7] clause 6.3.1 prior to the task activation.	M
TaskDetailsExtensions/ IdentifierAssociationExtensions	This field shall be included if the IRI POI is required to generate AMFIdentifierAssociation records (see clause 6.2.2.2.1). If the field is absent, AMFIdentifierAssociation records shall not be generated.	C

Table 6.2.2-0B: IdentifierAssociationExtensions Parameters

Field Name	Description	M/C/O
EventsGenerated	One of the following values: - IdentifierAssociation - All See clause 6.2.2.2.1 for the interpretation of this field.	M

6.2.2.2 Generation of xIRI over LI_X2

6.2.2.2.1 General

The IRI-POI present in the AMF shall send the xIRIs over LI_X2 for each of the events listed in TS 33.127 [5] clause 6.2.2.4, the details of which are described in the following sub-clauses.

If the AMF receives one or more cell IDs in an N2 message (as specified in TS 38.413 [23]), the POI associated with the AMF shall report all of them.

The IRI-POI in the AMF shall only generate xIRI containing AMFIdentifierAssociation records when the IdentifierAssocationExtensions parameter has been received over LI_X1 (see clause 6.2.2.1). If the IdentifierAssocationExtensions parameter is not received for a specific target the IRI-POI shall not generate AMFIdentifierAssociation records for that target. The AMF shall generate records according to the value of the EventsGenerated sub-parameter (see Table 6.2.2-0B) as follows:

- IdentifierAssociation: AMFIdentifierAssociation and AMFLocationUpdate records shall be generated. No other record types shall be generated for that target.

- All: All AMF record types shall be generated.

6.2.2.2.2 Registration

The IRI-POI in the AMF shall generate an xIRI containing an AMFRegistration record when the IRI-POI present in the AMF detects that a UE matching one of the target identifiers provided via LI_X1 has successfully registered to the 5GS via 3GPP NG-RAN or non-3GPP access. Accordingly, the IRI-POI in the AMF generates the xIRI when the following event is detected:

- AMF sends a N1: REGISTRATION ACCEPT message to the target UE and the UE 5G Mobility Management (5GMM) state for the access type (3GPP NG-RAN or non-3GPP access) within the AMF is changed to 5GMM-REGISTERED.

Table 6.2.2-1: Payload for AMFRegistration record

Field name	Description	M/C/O
registrationType	Specifies the type of registration, see TS 24.501 [13] clause 9.11.3.7. This is derived from the information received from the UE in the REGISTRATION REQUEST message.	M
registrationResult	Specifies the result of registration, see TS 24.501 [13] clause 9.11.3.6.	M
slice	Provide, if available, one or more of the following: - allowed NSSAI (see TS 24.501 [13] clause 9.11.3.37). - configured NSSAI (see TS 24.501 [13] clause 9.11.3.37), - rejected NSSAI (see TS 24.501 [13] clause 9.11.3.46). This is derived from the information sent to the UE in the REGISTRATION ACCEPT message.	C
sUPI	SUPI associated with the registration (see clause 6.2.2.4).	M
sUCI	SUCI used in the registration, if available.	C
pEI	PEI provided by the UE during the registration, if available.	C
gPSI	GPSI obtained in the registration, if available as part of the subscription profile.	C
gUTI	5G-GUTI provided as outcome of initial registration or used in other cases, see TS 24.501 [13] clause 5.5.1.2.2.	M
location	Location information determined by the network during the registration, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*) and, when Dual Connectivity is activated, as an *additionalCellIDs* parameter (*location>locationInfo>additionalCellIDs*), see Annex A.	C
non3GPPAccessEndpoint	UE's local IP address used to reach the N3IWF, TNGF or TWIF, if available. IP addresses are given as 4 octets (for IPv4) or 16 octets (for IPv6) with the most significant octet first (network byte order).	C
fiveGSTAIList	List of tracking areas associated with the registration area within which the UE is current registered, see TS 24.501 [13], clause 9.11.3.9 (see NOTE)	C
NOTE: List shall be included each time there is a change to the registration area.		

6.2.2.2.3 Deregistration

The IRI-POI in the AMF shall generate an xIRI containing an AMFDeregistration record when the IRI-POI present in the AMF detects that a UE matching one of the target identifiers provided via LI_X1 has deregistered from the 5GS. Accordingly, the IRI-POI in AMF generates the xIRI when any of the following events is detected:

- For network initiated de-registration, when the AMF receives the N1: DEREGISTRATION ACCEPT message from the target UE or when implicit deregistration timer expires; and in both cases the UE 5GMN state for the access type (3GPP NG-RAN or non-3GPP access) within the AMF is changed to 5GMM-DEREGISTERED.

- For UE initiated de-registration, when the AMF sends the N1: DEREGISTRATION ACCEPT message to the target UE or when the AMF receives the N1: DEREGISTRATION REQUEST message from the target UE with deregistration type value of “switch off”; and in both cases the UE 5GMN state for the access type (3GPP NG-RAN or non-3GPP access) within the AMF is changed to 5GMM-DEREGISTERED.

Table 6.2.2-2: Payload for AMFDeregistration record

Field name	Description	M/C/O
deregistrationDirection	Indicates whether the deregistration was initiated by the network or by the UE.	M
accessType	Indicates the access for which the deregistration is handled, see TS 24.501 [13], clause 9.11.3.20.	M
sUPI	SUPI associated with the deregistration (see clause 6.2.2.4), if available.	C
sUCI	SUCI used in the deregistration, if available (see NOTE).	C
pEI	PEI used in the deregistration, if available (see NOTE).	C
gPSI	GPSI associated to the deregistration, if available as part of the subscription profile.	C
gUTI	5G-GUTI used in the deregistration, if available, see TS 24.501 [13], clause 5.5.2.2.1 (see NOTE).	C
cause	Indicates the 5GMM cause value for network-initiated deregistration, see TS 24.501 [13], clause 9.11.3.2.	C
location	Location information determined by the network during the deregistration, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
NOTE: At least one among SUCI, PEI and GUTI shall be provided.		

6.2.2.2.4 Location update

The IRI-POI in the AMF shall generate an xIRI containing an AMFLocationUpdate record each time the IRI-POI present in an AMF detects that the target's UE location is updated due to target's UE mobility or as a part of an AMF service procedure and the reporting of location information is not restricted by service scoping. The generation of such separate xIRI is not required if the updated UE location information is obtained as a part of a procedure producing some other xIRIs (e.g. mobility registration). In that case the location information is included into the respective xIRI.

The UE mobility events resulting in generation of an AMFLocationUpdate xIRI include the *N2 Path Switch Request* (*Xn based inter NG-RAN handover* procedure described in 3GPP TS 23.502 [4], clause 4.9.1.2) and the *N2 Handover Notify* (*Inter NG-RAN node N2 based handover* procedure described in 3GPP TS 23.502 [4], clause 4.9.1.3).

The AMFLocationUpdate xIRI is also generated when the AMF receives an NG-RAN NGAP *PDU Session Resource Modify Indication* message as a result of Dual Connectivity activation/release for the target's UE, as described in 3GPP TS 37.340 [37], clause 10.

Optionally, based on operator policy, other NG-RAN NGAP messages that do not generate separate xIRI but carry location information (e.g. RRC INACTIVE TRANSITION REPORT) may trigger the generation of an xIRI AMFLocationUpdate record.

Additionally, based on regulatory requirements and operator policy, the location information obtained by AMF from NG-RAN or LMF in the course of some service operation (e.g. emergency services, LCS) may generate xIRI AMFLocationUpdate record. The AMF services providing the location information in these cases include the AMF Location Service (ProvideLocInfo, ProvidePosInfo, NotifiedPosInfo and EventNotify service operations) and the AMF Exposure Service (AmfEventReport with LOCATION_REPORT) (see TS 29.518 [22]). Additionally, the AMF Communication Service (Namf_Communication_N1MessageNotify service operation) may be monitored to capture the location information in the scenarios described in TS 23.273 [42], clause 6.3.1. Also, in the case of Mobile Originated LCS service invoked by the target, the location information may be derived from a Nlmf_Location_DetermineLocation Response to AMF (see TS 23.273 [42], clause 6.2).

Table 6.2.2-3: Payload for AMFLocationUpdate record

Field name	Description	M/C/O
sUPI	SUPI associated with the location update (see clause 6.2.2.4).	M
sUCI	SUCI associated with the location update, if available, see TS 24.501 [13].	C
pEI	PEI associated with the location update, if available.	C
gPSI	GPSI associated with the location update, if available as part of the subscription profile.	C
gUTI	5G-GUTI associated with the location update, if available, see TS 24.501 [13].	C
location	Updated location information determined by the network. Depending on the service or message type from which the location information is extracted, it may be encoded in several forms (Annex A): 1) as a *userLocation* parameter (*location>locationInfo>userLocation*) in the case the information is obtained from an NGAP message, except the LOCATION REPORT message (see TS 38.413 [23]); 2) as a *locationInfo* parameter (*location>locationInfo*) in the case the information is obtained from a **ProvideLocInfo** (TS 29.518 [22], clause 6.4.6.2.6); 3) as a *locationPresenceReport* parameter (*location>locationPresenceReport*) in the case the information is obtained from an **AmfEventReport** (TS 29.518 [22], clause 6.2.6.2.5) with event type **Location-Report** or **Presence-In-AOI-Report;** 4) as a *positionInfo* parameter (*location>positioningInfo>positionInfo*) in the case the information is obtained from a **ProvidePosInfo** (TS 29.518 [22], clause 6.4.6.2.3) or a **NotifiedPosInfo** (TS 29.518 [22], clause 6.4.6.2.4).	M

6.2.2.2.5 Start of interception with registered UE

The IRI-POI in the AMF shall generate an xIRI containing an AMFStartOfInterceptionWithRegisteredUE record when the IRI-POI present in the AMF detects that interception is activated on a UE that has already been registered in the 5GS (see clause 6.2.2.4 on identity privacy). A UE is considered already registered to the 5GS when the 5GMM state for the access type (3GPP NG-RAN or non-3GPP access) for that UE is 5GMM-REGISTERED. Therefore, the IRI-POI present in the AMF shall generate the xIRI AMFStartOfInterceptionWithRegisteredUE record when it detects that a new interception for a UE is activated (i.e. provisioned by the LIPF) and the 5G mobility management state for the access type (3GPP NG-RAN or non-3GPP access) within the AMF for that UE is 5GMM-REGISTERED. If the UE is registered over both 3GPP NG-RAN and non-3GPP access, the IRI-POI present in the AMF shall generate an xIRI containing an AMFStartOfInterceptionWithRegisteredUE record for each access type.

Table 6.2.2-4: Payload for AMFStartOfInterceptionWithRegisteredUE record

Field name	Description	M/C/O
registrationResult	Specifies the result of registration, see TS 24.501 [13], clause 9.11.3.6.	M
registrationType	Specifies the type of registration, see TS 24.501 [13] clause 9.11.3.7, if available.	C
slice	Provide, if available, one or more of the following: - allowed NSSAI (see TS 24.501 [13] clause 9.11.3.37). - configured NSSAI (see TS 24.501 [13] clause 9.11.3.37). - rejected NSSAI (see TS 24.501 [13] clause 9.11.3.46). This is derived from the information that was sent to the UE in the REGISTRATION ACCEPT message. IRI-POI in AMF can include this information if and only if it retained the information that it had previously sent in the REGISTRATION ACCEPT message to the UE.	C
sUPI	SUPI associated with the registration (see clause 6.2.2.4).	M
sUCI	SUCI used in the registration, if available.	C
pEI	PEI provided by the UE during the registration, if available.	C
gPSI	GPSI obtained in the registration, if available as part of the subscription profile.	C
gUTI	5G-GUTI provided as outcome of initial registration or used in other cases, see TS 24.501 [13], clause 5.5.1.2.2.	M
location	Location information, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*) and, when Dual Connectivity is activated, as an *additionalCellIDs* parameter (*location>locationInfo>additionalCellIDs*), see Annex A.	C
non3GPPAccessEndpoint	UE's local IP address used to reach the N3IWF, TNGF or TWIF, if available. IP addresses are given as 4 octets (for IPv4) or 16 octets (for IPv6) with the most significant octet first (network byte order).	C
timeOfRegistration	Time at which the last registration occurred, if available. This is the time stamp when the REGISTRATION ACCEPT message is sent to the UE or (when applicable) when the REGISTRATION COMPLETE is received from the UE. Shall be given qualified with time zone information (i.e. as UTC or offset from UTC, not as local time).	C
fiveGSTAIList	List of tracking areas associated with the registration area within which the UE is current registered, see TS 24.501 [13], clause 9.11.3.9 (see NOTE)	C
NOTE: List shall be included each time there is a change to the registration area.		

The IRI-POI present in the AMF generating an xIRI containing an AMFStartOfInterceptionWithRegisteredUE 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).

6.2.2.2.6 AMF unsuccessful procedure

The IRI-POI in the AMF shall generate an xIRI containing an AMFUnsuccessfulProcedure record when the IRI-POI present in the AMF detects an unsuccessful procedure for a UE matching one of the target identifiers provided via LI_X1.

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

- AMF sends a N1: REGISTRATION REJECT message to the target UE and the UE 5G Mobility Management (5GMM) state for the access type (3GPP NG-RAN or non-3GPP access) within the AMF is changed to 5GMM-DEREGISTERED.

- AMF aborts a registration procedure before the UE 5G Mobility Management (5GMM) state for the access type (3GPP NG-RAN or non-3GPP access) within the AMF is changed to 5GMM-REGISTERED.

- AMF sends a SERVICE REJECT message to the target UE including a PDU session establishment reject message type.

- AMF aborts a UE-initiated NAS transport procedure with payload container type IE set to "SMS".

Unsuccessful registration shall be reported only if the target UE has been successfully authenticated.

Table 6.2.2-5: Payload for AMFUnsuccessfulProcedure record

Field name	Description	M/C/O
failedprocedureType	Specifies the procedure which failed at the AMF.	M
failureCause	Provides the value of the 5GSM or 5GMM cause, see TS 24.501 [13], clauses 9.11.3.2 and 9.11.4.2.	M
requestedSlice	Slice requested for the procedure, if available, given as a NSSAI (a list of S-NSSAI values as described in TS 24.501 [13] clause 9.11.3.37).	C
sUPI	SUPI associated with the procedure, if available (see NOTE).	C
sUCI	SUCI used in the procedure, if applicable and if available (see NOTE).	C
pEI	PEI used in the procedure, if available (see NOTE).	C
gPSI	GPSI used in the procedure, if available (see NOTE).	C
gUTI	5G-GUTI used in the procedure, if available, see TS 24.501 [13], clause 9.11.3.4 (see NOTE).	C
location	Location information determined during the procedure, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
NOTE: At least one identity shall be provided, the others shall be provided if available.		

6.2.2.2.7 AMF identifier association

The IRI-POI present in the AMF shall generate an xIRI containing an AMFIdentifierAssociation record when the IRI-POI present in the AMF detects a new identifier association for a UE matching one of the target identifiers provided via LI_X1. Generation of this record is subject to this record type being enabled for a specific target (see clause 6.2.2.2.1).

Table 6.2.2-6: Payload for AMFIdentifierAssociation record

Field name	Description	M/C/O
sUPI	SUPI associated with the procedure (see NOTE 1).	M
sUCI	SUCI used in the procedure, if applicable and if available.	C
pEI	PEI used in the procedure, if available (see NOTE 1).	C
gPSI	GPSI used in the procedure, if available (see NOTE 1).	C
gUTI	5G-GUTI used in the procedure, see TS 24.501 [13], clause 9.11.3.4.	M
location	Location information available when identifier association occurs. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*) and, when Dual Connectivity is activated, as an *additionalCellIDs* parameter (*location>locationInfo>additionalCellIDs*), see Annex A.	M
fiveGSTAIList	List of tracking areas associated with the registration area within which the UE is current registered, see TS 24.501 [13], clause 9.11.3.9. (See NOTE 2)	C
NOTE 1: SUPI shall always be provided, in addition to the warrant target identifier if different to SUPI. Other identifiers shall be provided if available. NOTE 2: List shall be included each time there is a change to the registration area.		

6.2.2.3 Generation of IRI over LI_HI2

When an xIRI is received over LI_X2 from the IRI-POI in AMF, the MDF2 shall generate the corresponding IRI message and deliver over LI_HI2 without undue delay. The IRI message shall contain a copy of the relevant record received in the xIRI over LI_X2. This record may be enriched with any additional information available at the MDF (e.g. additional location information).

The timestamp field of the psHeader structure shall be set to the time at which the AMF event was observed (i.e. the timestamp field of the X2 PDU).

Table 6.2.2-7 shows the IRI type (see ETSI TS 102 232-1 [9] clause 5.2.10) to be used for each IRI message.

Table 6.2.2-7: IRI type for IRI messages

IRI message	IRI type
AMFRegistration	REPORT
AMFDeregistration	REPORT
AMFLocationUpdate	REPORT
AMFStartOfInterceptionWithRegisteredUE	REPORT
AMFUnsuccessfulProcedure	REPORT
AMFIdentifierAssociation	REPORT

These IRI messages shall omit the CIN (see ETSI TS 102 232-1 [9] clause 5.2.4).

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

When an additional warrant is activated on a target UE and the LIPF uses the same XID for the additional warrant, the MDF2 shall be able to generate and deliver the IRI message containing the AMFStartOfInterceptionWithRegisteredUE record to the LEMF associated with the additional warrant without receiving a corresponding xIRI. The payload of the AMFStartOfInterceptionWithRegisteredUE record is specified in table 6.2.2-4.

6.2.2.4 Identity privacy

The AMF shall ensure for every registration (including re-registration) that SUPI has been provided by the UDM to the AMF and that the SUCI to SUPI mapping has been verified as defined in TS 33.501 [11]. This shall be performed regardless of whether the SUPI is a target of interception, and whether the null encryption algorithm is used for the SUCI. The AMF shall maintain the SUPI to SUCI mapping for at least the lifetime of the registration in order to allow interception based on SUPI after the initial registration.

6.2.2A Identifier Reporting for AMF

6.2.2A.1 Activation of reporting over LI_XEM1

The IEF in the AMF is activated and deactivated over LI_XEM1 by the LIPF using the LI_XEM1 protocol described in clause 5.2.7.

NOTE: Since the IEF reports association events for all UEs registered in the IEF's parent AMF, unlike POIs there is no concept of provisioning an IEF with target identifiers.

Upon receiving a valid activate task message over LI_XEM1, the IEF shall start generating records as defined in clause 6.2.2A.2.

Upon receiving a valid deactivate task message over LI_XEM1, the IEF shall stop generating records as defined in clause 6.2.2A.2.

6.2.2A.2 Generation of records over LI_XER

6.2.2A.2.1 Events

The IEF in the AMF shall generate an IEFIdentifierAssociation record whenever the IEF present in the AMF detects a change in association between a SUPI and a 5G-GUTI for any UE registered with the AMF. The IEF shall send the IEFIdentifierAssociation records to the ICF over LI_XER as defined in clause 5.9.

Accordingly, the IEF in the AMF generates IEFIdentifierAssociation records when any of the following events are detected:

- IEFAssociationRecord: Association of a 5G-GUTI to a SUPI, (this may also include SUCI to SUPI association).
- IEFDeassociationRecord: De-association of a 5G-GUTI from a SUPI.

NOTE1: The de-association of 5G-GUTI from a SUPI event record is only generated if a new 5G-GUTI is not allocated to a SUPI to update a previous association (e.g. at inter-AMF handover).

NOTE 2: As SUCIs are single use and only valid for a single authentication, they are only be valid at the single point in time when the association event is detected and reported to the ICF by the IEF.

In addition, when an IEF is activated as per clause 6.2.2A.1, the IEF shall generate associations event for all SUPIs which are registered in the AMF, where those identifier associations allocated prior to IEF activation remain current and are still available in the AMF (See NOTE 2).

NOTE 3: Only identifier associations which have been maintained by the AMF as part of normal network operations will be available.

In the case where the IEF in the AMF detects that a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE (5G-GUTI) message as defined in TS 24.501 [13] has been sent by the AMF towards a UE, the IEF shall immediately generate an IEFIdentifierAssociation record. This record shall be generated regardless of whether the CONFIGURATION UPDATE (5G-GUTI) or REGISTRATION ACCEPT procedure is subsequently successfully completed or not.

6.2.2A.2.2 Association Events

For each association event, the IEF shall create an IEFAssociationRecord, as defined below.

Table 6.2.2A-1: Payload for IEFAssociationRecord

Field name	Description	M/C/O
sUPI	SUPI associated with detected association event.	M
fiveGGUTI	5G-GUTI shall be provided. Encoded as per TS 24.501 [13] figure 9.11.3.4.1, omitting the first four octets.	M
timeStamp	Time at which the identifier association event occurred. Shall be given qualified with time zone information (i.e. as UTC or offset from UTC, not as local time).	M
tAI	Last known TAI associated with the SUPI. Encoded as per TS 24.501 [13] clause 9.11.3.8, omitting the first octet.	M
nCGI	Last known nCGI(s) available when identifier association event detected. Given as a sequence of PLMNID (encoded as per TS 38.413 [23] clause 9.3.3.5) and NCI (encoded as per TS 38.413 [23] clause 9.3.1.7).	M
nCGITime	ueLocationTimestamp(s) of nCGIs if available in AMF as per TS 29.571 [17] clause 5.4.4.9. If ueLocationTimestamp(s) is not available, shall be populated with timeStamp(s) of when last known nCGI(s), were obtained and stored by the AMF.	M
sUCI	SUCI shall be provided when event is triggered by association of a SUCI to a SUPI.	C
pEI	PEI, (See NOTE 1).	C
fiveGSTAIList	List of tracking areas associated with the registration area within which the UE is current registered, see TS 24.501 [13], clause 9.11.3.9. (See NOTE 2)	C

NOTE 1: Shall be provided in first association record to ICF after PEI is available and following any change of PEI.

NOTE 2: As a minimum, list of tracking areas shall be included in the first association event for each SUPI registered (per UE session) with the AMF and additionally whenever the TAI list changes due to a change in registration area.

For each de-association event, the IEF shall create an IEFDeassociationRecord, as defined below.

Table 6.2.2A-2: Payload for IEFDeassociationRecord

Field name	Description	M/C/O
sUPI	SUPI associated with detected de-association event.	M
fiveGGUTI	5G-GUTI shall be provided. Encoded as per TS 24.501 [13] figure 9.11.3.4.1, omitting the first four octets.	M
timeStamp	Time at which the identifier de-association event occurred. Shall be given qualified with time zone information (i.e. as UTC or offset from UTC, not as local time).	M
nCGI	Last known nCGI(s) available when identifier de-association event detected. Given as a sequence of PLMNID (encoded as per TS 38.413 [23] clause 9.3.3.5) and NCI (encoded as per TS 38.413 [23] clause 9.3.1.7)	M
nCGITime	ueLocationTimestamp(s) of nCGIs if available in AMF as per TS 29 .571 [17] clause 5.4.4.9. If ueLocationTimestamp(s) is not available, shall be populated with timeStamp(s) of when last known nCGI(s), were obtained and stored by the AMF.	M

6.2.2A.2.3 Transmission to the ICF

When activated (see clause 5.2.7), the IEF shall establish a TLS connection to the ICF as given over LI_XEM1. If the IEF fails to establish a TLS connection, it shall report an error over LI_XEM1 using the error reporting mechanisms described in TS 103 221-1 [7], and attempt to reconnect after a configurable period of time.

When a record has been generated as described in clause 6.2.2A.2.2, the IEF shall encode the IEFAssociationRecord or IEFDeassociationRecord as a BER-encoded IEFMessage structure, following the ASN.1 schema given in Annex F, and transmit it to the ICF over the established TLS connection.

The IEF may transmit a keepalive request using the keepalive record defined in Annex F. Upon receiving a keepalive request, the ICF shall respond with a keepaliveResponse record containing the same sequence number used in the request. The circumstances under which the IEF transmits keepalive requests is out of scope of the present document.

6.2.3 LI for SMF/UPF

6.2.3.1 Provisioning over LI_X1

6.2.3.1.1 General

If the warrant is for IRI and CC, then the IRI-POI and the CC-TF in the SMF shall be provisioned in accordance with clause 6.2.3.1.2, the MDF2 shall be provisioned in accordance with clause 6.2.3.1.3, and the MDF3 shall be provisioned in accordance with clause 6.2.3.1.4.

If the warrant is for IRI only, the IRI-POI in the SMF shall be provisioned in accordance with clause 6.2.3.1.2 and the MDF2 shall be provisioned in accordance with clause 6.2.3.1.3.

If approach 1 described in clause 6.2.3.9 is used for packet header reporting, the IRI-TF in the SMF shall be provisioned in accordance with clause 6.2.3.1.2 and the MDF2 shall be provisioned in accordance with clause 6.2.3.1.3. If approach 2 described in clause 6.2.3.9 is used for packet header reporting, the CC-TF in the SMF shall be provisioned in accordance with clause 6.2.3.1.2, the MDF2 shall be provisioned in accordance with clause 6.2.3.1.3, and the MDF3 shall be provisioned in accordance with clause 6.2.3.1.4.

6.2.3.1.2 Provisioning of the IRI-POI, IRI-TF and CC-TF in the SMF

The IRI-POI, IRI-TF and CC-TF present in the SMF are provisioned over LI_X1 by the LIPF using the X1 protocol as described in clause 5.2.2.

The POI/TF in the SMF 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.
- PEIIMEI.
- PEIIMEISV.
- GPSIMSISDN.
- GPSINAI.

Table 6.2.3-0A shows the minimum details of the LI_X1 ActivateTask message used for provisioning the IRI-POI, in the SMF.

Table 6.2.3-0A: ActivateTask message for SMF IRI-POI, CC-TF and IRI-TF

ETSI TS 103 221-1 [7] field name	Description	M/C/O
XID	XID assigned by LIPF. If the CC-TF or IRI-TF is also being tasked for the same interception, the same XID shall be used.	M
TargetIdentifiers	One or more of the target identifiers listed in the paragraph above.	M
DeliveryType	Set to “X2Only”, “X3Only” or “X2andX3” as needed to meet the requirements of the warrant. (NOTE: "X2Only" for IRI-POI, IRI-TF and "X3Only" for CC-TF can also be also be used).	M
TaskDetailsExtensions/ HeaderReporting	Header reporting-specific tag to be carried in the *TaskDetailsExtensions* field of ETSI TS 103 221-1 [7]. See Table 6.2.3-10. This field shall be present if the packet header reporting is required. Only permitted to be sent to the IRI-TF.	C
ListOfDIDs	Delivery endpoints of LI_X2 or LI_X3. These delivery endpoints shall be configured using the *CreateDestination* message as described in ETSI TS 103 221-1 [7] clause 6.3.1 prior to first use.	M

If packet header reporting is required, parameters specified in table 6.2.3-10: ActivatePDHReporting parameters shall be provided as the TaskDetailsExtensions/HeaderReporting field of the LI_X1 provisioning message.

6.2.3.1.3 Provisioning of the MDF2

The MDF2 listed as the delivery endpoint for xIRI generated by the IRI-POI in the SMF or the IRI-POI in the UPF shall be provisioned over LI_X1 by the LIPF using the X1 protocol as described in clause 5.2.2. Table 6.2.3-0B shows the minimum details of the LI_X1 ActivateTask message used for provisioning the MDF2.

The MDF2 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.
- PEIIMEI.
- PEIIMEISV.
- GPSIMSISDN.
- GPSINAI.

Table 6.2.3-0B: ActivateTask message for MDF2

ETSI TS 103 221-1 [7] field name	Description	M/C/O
XID	XID assigned by LIPF.	M
TargetIdentifiers	One or more of the target identifiers listed in the paragraph above.	M
DeliveryType	Set to “X2Only”, “X3Only” or “X2andX3” as needed to meet the requirements of the warrant. (Ignored by the MDF2).	M
TaskDetailsExtensions/ HeaderReporting	Header reporting-specific tag to be carried in the *TaskDetailsExtensions* field of ETSI TS 103 221-1 [7]. See Table 6.2.3-10. This field shall be present if packet header reporting is required.	C
ListOfDIDs	Delivery endpoints of LI_HI2. These delivery endpoints shall be configured using the *CreateDestination* message as described in ETSI TS 103 221-1 [7] clause 6.3.1 prior to first use.	M
ListOfMediationDetails	Sequence of Mediation Details, See Table 6.2.3-0C.	M

Table 6.2.3-0C: Mediation Details for MDF2

ETSI TS 103 221-1 [7] field name	Description	M/C/O
LIID	Lawful Intercept ID associated with the task.	M
DeliveryType	Set to "HI2Only".	M
ListOfDIDs	Details of where to send the IRI for this LIID. Shall be included if deviation from the ListofDIDs in the ActivateTask message is necessary. If included, the ListOfDIDs in the Mediation Details shall be used instead of any delivery destinations authorised by the ListOfDIDs field in the ActivateTask Message.	C
ServiceScoping	Shall be included to Identify the service(s) and associated service-related delivery settings for this LIID. May include more than one instance of this parameter to allow for different combinations of subparameters associated with a single LIID. This parameter is defined in ETSI TS 103 221-1 [7], Annex C, Table C.2.	C

6.2.3.1.4 Provisioning of the MDF3

The MDF3 listed as the delivery endpoint for the xCC generated by the CC-POI in the UPF shall be provisioned over LI_X1 by the LIPF using the X1 protocol as described in clause 5.2.2. Table 6.2.3-0D shows the minimum details of the LI_X1 ActivateTask message used for provisioning the MDF3. If packet header reporting is authorised and approach 2 described in clause 6.2.3.5 is used, the endpoint for the MDF3 shall be the MDF2 over LI_MDF.

The MDF3 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.
- PEIIMEI.
- PEIIMEISV.
- GPSIMSISDN.
- GPSINAI.

Table 6.2.3-0D: ActivateTask message for MDF3

ETSI TS 103 221-1 [7] field name	Description	M/C/O
XID	XID assigned by LIPF.	M
TargetIdentifiers	One or more of the target identifiers listed in the paragraph above.	M
DeliveryType	Set to “X2Only”, “X3Only” or “X2andX3” as needed to meet the requirements of the warrant.	M
TaskDetailsExtensions/ HeaderReporting	Header reporting-specific tag to be carried in the *TaskDetailsExtensions* field of ETSI TS 103 221-1 [7]. See Table 6.2.3-10. This field shall be present if packet header reporting is required.	C
ListOfDIDs	Delivery endpoints of LI_HI3 or LI_MDF. These delivery endpoints shall be configured using the *CreateDestination* message as described in ETSI TS 103 221-1 [7] clause 6.3.1 prior to first use.	M
ListOfMediationDetails	Sequence of Mediation Details, See Table 6.2.3-0E.	M

Table 6.2.3-0E: Mediation Details for MDF3

ETSI TS 103 221-1 [7] field name	Description	M/C/O
LIID	Lawful Intercept ID associated with the task.	M
DeliveryType	Set to "HI3Only".	M
ListOfDIDs	Details of where to send the CC for this LIID. Shall be included if deviation from the ListofDIDs in the ActivateTask message is necessary. If included, the ListOfDIDs in the Mediation Details shall be used instead of any delivery destinations authorised by the ListOfDIDs field in the ActivateTask Message.	C
ServiceScoping	Shall be included to Identify the service(s) and associated service-related delivery settings for this LIID. May include more than one instance of this parameter to allow for different combinations of subparameters associated with a single LIID. This parameter is defined in ETSI TS 103 221-1 [7], Annex C, Table C.2.	C

6.2.3.2 Generation of xIRI at IRI-POI in SMF over LI_X2

6.2.3.2.1 General

The IRI-POI present in the SMF shall send the xIRIs over LI_X2 for each of the events listed in TS 33.127 [5] clause 6.2.3.3, the details of which are described in the following sub-clauses.

6.2.3.2.2 PDU session establishment

The IRI-POI in the SMF shall generate an xIRI containing an SMFPDUSessionEstablishment record when the IRI-POI present in the SMF detects that a PDU session has been established for the target UE. The IRI-POI present in the SMF shall generate the xIRI for the following events:

- For a non-roaming scenario, the SMF (or for a roaming scenario, V-SMF in the VPLMN), sends the N1 NAS message (via AMF) PDU SESSION ESTABLISHMENT ACCEPT to the UE and the 5G Session Management (5GSM) state within the SMF is changed to PDU SESSION ACTIVE (see TS 24.501 [13]).

- For a home-routed roaming scenario, the SMF in the HPLMN (i.e. H-SMF) sends the N16: Nsmf_PDU_Session_Create response message with n1SmInfoToUe IE containing the PDU SESSION ESTABLISHMENT ACCEPT (see TS 29.502 [16]).

Table 6.2.3-1: Payload for SMFPDUSessionEstablishment record

Field name	Description	M/C/O
sUPI	SUPI associated with the PDU session (e.g. as provided by the AMF in the associated Nsmf_PDU_Session_CreateSMContext service operation). Shall be present except for PEI-only unauthenticated emergency sessions (see NOTE).	C
sUPIUnauthenticated	Shall be present if a SUPI is present in the message and set to “true” if the SUPI has not been authenticated, or “false” if it has been authenticated.	C
pEI	PEI associated with the PDU session if available (see NOTE).	C
gPSI	GPSI associated with the PDU session if available (see NOTE).	C
pDUSessionID	PDU Session ID See TS 24.501 [13] clause 9.4.	M
gTPTunnelID	Contains the F-TEID identifying the GTP tunnel used to encapsulate the traffic, as defined in TS 29.244 [15] clause 8.2.3. Non-GTP encapsulation is for further study.	M
pDUSessionType	Identifies selected PDU session type, see TS 24.501 [13] clause 9.11.4.11.	M
sNSSAI	Slice identifiers associated with the PDU session, if available. See TS 23.003 [19] clause 28.4.2 and TS 23.501 [2] clause 5.12.2.2.	C
uEEndpoint	UE endpoint address(es) if available.	C
non3GPPAccessEndpoint	UE's local IP address used to reach the N3IWF, TNGF or TWIF, if available. IP addresses are given as 4 octets (for IPv4) or 16 octets (for IPv6) with the most significant octet first (network byte order).	C
location	Location information provided by the AMF, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
dNN	Data Network Name associated with the target traffic, as defined in TS 23.003[19] clause 9A and described in TS 23.501 [2] clause 4.3.2.2.	M
aMFID	Identifier of the AMF associated with the target UE, as defined in TS 23.003 [19] clause 2.10.1 when available.	C
hSMFURI	URI of the Nsmf_PDUSession service of the selected H-SMF, if available. See TS 29.502 [16] clause 6.1.6.2.2.	C
requestType	Type of request as described in TS 24.501 [13] clause 9.11.3.47 if available. In the case where the network does not support Multi Access (MA) PDU sessions, but receives a MA PDU session request, a request type of “Initial request” shall be reported.	C
accessType	Access type associated with the session (i.e. 3GPP or non-3GPP access) if provided by the AMF (see TS 24.501 [13] clause 9.11.2.1A).	C
rATType	RAT Type associated with the access if provided by the AMF as part of session establishment (see TS 23.502 [4] clause 4.3.2). Values given as per TS 29.571 [17] clause 5.4.3.2.	C
sMPDUDNRequest	Contents of the SM PDU DN Request container, if available, as described in TS 24.501 [13] clause 9.11.4.15.	C
uEEPSPDNConnection	This IE shall be present, if available, during an EPS to 5GS Idle mode mobility or handover using the N26 interface. When present, it shall contain the EPS bearer context(s) information present in the uEEPSPDNConnection parameter of the intercepted SmContextCreateData message. (see TS 29.502 [16] clause 6.1.6.2.2).	C
NOTE: At least one of the SUPI, PEI or GPSI fields shall be present.		

6.2.3.2.3 PDU session modification

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

- For a non-roaming scenario, the SMF (or for a roaming scenario, V-SMF in the VPLMN), receives the N1 NAS message (via AMF) PDU SESSION MODIFICATION COMMAND COMPLETE from the UE and the 5GSM state within the SMF is returned to PDU SESSION ACTIVE (see TS 24.501 [13]). This applies to the following two cases:
  - UE initiated PDU session modification.
  - Network (VPLMN) initiated PDU session modification.
- For a non-roaming scenario, the SMF (or for a roaming scenario, V-SMF in the VPLMN), sends the N1 NAS message (via AMF) PDU SESSION ESTABLISHMENT ACCEPT to the UE and the 5GSM state within the SMF remains in the PDU SESSION ACTIVE (see TS 24.501 [13]). This applies to the following case:

- Handover from one access type to another access type happens (e.g. 3GPP to non-3GPP).

- For a home-routed roaming scenario, the SMF in the HPLMN (i.e. H-SMF) receives the N16: Nsmf_PDU_Session_Update response message with n1SmInfoFromUe IE containing the PDU SESSION MODIFICATION COMMAND COMPLETE (see TS 29.502 [16]). This applies to the following three cases:

  - UE initiated PDU session modification.

  - Network (VPLMN) initiated PDU session modification.

  - Network (HPLMN) initiated PDU session modification.

- For a home-routed roaming scenario, the SMF in the HPLMN (i.e. H-SMF) sends the N16: Nsmf_PDU_Session_Create response message with n1SmInfoToUe IE containing the PDU SESSION ESTABLISHMENT ACCEPT (see TS 29.502 [16]) while it had received a N16 Nsmf_PDU_Session_Create request message with an existing PDU Session Id with access type being changed. This applies to the following case:

  - Handover from one access type to another access type happens (e.g. 3GPP to non-3GPP).

Table 6.2.3-2: Payload for SMFPDUSessionModification record

Field name	Description	M/C/O
sUPI	SUPI associated with the PDU session (e.g. as provided by the AMF in the associated Nsmf_PDU_Session_CreateSMContext service operation). Shall be present except for PEI-only unauthenticated emergency sessions.	C
sUPIUnauthenticated	Shall be present if a SUPI is present in the message and set to “true” if the SUPI was not authenticated, or “false” if it has been authenticated.	C
pEI	PEI associated with the PDU session if available.	C
gPSI	GPSI associated with the PDU session if available.	C
sNSSAI	Slice identifier associated with the PDU session, if available. See TS 23.003 [19] clause 28.4.2 and TS 23.501 [2] clause 5.12.2.2.	C
non3GPPAccessEndpoint	UE's local IP address used to reach the N3IWF, TNGF or TWIF, if available. IP addresses are given as 4 octets (for IPv4) or 16 octets (for IPv6) with the most significant octet first (network byte order).	C
location	Location information provided by the AMF, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
requestType	Type of request as described in TS 24.501 [13] clause 9.11.3.47 if available.	C
accessType	Access type associated with the session (i.e. 3GPP or non-3GPP access) if provided by the AMF (see TS 24.501 [13] clause 9.11.2.1A).	C
rATType	RAT type associated with the access, if available. Values given as per TS 29.571 [17] clause 5.4.3.2.	C
pDUSessionID	PDU Session ID See TS 24.501 [13] clause 9.4. This parameter is conditional only for backwards compatibility.	C

6.2.3.2.4 PDU session release

The IRI-POI in the SMF shall generate an xIRI containing an SMFPDUSessionRelease record when the IRI-POI present in the SMF detects that a PDU session been released. The IRI-POI present in the SMF shall generate the xIRI for the following events:

- For a non-roaming scenario, the SMF (or for a roaming scenario, V-SMF in the VPLMN), receives the N1 NAS message (via AMF) PDU SESSION RELEASE COMMAND COMPLETE from the UE and the 5GSM state within the SMF is changed to PDU SESSION INACTIVE (see TS 24.501 [13]). This applies to the following two cases:

  - UE initiated PDU session release.

  - Network initiated PDU session release.

- For a non-roaming scenario, the SMF (or for a roaming scenario, V-SMF in the VPLMN), receives the N1 NAS message (via AMF) PDU SESSION MODIFICATION COMMAND REJECT from the UE with the cause value #43 indicating an invalid PDU Session ID and the 5GSM state within the SMF is changed to PDU SESSION INACTIVE (see TS 24.501 [13]). This applies to the case where the UE rejects a PDU SESSION

MODIFICATION COMMAND as it finds that the indicated PDU session ID is invalid. The 5GSM state is changed to PDU SESSION INACTIVE within the SMF.

- For a home-routed roaming scenario, the SMF in the HPLMN (i.e. H-SMF) receives the N16: Nsmf_PDU_Session_Update response message with n1SmInfoFromUe IE containing the PDU SESSION RELEASE COMMAND COMPLETE (see TS 29.502 [16]) from the V-SMF. This applies to the following three cases:
  - UE initiated PDU session release.
  - Network (VPLMN) initiated PDU session release.
  - Network (HPLMN) initiated PDU session release.
- For a home-routed roaming scenario, the SMF in the HPLMN (i.e. H-SMF) receives the N16: Nsmf_PDU_Session_Update response message with n1SmInfoFromUe IE containing the PDU SESSION MODIFICATION COMMAND REJECT (see TS 29.502 [16]) from the V-SMF with the cause value #43 indicating an Invalid PDU Session ID.

Table 6.2.3-3: Payload for SMFPDUSessionRelease record

Field name	Description	M/C/O
sUPI	SUPI associated with the PDU session.	M
pEI	PEI associated with the PDU session if available.	C
gPSI	GPSI associated with the PDU session if available.	C
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
location	Location information, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
cause	Indicates the NF Service Consumer cause for the requested PDU session release (see TS 29.502 [16] clause 6.1.6.3.8 for enumerated cause information). Include if known.	C

6.2.3.2.5 Start of interception with an established PDU session

The IRI-POI in the SMF shall generate an xIRI containing an SMFStartOfInterceptionWithEstablishedPDUSession record when the IRI-POI present in the SMF detects that a PDU session has already been established for the target UE when interception starts.

In a non-roaming scenario, the IRI-POI in the SMF (or in a roaming scenario, the IRI-POI in the V-SMF in the VPLMN) shall generate the xIRI containing the SMFStartOfInterceptionWithEstablishedPDUSession record when it detects that a new interception for a UE is activated (i.e. provisioned by the LIPF) for the following case:

- The 5GSM state within the SMF for that UE is 5GSM: PDU SESSION ACTIVE or PDU SESSION MODIFICATION PENDING.

NOTE: The above trigger happens when the SMF (V-SMF in VPLMN) had not sent an N1 NAS message PDU SESSION RELEASE COMMAND to the UE for a PDU session and the SMF (V-SMF in the VPLMN) had previously sent an N1 NAS message PDU SESSION ESTABLISHMENT ACCEPT to that UE for the same PDU session.

In a home-routed roaming scenario, the IRI-POI in the H-SMF shall generate the xIRI containing the SMFStartOfInterceptionWithEstablishedPDUSession record when it detects that a new interception for a UE is activated (i.e. provisioned by the LIPF) for the following case:

- The H-SMF had not sent a Nsmf_PDU_Session_Update Request (n1SmInfoToUe: PDU SESSION RELEASE COMMAND) to the V-SMF for a PDU session and H-SMF had previously sent a Nsmf_PDU_Session_Create response (n1SmInfoToUE: PDU SESSION ESTABLISHMENT ACCEPT) to the V-SMF for that PDU session.

The IRI-POI in the SMF shall generate the xIRI containing the SMFStartOfInterceptionWithEstablishedPDUSession record for each of the PDU sessions (that meets the above criteria) associated with the newly identified target UEs.

Table 6.2.3-4: Payload for SMFStartOfInterceptionWithEstablishedPDUSession record

Field name	Description	M/C/O
sUPI	SUPI associated with the PDU session (e.g. as provided by the AMF in the associated Nsmf_PDU_Session_CreateSMContext service operation). Shall be present except for PEI-only unauthenticated emergency sessions.	C
sUPIUnauthenticated	Shall be present if a SUPI is present in the message and set to “true” if the SUPI has not been authenticated, or “false” if it has been authenticated.	C
pEI	PEI associated with the PDU session if available.	C
gPSI	GPSI associated with the PDU session if available.	C
pDUSessionID	PDU Session ID as assigned by the AMF, as defined in TS 24.007 [14] clause 11.2.3.1b.	M
gTPTunnelID	Contains the F-TEID identifying the tunnel used to encapsulate the traffic, as defined in TS 29.244 [15] clause 8.2.3. Non-GTP encapsulation is for further study.	M
pDUSessionType	Identifies selected PDU session type, see TS 24.501 [13] clause 9.11.4.11.	M
sNSSAI	Slice identifier associated with the PDU session, if available. See TS 23.003 [19] clause 28.4.2 and TS 23.501 [2] clause 5.12.2.2.	C
uEEndpoint	UE endpoint address(es) if available. IP addresses are given as 4 octets (for IPv4) or 16 octets (for IPv6) with the most significant octet first (network byte order). MAC addresses are given as 6 octets with the most significant octet first.	C
non3GPPAccessEndpoint	UE's local IP address used to reach the N3IWF, TNGF or TWIF, if available. IP addresses are given as 4 octets (for IPv4) or 16 octets (for IPv6) with the most significant octet first (network byte order).	C
location	Location information provided by the AMF at session establishment, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
dNN	Data Network Name associated with the target traffic, as defined in TS 23.003 [19] clause 9A and described in TS 23.501 [2] clause 4.3.2.2.	M
aMFID	Identifier of the AMF associated with the target UE, as defined in TS 23.003 [19] clause 2.10.1, if available.	C
hSMFURI	URI of the Nsmf_PDUSession service of the selected H-SMF, if available. See TS 29.502 [16] clause 6.1.6.2.2.	C
requestType	Type of request as described in TS 24.501 [13] clause 9.11.3.47 if available.	C
accessType	Access type associated with the session (i.e. 3GPP or non-3GPP access) if provided by the AMF (see TS 24.501 [13] clause 9.11.2.1A).	C
rATType	RAT type associated with the access if provided by the AMF as part of session establishment (see TS 23.502 [4] clause 4.3.2). Values given as per TS 29.571 [17] clause 5.4.3.2.	C
sMPDUDNRequest	Contents of the SM PDU DN request container, if available, as described in TS 24.501 [13] clause 9.11.4.15.	C
timeOfSessionEstablishment	Time at which the session establishment occurred, if available. Shall be given qualified with time zone information (i.e. as UTC or offset from UTC, not as local time).	C

The IRI-POI present in the SMF generating an xIRI containing a SMFStartOfInterceptionWithEstablishedPDUSession 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).

6.2.3.2.6 SMF unsuccessful procedure

The IRI-POI in the SMF shall generate an xIRI containing an SMFUnsuccessfulProcedure record when the IRI-POI present in the SMF 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 SMF generates the xIRI when one of the following events are detected:

- SMF sends a PDU SESSION ESTABLISHMENT REJECT message to the target UE.
- SMF sends a PDU SESSION MODIFICATION REJECT message to the target UE.
- SMF sends a PDU SESSION RELEASE REJECT message to the target UE.

- SMF receives a PDU SESSION MODIFICATION COMMAND REJECT message from the target UE.

- An ongoing SM procedure is aborted at the SMF, due to e.g. a 5GSM STATUS message sent from or received by the SMF.

Table 6.2.3-5: Payload for SMFUnsuccessfulProcedure record

Field name	Description	M/C/O
failedProcedureType	Specifies the procedure which failed or is aborted at the SMF.	M
failureCause	Provides the value of the 5GSM cause, see TS 24.501 [13], clause 9.11.4.2. In case the procedure is aborted due to a 5GSM STATUS message, the 5GSM cause is the one included in the 5GSM status message.	M
requestedSlice	Slice requested for the procedure, if available, given as a NSSAI (a list of S-NSSAI values as described in TS 24.501 [13] clause 9.11.3.37).	C
initiator	Specifies whether the network (SMF) or the UE is initiating the rejection or indicating the failure.	M
sUPI	SUPI associated with the procedure, if available (see NOTE).	C
sUPIUnauthenticated	Shall be present if a SUPI is present in the message and set to “true” if the SUPI has not been authenticated, or “false” if it has been authenticated.	C
pEI	PEI used in the procedure, if available (see NOTE).	C
gPSI	GPSI used in the procedure, if available (see NOTE).	C
pDUSessionID	PDU Session ID See clause 9.4 of TS 24.501 [13], if available.	C
uEEndpoint	UE endpoint address(es) if available.	C
non3GPPAccessEndpoint	UE's local IP address used to reach the N3IWF, TNGF or TWIF, if available.	C
location	Location information provided by the AMF, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
dNN	Data Network Name associated with the target traffic, as defined in TS 23.003 [19] clause 9A and described in TS 23.501 [2] clause 4.3.2.2, if available.	C
aMFID	Identifier of the AMF associated with the target UE, as defined in TS 23.003 [19] clause 2.10.1 when available.	C
hSMFURI	URI of the Nsmf_PDUSession service of the selected H-SMF, if available. See TS 29.502 [16] clause 6.1.6.2.2.	C
requestType	Type of request as described in TS 24.501 [13] clause 9.11.3.47 if available.	C
accessType	Access type associated with the session (i.e. 3GPP or non-3GPP access) if provided by the AMF (see TS 24.501 [13] clause 9.11.2.1A).	C
rATType	RAT Type associated with the access if provided by the AMF as part of session establishment (see TS 23.502 [4] clause 4.3.2). Values given as per TS 29.571 [17] clause 5.4.3.2.	C
sMPDUDNRequest	Contents of the SM PDU DN Request container, if available, as described in TS 24.501 [13] clause 9.11.4.15.	C
NOTE: At least one identity shall be provided, the others shall be provided if available.		

6.2.3.2.7 MA PDU sessions

6.2.3.2.7.1 General

In the present document, an MA PDU session will include two general types of PDU sessions as defined below:

- MA-Confirmed: This is an MA PDU session where the UE signals Upgrade Allowed to MA and the network immediately upgrades the session to an MA PDU session or the UE explicitly requests an MA PDU session (using a Request Type of MA PDU).

- MA-Upgrade-Allowed: This is a PDU session where the UE indicated that upgrade to an MA PDU session is allowed, but the network does not immediately confirm the upgrade. The network may at some later point upgrade the session to an MA PDU session

NOTE: The above terms are not defined or used in other 3GPP Stage 2 or Stage 3 specifications, but have been introduced here to clarify and distinguish LI event reporting for the respective situations.

An MA-Confirmed MA PDU session may be established over a single access or over multiple accesses. The establishment over multiple accesses may occur concurrently or may occur at different points in time.

An MA-Upgrade-Allowed MA PDU session is established over a single access and nearly all aspects appears to be an ordinary non-MA PDU session with the key difference that the network may upgrade the session to an MA-confirmed MA PDU session.

6.2.3.2.7.2 MA PDU session establishment

The IRI-POI in the SMF shall generate an xIRI containing an SMFMAPDUSessionEstablishment record when the IRI-POI present in the SMF detects that a PDU session has been established for the target UE that is an MA PDU session (Request Type set to MA PDU session or upgraded at establishment), or where the upgrade allowed parameter is set to upgrade allowed and session is established as an ordinary PDU session (not upgraded at establishment, but may occur later on). The IRI-POI present in the SMF shall generate the xIRI for the following events:

- For a non-roaming scenario , the SMF sends the N1 NAS message (via AMF) PDU Session Establishment Accept to the UE for a new PDU session and the 5G Session Management (5GSM) state within the SMF is changed to PDU SESSION ACTIVE (see TS 24.501 [13]) in response to a PDU Session Establishment request received along with:
  - PDU Session ID which does not identify an existing PDU session, and
  - Request Type = MA PDU request, or
  - Request Type = initial request and MA PDU session information set to "MA PDU session network upgrade is allowed", with either upgrade occuring at establishment or upgrade does not occur at establishment but may occur later.
- For a home-routed roaming scenario, the SMF in the HPLMN (i.e. H-SMF) sends the N16: Nsmf_PDU_Session_Create response message with n1SmInfoToUe IE containing the PDU SESSION ESTABLISHMENT ACCEPT (see TS 29.502 [16]) for a new PDU session in response to a PDU Session Establishment request received along with:
  - PDU Session ID which does not identify an existing PDU session, and
  - Request Type = MA PDU request, or
  - Request Type = initial request and MA PDU session information set to "MA PDU session network upgrade is allowed", with either upgrade occuring at establishment or upgrade does not occur at establishment but may occur later.

Table 6.2.3-5A: Payload for SMFMAPDUSessionEstablishment record

Field name	Description	M/C/O
sUPI	SUPI associated with the PDU session (e.g. as provided by the AMF in the associated Nsmf_PDU_Session_CreateSMContext service operation). Shall be present except for PEI-only unauthenticated emergency sessions (see NOTE).	C
sUPIUnauthenticated	Shall be present if a SUPI is present in the message and set to “true” if the SUPI has not been authenticated, or “false” if it has been authenticated.	C
pEI	PEI associated with the PDU session if available (see NOTE).	C
gPSI	GPSI associated with the PDU session if available (see NOTE).	C
pDUSessionID	PDU Session ID See clause 9.4 of TS 24.501 [13]. Identifies a new PDU session.	M
pDUSessionType	Identifies selected PDU session type, see TS 24.501 [13] clause 9.11.4.11.	M
accessInfo	Identifies the access(es) associated with the PDU session including the information for each specific access (see Table 6.2.3-5B)	M
sNSSAI	Slice identifiers associated with the PDU session, if available. See TS 23.003 [19] clause 28.4.2 and TS 23.501 [2] clause 5.12.2.2.	C
uEEndpoint	UE endpoint address(es) if available.	C
location	Location information provided by the AMF, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
dNN	Data Network Name associated with the target traffic, as defined in TS 23.003[19] clause 9A and described in TS 23.501 [2] clause 4.3.2.2.	M
aMFID	Identifier of the AMF associated with the target UE, as defined in TS 23.003 [19] clause 2.10.1 when available.	C
hSMFURI	URI of the Nsmf_PDUSession service of the selected H-SMF, if available. See TS 29.502 [16] clause 6.1.6.2.2.	C
requestType	Type of request as described in TS 24.501 [13] clause 9.11.3.47 if available.	C
sMPDUDNRequest	Contents of the SM PDU DN Request container, if available, as described in TS 24.501 [13] clause 9.11.4.15.	C
servingNetwork	PLMN ID of the serving core network operator, and, for a Non-Public Network (NPN), the NID that together with the PLMN ID identifies the NPN.	M
oldPDUSessionID	The old PDU Session ID received from the UE. See clauses 4.3.2.2.1 and 4.3.5.2 of TS 23.502 [4] and clause 6.4.1.2 of TS 24.501 [13]. Include if known.	C
mAUpgradeIndication	Indicates whether the PDU session is allowed to be upgraded to MA-Confirmed MA PDU session (see clause 4.22.3 of TS 23.502 [4]). Include if known.	C
ePSPDNCnxInfo	Indicates if the PDU session may be moved to EPS during its lifetime (see TS 29.502 [16] clause 6.1.6.2.31). Include if known.	C
mAAcceptedIndication	Indicates that a request to establish an MA PDU session was accepted or if a single access PDU session request was upgraded into a MA PDU session (see clauses 4.22.2 and 4.22.3 of TS 23.502 [4]). It shall be set as follows: - true: MA-Confirmed MA PDU session was established - false: single access MA-Upgrade-Allowed MA PDU session was established that may be upgraded to an MA-Confirmed MA PDU session.	M
aTSSSContainer	Identifies the steering, switching, and splitting features for the MA-Confirmed MA PDU session. Also indicates whether MPTCP or ATSSS-LL is to be used for ATSSS. See 9.11.4.22 of 24.501[13].	C
NOTE: At least one of the SUPI, PEI or GPSI fields shall be present.		

Table 6.2.3-5B: Contents of Access Info parameter

Field name	Description	M/C/O
accessType	Access type associated with the session (i.e. 3GPP or non-3GPP access) as provided by the AMF (see TS 24.501 [13] clause 9.11.2.1A).	M
rATType	RAT Type associated with the access as provided by the AMF as part of session establishment (see TS 23.502 [4] clause 4.3.2). Values given as per TS 29.571 [17] clause 5.4.3.2.	C
gTPTunnelID	Contains the F-TEID identifying the GTP tunnel used to encapsulate the traffic, as defined in TS 29.244 [15] clause 8.2.3. Non-GTP encapsulation is for further study.	M
non3GPPAccessEndpoint	UE's local IP address used to reach the N3IWF, TNGF or TWIF, if available. IP addresses are given as 4 octets (for IPv4) or 16 octets (for IPv6) with the most significant octet first (network byte order).	C
establishmentStatus	Indicates whether the access type is established or released.	M
aNTypeToReactivate	Indicates the Access Network Type for which the UP connection is requested to be re-activated, for an MA PDU session. Applicable to session modification reporting.	C

6.2.3.2.7.3 MA PDU session modification

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

- For a non-roaming scenario, the SMF (or for a roaming scenario, V-SMF in the VPLMN), receives the N1 NAS message (via AMF) PDU SESSION MODIFICATION COMMAND COMPLETE from the UE and the 5GSM state within the SMF is returned to PDU SESSION ACTIVE (see TS 24.501 [13]). This applies to the following cases for an MA-Upgrade-Allowed PDU session:
  - UE initiated PDU session modification.
  - Network (VPLMN) initiated PDU session modification.
  - Upgrade to an MA PDU session.
- For a non-roaming scenario, the SMF (or for a roaming scenario, V-SMF in the VPLMN), receives the N1 NAS message (via AMF) PDU SESSION RELEASE COMPLETE from the UE in response to a PDU SESSION RELEASE COMMAND message containing an Access type IE identifying a single access to be released of an MA PDU session which was established over both accesses and the 5GSM state within the SMF remains in the PDU SESSION ACTIVE (see TS 24.501 [13]). This applies to the following case:
  - A single access type is released from an MA PDU session, but the MA PDU session continues.
- For a non-roaming scenario, the SMF (or for a roaming scenario, V-SMF in the VPLMN), sends the N1 NAS message (via AMF) PDU SESSION ESTABLISHMENT ACCEPT to the UE and the 5GSM state within the SMF remains in the PDU SESSION ACTIVE (see TS 24.501 [13]). This applies to the following cases:
  - Handover from one access type to another access type happens (e.g. 3GPP to non-3GPP) for an MA-Upgrade-Allowed MA PDU session.
  - MA PDU Session establishment over second access type.
- For a home-routed roaming scenario, the SMF in the HPLMN (i.e. H-SMF) receives the N16: Nsmf_PDU_Session_Update response message with n1SmInfoFromUe IE containing the PDU SESSION MODIFICATION COMMAND COMPLETE (see TS 29.502 [16]). This applies to the following cases for an MA-Upgrade-Allowed PDU session:
  - UE initiated PDU session modification.
  - Network (VPLMN) initiated PDU session modification.
  - Network (HPLMN) initiated PDU session modification.
  - Upgrade to an MA PDU session.

- For a home-routed roaming scenario, the SMF in the HPLMN (i.e. H-SMF) receives the N16: Nsmf_PDU_Session_Update response message with n1SmInfoFromUe IE containing the PDU SESSION RELEASE COMPLETE message, a response to a PDU SESSION RELEASE COMMAND message containing an Access type IE identifying a single access to be released of an MA PDU session which was established over both accesses and the 5GSM state within the SMF remains in the PDU SESSION ACTIVE (see TS 29.502 [16]). This applies to the following cases:

  - A single access type is released from an MA PDU session, but the MA PDU session continues.

- For a home-routed roaming scenario, the SMF in the HPLMN (i.e. H-SMF) sends the N16: Nsmf_PDU_Session_Create response message with n1SmInfoToUe IE containing the PDU SESSION ESTABLISHMENT ACCEPT (see TS 29.502 [16]) while it had received an N16 Nsmf_PDU_Session_Create request message with an existing PDU Session Id with access type being changed. This applies to the following cases:

  - Handover from one access type to another access type happens (e.g. 3GPP to non-3GPP) for an MA-Upgrade-Allowed PDU session.

  - MA PDU Session establishment over second access type.

Table 6.2.3-5C: Payload for SMFMAPDUSessionModification record

Field name	Description	M/C/O
sUPI	SUPI associated with the PDU session (e.g. as provided by the AMF in the associated Nsmf_PDU_Session_CreateSMContext service operation). Shall be present except for PEI-only unauthenticated emergency sessions.	C
sUPIUnauthenticated	Shall be present if a SUPI is present in the message, and set to “true” if the SUPI was not authenticated, or “false” if it has been authenticated.	C
pEI	PEI associated with the PDU session if available.	C
gPSI	GPSI associated with the PDU session if available.	C
pDUSessionID	PDU Session ID See clause 9.4 of TS 24.501 [13].	M
accessInfo	Identifies the access(es) associated with the PDU session including the information for each specific access (see Table 6.2.3-5B) being modified.	C
sNSSAI	Slice identifier associated with the PDU session, if available. See TS 23.003 [19] clause 28.4.2 and TS 23.501 [2] clause 5.12.2.2.	C
location	Location information provided by the AMF, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
requestType	Type of request as described in TS 24.501 [13] clause 9.11.3.47 if available.	C
servingNetwork	PLMN ID of the serving core network operator, and, for a Non-Public Network (NPN), the NID that together with the PLMN ID identifies the NPN.	M
oldPDUSessionID	The old PDU Session ID received from the UE. See clauses 4.3.2.2.1 and 4.3.5.2 of TS 23.502 [4] and clause 6.4.1.2 of TS 24.501 [13]. Include if known.	C
mAUpgradeIndication	Indicates whether the PDU session is allowed to be upgraded to MA PDU session (see clause 4.22.3 of 3GPP TS 23.502 [4]). Include if known.	C
ePSPDNCnxInfo	Indicates if the PDU session may be moved to EPS during its lifetime (see TS 29.502 [16] clause 6.1.6.2.31). Include if known.	C
mAAcceptedIndication	Indicates that a request to establish an MA PDU session was accepted or if a single access PDU session request was upgraded into a MA PDU session (see clauses 4.22.2 and 4.22.3 of TS 23.502 [4]). It shall be set as follows: - true: MA-Confirmed MA PDU session was established - false: single access MA-Upgrade-Allowed MA PDU session was established that may be upgraded to an MA-Confirmed MA PDU session.	M
aTSSSContainer	Identifies the steering, switching, and splitting features for the MA-Confirmed MA PDU session. Also indicates whether MPTCP or ATSSS-LL is to be used for ATSSS. See clause 9.11.4.22 of TS 24.501 [13].	C

6.2.3.2.7.4 MA PDU session release

The IRI-POI in the SMF shall generate an xIRI containing an SMFMAPDUSessionRelease record when the IRI-POI present in the SMF detects that an MA PDU session has been released. The IRI-POI present in the SMF shall generate the xIRI for the following events:

- For a non-roaming scenario, the SMF (or for a roaming scenario, V-SMF in the VPLMN), receives the N1 NAS message (via AMF) PDU SESSION RELEASE COMPLETE from the UE and the 5GSM state within the SMF is changed to PDU SESSION INACTIVE (see TS 24.501 [13]). This applies to the following two cases for an MA PDU session that is either MA-Confirmed or MA-Upgrade-Allowed:
  - UE initiated PDU session release.
  - Network initiated PDU session release.
- For a roaming scenario, V-SMF in the VPLMN, the V-SMF receives the N1 NAS message (via AMF) PDU SESSION RELEASE COMPLETE from the UE and the 5GSM state within the V-SMF is changed to PDU SESSION INACTIVE (see TS 24.501 [13]). This applies to the following two cases for an MA PDU session that is either MA-confirmed or MA-Upgrade-Allowed:
  - UE initiated PDU session release of a single access for an MA PDU session; (VPLMN considers MA PDU session fully released while HPLMN considers MA PDU session active).
  - Network initiated PDU session release of a single access for an MA PDU session; (VPLMN considers MA PDU session fully released while HPLMN considers MA PDU session active).
- For a non-roaming scenario, the SMF (or for a roaming scenario, V-SMF in the VPLMN), receives the N1 NAS message (via AMF) PDU SESSION MODIFICATION COMMAND REJECT from the UE with the cause value #43 indicating an invalid PDU Session ID and the 5GSM state within the SMF is changed to PDU SESSION INACTIVE (see TS 24.501 [13]). This applies to the case for a PDU session that is either MA-Confirmed or MA-Upgrade-Allowed and where the UE rejects a PDU SESSION MODIFICATION COMMAND as it finds that the indicated PDU session ID is invalid. The 5GSM state is changed to PDU SESSION INACTIVE within the SMF.
- For a home-routed roaming scenario, the SMF in the HPLMN (i.e. H-SMF) receives the N16: Nsmf_PDU_Session_Update response message with n1SmInfoFromUe IE containing the PDU SESSION RELEASE COMMAND COMPLETE (see TS 29.502 [16]) from the V-SMF. This applies to the following three cases for an MA PDU session that is either MA-Confirmed or MA-Upgrade-Allowed:
  - UE initiated PDU session release.
  - Network (VPLMN) initiated PDU session release.
  - Network (HPLMN) initiated PDU session release.
- For a home-routed roaming scenario, the SMF in the HPLMN (i.e. H-SMF) receives the N16: Nsmf_PDU_Session_Update response message with n1SmInfoFromUe IE containing the PDU SESSION MODIFICATION COMMAND REJECT (see TS 29.502 [16]) from the V-SMF with the cause value #43 indicating an Invalid PDU Session ID for an MA PDU session that is either MA-Confirmed or MA-Upgrade-Allowed.

Table 6.2.3-5D: Payload for SMFMAPDUSessionRelease record

Field name	Description	M/C/O
sUPI	SUPI associated with the PDU session.	M
pEI	PEI associated with the PDU session if available.	C
gPSI	GPSI associated with the PDU session if available.	C
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
location	Location information, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
cause	Indicates the NF Service Consumer cause for the requested PDU session release (see TS 29.502 [16] clause 6.1.6.3.8 for enumerated cause information). Include if known.	C

6.2.3.2.7.5 Start of interception with an established MA PDU session

The IRI-POI in the SMF shall generate an xIRI containing an SMFStartOfInterceptionWithEstablishedMAPDUSession record when the IRI-POI present in the SMF detects that a MA PDU session has already been established for the target UE when interception starts.

In a non-roaming scenario, the IRI-POI in the SMF (or in a roaming scenario, the IRI-POI in the V-SMF in the VPLMN) shall generate the xIRI containing the SMFStartOfInterceptionWithEstablishedMAPDUSession record when it detects that a new interception for a UE is activated (i.e. provisioned by the LIPF) for the following case for an MA PDU session that is either MA-Confirmed or MA-Upgrade-Allowed:

- The 5GSM state within the SMF for that UE is 5GSM: PDU SESSION ACTIVE or PDU SESSION MODIFICATION PENDING.

NOTE: The above trigger happens when the SMF (V-SMF in VPLMN) had not sent an N1 NAS message PDU SESSION RELEASE COMMAND to the UE to release the entire MA PDU session and the SMF (V-SMF in the VPLMN) had previously sent an N1 NAS message PDU SESSION ESTABLISHMENT ACCEPT to that UE for the same MA PDU session.

In a home-routed roaming scenario, the IRI-POI in the H-SMF shall generate the xIRI containing the SMFStartOfInterceptionWithEstablishedMAPDUSession record when it detects that a new interception for a UE is activated (i.e. provisioned by the LIPF) for the following case for an MA PDU session that is either MA-Confirmed or MA-Upgrade-Allowed:

- The H-SMF had not sent an Nsmf_PDU_Session_Update Request (n1SmInfoToUe: PDU SESSION RELEASE COMMAND to release the entire MA PDU session) to the V-SMF for a PDU session and H-SMF had previously sent an Nsmf_PDU_Session_Create response (n1SmInfoToUE: PDU SESSION ESTABLISHMENT ACCEPT) to the V-SMF for that PDU session.

The IRI-POI in the SMF shall generate the xIRI containing the SMFStartOfInterceptionWithEstablishedMAPDUSession record for each of the MA PDU sessions (that meets the above criteria) associated with the newly identified target UEs.

Table 6.2.3-5E: Payload for SMFStartOfInterceptionWithEstablishedMAPDUSession record

Field name	Description	M/C/O
sUPI	SUPI associated with the PDU session (e.g. as provided by the AMF in the associated Nsmf_PDU_Session_CreateSMContext service operation). Shall be present except for PEI-only unauthenticated emergency sessions.	C
sUPIUnauthenticated	Shall be present if a SUPI is present in the message and set to “true” if the SUPI has not been authenticated, or “false” if it has been authenticated.	C
pEI	PEI associated with the PDU session if available.	C
gPSI	GPSI associated with the PDU session if available.	C
pDUSessionID	PDU Session ID as assigned by the AMF, as defined in TS 24.007 [14] clause 11.2.3.1b.	M
pDUSessionType	Identifies selected PDU session type, see TS 24.501 [13] clause 9.11.4.11.	M
accessInfo	Identifies the access(es) associated with the PDU session including the information for each specific access (see Table 6.2.3-5B).	M
sNSSAI	Slice identifier associated with the PDU session, if available. See TS 23.003 [19] clause 28.4.2 and TS 23.501 [2] clause 5.12.2.2.	C
uEEndpoint	UE endpoint address(es) if available. IP addresses are given as 4 octets (for IPv4) or 16 octets (for IPv6) with the most significant octet first (network byte order). MAC addresses are given as 6 octets with the most significant octet first.	C
location	Location information provided by the AMF at session establishment, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
dNN	Data Network Name associated with the target traffic, as defined in TS 23.003 [19] clause 9A and described in TS 23.501 [2] clause 4.3.2.2.	M
aMFID	Identifier of the AMF associated with the target UE, as defined in TS 23.003 [19] clause 2.10.1, if available.	C
hSMFURI	URI of the Nsmf_PDUSession service of the selected H-SMF, if available. See TS 29.502 [16] clause 6.1.6.2.2.	C
requestType	Type of request as described in TS 24.501 [13] clause 9.11.3.47 if available.	C
sMPDUDNRequest	Contents of the SM PDU DN request container, if available, as described in TS 24.501 [13] clause 9.11.4.15.	C
servingNetwork	PLMN ID of the serving core network operator, and, for a Non-Public Network (NPN), the NID that together with the PLMN ID identifies the NPN.	M
oldPDUSessionID	The old PDU Session ID received from the UE. See clauses 4.3.2.2.1 and 4.3.5.2 of TS 23.502 [4] and clause 6.4.1.2 of TS 24.501 [13]. Include if known.	C
mAUpgradeIndication	Indicates whether the PDU session is allowed to be upgraded to MA PDU session (see clause 4.22.3 of TS 23.502 [4]). Include if known.	C
ePSPDNCnxInfo	Indicates if the PDU session may be moved to EPS during its lifetime (see TS 29.502 [16] clause 6.1.6.2.31). Include if known.	C
mAAcceptedIndication	Indicates that a request to establish an MA PDU session was accepted or if a single access PDU session request was upgraded into an MA PDU session (see clauses 4.22.2 and 4.22.3 of TS 23.502 [4]). It shall be set as follows: - true: MA-Confirmed MA PDU session was established. - false: single access MA-Upgrade-Allowed MA PDU session was established that may be upgraded to an MA-Confirmed MA PDU session.	M
aTSSSContainer	Identifies the steering, switching, and splitting features for the MA-Confirmed MA PDU session. Also indicates whether MPTCP or ATSSS-LL is to be used for ATSSS. See clause 9.11.4.22 of TS 24.501 [13].	C

The IRI-POI present in the SMF generating an xIRI containing a SMFStartOfInterceptionWithEstablishedMAPDUSession 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).

6.2.3.2.7.6 SMF MA unsuccessful procedure

The IRI-POI in the SMF shall generate an xIRI containing an SMFMAUnsuccessfulProcedure record when the IRI-POI present in the SMF 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 SMF generates the xIRI when one of the following events are detected:

- SMF sends a PDU SESSION ESTABLISHMENT REJECT message to the target UE for MA-Confirmed and MA-Upgrade-Allowed MA PDU sessions.

- SMF sends a PDU SESSION MODIFICATION REJECT message to the target UE for MA-Confirmed and MA-Upgrade-Allowed MA PDU sessions.
- SMF sends a PDU SESSION RELEASE REJECT message to the target UE for MA-Confirmed and MA-Upgrade-Allowed MA PDU sessions.
- SMF receives a PDU SESSION MODIFICATION COMMAND REJECT message from the target UE for MA-Confirmed and MA-Upgrade-Allowed MA PDU sessions.
- An ongoing SM procedure is aborted at the SMF, due to e.g. a 5GSM STATUS message sent from or received by the SMF for MA-Confirmed and MA-Upgrade-Allowed MA PDU sessions.

Table 6.2.3-5F: Payload for SMFMAUnsuccessfulProcedure record

Field name	Description	M/C/O
failedProcedureType	Specifies the procedure which failed or is aborted at the SMF.	M
failureCause	Provides the value of the 5GSM cause, see TS 24.501 [13], clause 9.11.4.2. In case the procedure is aborted due to a 5GSM STATUS message, the 5GSM cause is the one included in the 5GSM status message.	M
requestedSlice	Slice requested for the procedure, if available, given as a NSSAI (a list of S-NSSAI values as described in TS 24.501 [13] clause 9.11.3.37).	C
initiator	Specifies whether the network (SMF) or the UE is initiating the rejection or indicating the failure.	M
sUPI	SUPI associated with the procedure, if available (see NOTE).	C
sUPIUnauthenticated	Shall be present if a SUPI is present in the message and set to “true” if the SUPI has not been authenticated, or “false” if it has been authenticated.	C
pEI	PEI used in the procedure, if available (see NOTE).	C
gPSI	GPSI used in the procedure, if available (see NOTE).	C
pDUSessionID	PDU Session ID See clause 9.4 of TS 24.501 [13], if available.	C
accessInfo	Identifies the access(es) associated with the PDU session including the information for each specific access (see Table 6.2.3-5B).	M
uEEndpoint	UE endpoint address(es) if available.	C
location	Location information provided by the AMF, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
dNN	Data Network Name associated with the target traffic, as defined in TS 23.003 [19] clause 9A and described in TS 23.501 [2] clause 4.3.2.2, if available.	C
aMFID	Identifier of the AMF associated with the target UE, as defined in TS 23.003 [19] clause 2.10.1 when available.	C
hSMFURI	URI of the Nsmf_PDUSession service of the selected H-SMF, if available. See TS 29.502 [16] clause 6.1.6.2.2.	C
requestType	Type of request as described in TS 24.501 [13] clause 9.11.3.47 if available.	C
sMPDUDNRequest	Contents of the SM PDU DN Request container, if available, as described in TS 24.501 [13] clause 9.11.4.15.	C
NOTE: At least one identity shall be provided, the others shall be provided if available.		

6.2.3.2.8 PDU to MA PDU session modification

The IRI-POI in the SMF shall generate an xIRI containing an SMFPDUtoMAPDUSessionModification record when the IRI-POI present in the SMF detects that an existing PDU session for the target UE has been successfully modified to an MA PDU session using the PDU session modification procedures as described in TS 24.501 [13]. A PDU session is considered to be successfully modified to a MA PDU session, when all of the following are true:

1. The UE is registered to both 3GPP access and non-3GPP access:
   - In the same PLMN (non-roaming UE).
   - In the different PLMNs (roaming UE).
2. SMF receives the PDU SESSION MODIFICATION REQUEST from the UE (clause 8.2.10 in TS 24.501 [13]) that includes one of the following:
   - *modification request* and includes MA PDU session information IE set to *MA PDU session network upgrade allowed*.

- *MA PDU request.*

3. SMF sends a PDU SESSION MODIFICATION COMMAND to the UE that includes the ATSSS IE (clause 6.4.2.3 in TS 24.501 [13]).

4. SMF receives the PDU SESSION MODIFICATION COMPLETE from the UE (clause 8.3.10.1 in TS 24.501 [13]).

5. The 5GSM state within the SMF is PDU Session Active.

Once the SMFPDUtoMAPDUSessionModification record has been generated by the IRI-POI in the SMF, the IRI-POI shall follow clause 6.2.3.2.7 of the present document for further reporting for this MA PDU session.

Table 6.2.3-5G: Payload for SMFPDUtoMAPDUSessionModification record

Field name	Description	M/C/O
sUPI	SUPI associated with the PDU session (e.g. as provided by the AMF in the associated Nsmf_PDU_Session_CreateSMContext service operation). Shall be present except for PEI-only unauthenticated emergency sessions.	C
sUPIUnauthenticated	Shall be present if a SUPI is present in the message, and set to *true* if the SUPI was not authenticated, or *false* if it has been authenticated.	C
pEI	PEI associated with the PDU session if available.	C
gPSI	GPSI associated with the PDU session if available.	C
sNSSAI	Slice identifier associated with the PDU session, if available. See TS 23.003 [19] clause 28.4.2 and TS 23.501 [2] clause 5.12.2.2.	C
non3GPPAccessEndpoint	UE's local IP address used to reach the N3IWF, TNGF or TWIF, if available. IP addresses are given as 4 octets (for IPv4) or 16 octets (for IPv6) with the most significant octet first (network byte order).	C
location	Location information provided by the AMF, if available. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
requestType	Type of request as described in TS 24.501 [13] clause 9.11.3.47.	M
accessType	Access type associated with the session (i.e. 3GPP or non-3GPP access) if provided by the AMF (see TS 24.501 [13] clause 9.11.2.1A).	C
rATType	RAT type associated with the access, if available. Values given as per TS 29.571 [17] clause 5.4.3.2.	C
pDUSessionID	PDU Session ID See TS 24.501 [13] clause 9.4.	M
requestIndication	Indicates the request type for PDU session modification as indicated by the requestIndication sent in the PDU SESSION MODIFICATION REQUEST (see TS 29.502 [16] clause 6.1.6.3.6).	M
aTSSSContainer	Identifies the steering, switching, and splitting features for the MA-Confirmed MA PDU session. Also indicates whether MPTCP or ATSSS-LL is to be used for ATSSS. See TS 24.501 [13] clause 9.11.4.22.	M

6.2.3.3 Triggering of the CC-POI from CC-TF over LI_T3

6.2.3.3.1 LI_T3 interface specifics

When interception of communication contents is required or the delivery of packet header information is required and approach 2 described in clause 6.2.3.5 is used, the CC-TF present in the SMF sends a trigger to the CC-POI present in the UPF over the LI_T3 interface.

When the CC-TF in the SMF detects that a PDU session is being established for a target UE (i.e. when the SMF sends the N4: Session Establishment Request), it shall send an activation message to the CC-POI in the UPF over the LI_T3 interface. The activation message shall contain the correlation identifiers that the CC-POI in the UPF shall use with the xCC. This can be achieved by sending an ActivateTask message as defined in ETSI TS 103 221-1 [7] clause 6.2.1 with the following details.

Table 6.2.3-6: ActivateTask message for triggering the CC-POI in the UPF

ETSI TS 103 221-1 [7] field name	Description	M/C/O
XID	Allocated by the CC-TF as per ETSI TS 103 221-1 [7].	M
TargetIdentifiers	Packet detection criteria as determined by the CC-TF in the SMF, which enables the UPF to isolate target traffic. The CC-POI in the UPF shall support at least the identifier types given in Table 6.2.3-7. NOTE: This value is the target identifier for the CC-POI in the UPF and may be different from the target identifier specified in the warrant.	M
DeliveryType	Set to "X3Only".	M
ListOfDIDs	Delivery endpoints for LI_X3. These delivery endpoints shall be configured by the CC-TF in the SMF using the CreateDestination message as described in ETSI TS 103 221-1 [7] clause 6.3.1 prior to first use.	M
CorrelationID	Correlation ID to assign to X3 PDUs generated by the CC-POI in the UPF. This field is populated with the same CorrelationID the IRI-POI in the SMF uses for the associated xIRI.	M
ProductID	Shall be set to the XID of the Task Object associated with the interception at the CC-TF. This value shall be used by the CC-POI in the UPF to fill the XID of X3 PDUs.	M

Table 6.2.3-7: Target Identifier Types for LI_T3

Identifier type	Owner	ETSI TS 103 221-1 [7] TargetIdentifier type	Definition
GTP Tunnel ID	3GPP	gtpuTunnelId	F-TEID (see XSD schema)
UE IP Address	ETSI	ipAddress	See ETSI TS 103 221-1 [7]
UE IP Address and port	ETSI	ipAddressPort	See ETSI TS 103 221-1 [7]
PFCP Session ID	3GPP	TargetIdentifierExtension / FSEID	F-SEID (see XSD schema)
PDR ID	3GPP	TargetIdentifierExtension / PDRID	32 bit unsigned integer (see XSD schema)
QER ID	3GPP	TargetIdentifierExtension / QERID	32 bit unsigned integer (see XSD schema)
Network Instance	3GPP	TargetIdentifierExtension / NetworkInstance	Octet string (see XSD schema)
GTP Tunnel Direction	3GPP	TargetIdentifierExtension / GTPTunnelDirection	Enumeration (see XSD schema)

When the CC-TF in the SMF detects that a targeted PDU session is changing (i.e. when the SMF sends the N4 Session Modification Request to the UPF) in a way that requires changes to the interception already activated by the CC-POI in the UPF, the CC-TF shall modify the interception at the CC-POI in the UPF over the LI_T3 interface. This is achieved by sending a ModifyTask message as defined in ETSI TS 103 221-1 [7] clause 6.2.2. The ModifyTask message contains the same details as the ActivateTask message with the following fields updated as appropriate.

Table 6.2.3-8: Parameters that may be changed in a ModifyTask message when updating interception at the CC-POI in the UPF

ETSI TS 103 221-1 [7] field name	Description	M/C/O
TargetIdentifiers	Updated packet detection criteria as determined by the CC-TF in the SMF. NOTE: See notes on TargetIdentifiers in Table 6.2.3-6.	M

When the CC-TF in the SMF detects that a targeted PDU session is changing (i.e. when the SMF sends the N4 Session Modification Request to the UPF) for which the interception had not been previously activated in the CC-POI in the UPF (e.g. in case of previous unsuccessful LI activation at the CC-POI in the UPF by the CC-TF in the SMF), the CC-TF shall send an activation message to the CC-POI in the UPF over the LI_T3 interface. The activation message shall contain the correlation identifiers that the CC-POI in the UPF shall use with the xCC. This can be achieved by sending an ActivateTask message as defined in ETSI TS 103 221-1 [7] clause 6.2.1 with the details provided by Table 6.2.3-6.

When the CC-TF in the SMF detects that the PDU session has been released (i.e. when the SMF sends the N4: Session Release Request to the UPF) for a target UE, it shall send a deactivation message to the CC-POI in the UPF over the LI_T3 interface. When using ETSI TS 103 221-1 [7] this is achieved by sending a DeactivateTask message with the XID field set to the XID associated with the interception, as described in ETSI TS 103 221-1 [7] clause 6.2.3.

By default, interception shall occur at the anchor UPF as described in 6.2.3.3.3.

When a warrant that includes the service scoping of CC is activated for a target UE with an established PDU session and when the IRI-POI present in the SMF generates the xIRI containing an SMFStartOfInterceptionWithEstablishedPDUSession record (see clause 6.2.3.2.5), the CC-TF present in the SMF shall send an activation message to the CC-POI present in the UPF to generate the xCC.

6.2.3.3.2 CC interception with multi-homed PDU session

When a target UE accesses multiple Data Networks (DNs) via a multi-homed PDU session (see TS 23.501 [2] clause 5.6.4.3), multiple UPFs are involved in providing the PDU Session Anchors, with one UPF providing the Branching Point functionality. The Branching Point UPF may, or may not, be a PDU Session Anchor UPF (see TS 33.127 [5] Annex A3.2). The CC-TF present in the SMF shall send the CC intercept trigger to the CC-POI present in an UPF if and only if that UPF is selected to provide the CC-POI functions.

When the target UE is involved in multi-homed PDU session, the CC-TF present in the SMF (i.e. in the SMF that establishes the PDU session) shall determine which UPF(s) is(are) more suitable to provide the CC-POI functions adhering to the following requirements specified in TS 33.127 [5]:

- All applicable user plane packets are captured and delivered.
- Duplicate delivery of CC is suppressed to the extent possible.

This clause assumes that a PDU session contains only one Branching Point UPF (with N3 reference point toward the target UE) and one PDU Session Anchor UPF for each DN connection.

Since the present document requires the interception of all DN connections, the SMF may choose either all the PDU Session Anchor UPFs or the Branching Point UPF to provide the CC-POI functions.

The Branching Point UPF may be chosen when all user plane packets pass through the Branching Point UPF, and the CC-TF present in the SMF may choose the Branching Point UPF to provide the CC-POI function and accordingly, send the CC interception trigger to the CC-POI present in the Branching Point UPF. The CC intercept trigger shall include the packet detection rules. An example of these rules is:

- Generate the xCC from all the incoming and outgoing user plane packets to the target UE.

In this case, the CC-TF present in the SMF shall not select any of the PDU Session Anchor UPFs to provide the CC-POI functions.

When a Branching Point UPF is chosen to provide the CC-POI functions, and if the Branching Point UPF is removed from the user plane path during a PDU session, then the CC POI functions will have to be moved to the PDU Session Anchor UPFs.

The xCC delivered to the MDF3 shall be correlated to the PDU session related xIRI. The use of Correlation Id shall be on a user-plane path basis, which means that the xCC generated at different UPFs that belong to different PDU sessions may need to have separate Correlation IDs, each correlating to their own PDU session related xIRI.

6.2.3.3.3 CC Interception only at PDU Session Anchor UPFs

An option is to intercept a copy of the packets sent and received on the N6 interface [2] side of the PDU Anchor UPF (for each UL classifier in case of selective routing or *Service and Session Continuity* mode 3) for all DNs the subject is connected to. In the in-bound roaming case for home-routed roaming, the CSP shall deliver a copy of the packets sent and received on the N9 side of the PDU Anchor UPF towards the serving network.

6.2.3.4 IRI-POI in UPF triggering over LI_T2

When interception of packet data headers is required, if approach 1 as described in clause 6.2.3.9 is used for packet data header reporting is used, the IRI-TF in the SMF shall send a trigger to the IRI-POI in the UPF over the LI_T2 interface,

when the IRI-TF in the SMF detects that a PDU session has been established for a target UE. The activation message shall contain the correlation ID that the IRI-POI in the UPF shall use when generating xIRI. This shall be achieved by sending an ActivateTask message as defined in TS 103 221-1 [7] clause 6.2.1 with the following details.

Table 6.2.3-9: ActivateTask message for triggering the UPF IRI-POI

ETSI TS 103 221-1 [7] field name	Description	M/C/O
XID	Allocated by the IRI-TF as per ETSI TS 103 221-1 [7].	M
TargetIdentifiers	Packet detection criteria as determined by the IRI-TF in the SMF, which enable the UPF IRI-POI to isolate target traffic. The IRI-POI in the UPF shall support at least the identifier types given in Table 6.2.3-7. NOTE: This value is the target identifier for the IRI-POI in the UPF and may be different from the target identifier specified in the warrant.	M
DeliveryType	Set to “X2Only”.	M
TaskDetailsExtensions/ HeaderReporting	Header reporting-specific tag to be carried in the *TaskDetailsExtensions* field of ETSI TS 103 221-1 [7]. See Table 6.2.3-10.	M
ListOfDIDs	Delivery endpoints of LI_X2. These delivery endpoints shall be configured by the IRI-TF in the SMF using the *CreateDestination* message as described in ETSI TS 103 221-1 [7] clause 6.3.1 prior to first use.	M
CorrelationID	Correlation ID to assign for xIRI generated by the IRI-POI in the UPF. This field is populated with the same CorrelationID the IRI-POI in the SMF uses for the associated xIRI.	M
ProductID	Shall be set to the XID of the Task Object associated with the interception at the IRI-TF. This value shall be used by the IRI-POI in the UPF to fill the XID of X2 PDUs.	M

Table 6.2.3-10: ActivatePDHReporting Parameters

Field name	Description	M/C/O
pDHType	This field shall be set to either: - "PDHR," for packet-by-packet reporting. - "PDSR," for summarized reporting.	M
pDSRType	If pDHType is PDSR, this field shall be set to at least one of the following triggers: a) timer expiry (along with a timer value and unit). b) packet count (along with a value for the number of packets detected before a summary is to be triggered). c) byte count (along with a value for the cumulative byte size reached across all packets belonging to the summary before said summary is to be triggered). Summary reports shall not be cumulative, i.e. each summary report shall describe only the packets contained in its respective range, and each new summary shall start its count (of whichever attribute from the numbered list above applies) from zero, i.e. the information in the (n+1)'th summary report starts immediately after the end of the n'th summary report.	C

When the IRI-TF in the SMF detects that a targeted PDU session has changed in a way which requires changes to the interception by the IRI-POI in the UPF, the IRI-TF in the SMF shall modify the interception at the IRI-POI in the UPF over the LI_T2 interface. This is achieved by sending a ModifyTask message as defined in ETSI TS 103 221-1 [7] clause 6.2.2. The ModifyTask message contains the same details as the ActivateTask message with the following fields updated as appropriate.

Table 6.2.3-11: Parameters that may be changed in a ModifyTask message when updating interception at the IRI-POI in the UPF

Field name	Description	M/C/O
TargetIdentifiers	Updated packet detection criteria as determined by the IRI-TF in the SMF. NOTE: See notes on TargetIdentifiers in Table 6.2.3-6.	M

When the IRI-TF in the SMF detects that the PDU session has been released for a target UE, it shall send a deactivation message to the IRI-POI in the UPF over the LI_T2 interface. When using ETSI TS 103 221-1 [7] this is achieved by sending a DeactivateTask message with the XID field set to the XID associated with the interception, as described in ETSI TS 103 221-1 [7] clause 6.2.3.

When a PDU session involves multiple UPFs, the selection of UPF to provide the IRI-POI functions shall be done in the same way an UPF is selected to provide the CC-POI functions as described in clauses 6.2.3.3.2 and 6.2.3.3.3.

When interception of packet data headers is required for a target UE and when the IRI-POI present in the SMF generates the xIRI containing an SMFStartOfInterceptionWithEstablishedPDUSession record, if approach 1 described in clause 6.2.3.9 is used for packet data header information reporting, then the IRI-TF present in the SMF shall send an activation message to the IRI-POI present in the UPF to generate the Packet Data Header report related xIRIs from the user plane packets of that PDU session.

6.2.3.5 Generation of xIRI at UPF over LI_X2

6.2.3.5.1 Packet data header reporting

The IRI-POI in the UPF generates packet data header information either in per-packet form, as Packet Data Header Reports (PDHRs), or in summary form, as Packet Data Header Summary Reports (PDSRs).

6.2.3.5.2 Fragmentation

If the IRI-POI in the UPF is placed on a link which fragmented the original IP packet (see IETF RFC 791[34] for basic fragmentation rules, and IETF RFC 815 [26] for more complex re-assembly rules), a situation may occur in which only the first fragment can be sensibly reported in a PDHR, while the subsequent fragments may be missing essential fields that are mandatory, which may cause simplistic implementations to mis-report them, or omit them altogether.

In this case, the IRI-POI in the UPF shall report the first fragment of a fragmented IP packet, including the port numbers when they are included within this first fragment, using the length of the fragment to determine if the port numbers are indeed encoded within this first fragment. The subsequent fragments are reported without port information. This technique relieves the IRI-POI in the UPF from having to reassemble the original IP packet (at line speed) at the cost of accuracy of the reported fields.

6.2.3.5.3 Packet Data Header Reporting (PDHR)

If the per-packet form of packet data header reporting, i.e. PDHR, is used, the IRI-POI in the UPF extracts the following information from each packet.

Table 6.2.3-12: PDHeaderReport record

Field name	Description	M/C/O
pDUSessionID	The PDU Session ID value 255 shall be used by the sender; the receiver shall ignore the parameter (see NOTE).	M
sourceIPAddress	Shall contain the source address of the packet from the 32-bit *"Source Address"* field in IPv4, as defined in IETF RFC 791 [34], or from the 128-bit *"Source Address"* field in IPv6, as defined in IETF RFC 2460 [27].	M
sourcePort	Shall contain the "*Source Port*" number that indicates an application or service running on top of the transport, if the *"Protocol"* IP field (see the *nextLayerProtocol* field below in this table) is one of: a) Transmission Control Protocol (**TCP**), IP "Protocol" field decimal "6"; see IETF RFC 793 [28]. b) User Datagram Protocol (**UDP**), IP "Protocol" field decimal "17"; see IETF RFC 768 [29]. c) Datagram Congestion Control Protocol (**DCCP**), IP "Protocol" field decimal "33"; see IETF RFC 4340 [30]. d) Stream Control Transmission Protocol (**SCTP**), IP "Protocol" field decimal "132"; see IETF RFC 4960 [31]. For further details on Layer four protocols, see IANA [32].	C
destinationIPAddress	Shall contain the destination address of the packet from the 32-bit *"Destination Address"* field in IPv4, as defined in IETF RFC 791 [34], or from the 128-bit *"Destination Address"* field, as defined in IETF RFC 2460 [27].	M
destinationPort	Shall contain the *"Destination Port*" number that indicates an application or service running on top of the transport, if the *"Protocol"* IP field (see the *nextLayerProtocol* field below in this table) is one of: e) Transmission Control Protocol (**TCP**), IP "Protocol" field decimal "6"; see IETF RFC 793 [28]. f) User Datagram Protocol (**UDP**), IP "Protocol" field decimal "17"; see IETF RFC 768 [29]. g) Datagram Congestion Control Protocol (**DCCP**), IP "Protocol" field decimal "33"; see IETF RFC 4340 [30]. h) Stream Control Transmission Protocol (**SCTP**), IP "Protocol" field decimal "132"; see IETF RFC 4960 [31]. For further details on Layer four protocols, see IANA [32].	C
nextLayerProtocol	Shall contain the contents of the IP *"Protocol"* field as defined in IETF RFC 791 [34] (bits 72...79 in the IP header), and is one of the assigned Internet protocol numbers defined in *IANA* [32].	M
iPv6flowLabel	If the IP addresses in the report are IPv6, this field shall contain the 20-bit IPv6 "Flow Label" as defined in: - IPv6 IETF RFC 2460 [27], and - IPV6 Flow Label Specification IETF RFC 6437 [33].	C
direction	Shall contain the direction of the intercepted packet, and it indicates either "from target" or "to target."	M
packetSize	Shall contain the value of the *"Total Length*" IP header field if IPv4 is used, as defined in IETF RFC 791 [34], or the value of the "*Payload Length*" field if IPv6 is used, as defined in IETF RFC 2460 [27].	M

NOTE: This is a placeholder value used to fill the pDUSessionID field, given that the UPF does not receive the PDU Session ID used for the session by the SMF, so this information is not available at the UPF. The PDU Session ID can be retrieved by the LEMF from the IRIs generated by the IRI-POI at the SMF and delivered by the MDF2.

6.2.3.5.4 Packet Data Summary Reporting (PDSR)

If the summary form of the packet data header reporting, i.e. PDSR, is used, the IRI-POI in the UPF extracts from each packet the following information and aggregates it in summaries which are delivered over LI_X2 according to the pDSRType field defined in the ActivatePDHReporting Parameters of the ActivateTask message received from the IRI-TF (see clause 6.2.3.4 and Table 6.2.3-10). In addition, the current summary is sent over LI_X2 when the IRI_POI in the UPF receives a DeactivateTask message for the Task that generated the PDSR regardless of whether the trigger in the pDSRType field of the ActivateTask message was met. In this case, the pDSRSummaryTrigger field of the PDSR record shall be set to endOfFlow.

Table 6.2.3-13: PDSummaryReport record

Field name	Description	M/C/O
pDUSessionID	The PDU Session ID value 255 shall be used; the receiver shall ignore the parameter (see NOTE).	M
sourceIPAddress	Shall contain the source address of the packet from the 32-bit *"Source Address"* field in IPv4, as defined in IETF RFC 791 [34], or from the 128-bit *"Source Address"* field in IPv6, as defined in IETF RFC 2460 [27].	M
sourcePort	Shall contain the "*Source Port*" number that indicates an application or service running on top of the transport, if the *"Protocol"* IP field (see the *nextLayerProtocol* field below in this table) is one of: a) Transmission Control Protocol (**TCP**), IP "Protocol" field decimal "6"; see IETF RFC 793 [28]. b) User Datagram Protocol (**UDP**), IP "Protocol" field decimal "17"; see IETF RFC 768 [29]. c) Datagram Congestion Control Protocol (**DCCP**), IP "Protocol" field decimal "33"; see IETF RFC 4340 [30]. d) Stream Control Transmission Protocol (**SCTP**), IP "Protocol" field decimal "132"; Stream Control Transmission Protocol [31]. For further details on Layer four protocols, see IANA [32].	C
destinationIPAddress	Shall contain the destination address of the packet from the 32-bit *"Destination Address"* field in IPv4, as defined in IETF RFC 791 [34], or from the 128-bit *"Destination Address"* field, as defined in IETF RFC 2460 [27].	M
destinationPort	Shall contain the *"Destination Port*" number that indicates an application or service running on top of the transport, if the *"Protocol"* IP field (see the *nextLayerProtocol* field below in this table) is one of: a) Transmission Control Protocol (**TCP**), IP "Protocol" field decimal "6"; see IETF RFC 793 [28]. b) User Datagram Protocol (**UDP**), IP "Protocol" field decimal "17"; see IETF RFC 768 [29]. c) Datagram Congestion Control Protocol (**DCCP**), IP "Protocol" field decimal "33"; see IETF RFC 4340 [30]. d) Stream Control Transmission Protocol (**SCTP**), IP "Protocol" field decimal "132"; Stream Control Transmission Protocol [31]. For further details on Layer four protocols, see IANA [32].	C
nextLayerProtocol	Shall contain the contents of the IP *"Protocol"* field as defined in IETF RFC 791 [34] (bits 72..79 in the IP header), and is one of the assigned Internet protocol numbers defined in *IANA* [32].	M
iPv6flowLabel	If the IP addresses in the report are IPv6, this field shall contain the 20-bit IPv6 "Flow Label" as defined in IPv6 IETF RFC 2460 [27] and the *IPV6 Flow Label Specification* IETF RFC 6437 [33].	C
direction	Shall contain the direction of the intercepted packet, and it indicates either "from target" or "to target."	M
pDSRSummaryTrigger	Shall contain the trigger that caused the summary report to be generated, which is one of the following: a) timer expiry. b) packet count. c) byte count. d) start of a flow. e) end of a flow.	M
firstPacketTimestamp	Shall contain the timestamp that represents the time that the IRI-POI in the UPF detected the first packet in the set represented by this summary.	M
lastPacketTimestamp	Shall contain the timestamp that represents the time that the IRI-POI in the UPF detected the last packet in the set represented by this summary.	M
packetCount	Shall contain the number of packets detected during the creation of this summary.	M
byteCount	Shall contain the number of bytes summed across all packets that belong to this summary. For IPv4 it is the sum of the *"Total Length"* fields across all packets in the summary as defined in *Internet Protocol* IETF RFC 791 [34], while for IPv6 it is the sum of the *"Payload Length*" fields across all packets in the summary as defined in *Internet Protocol, Version 6 (IPv6) Specification*, IETF RFC 2460 [27].	M

NOTE: This is a placeholder value used to fill the pDUSessionID field, given that the UPF does not receive the PDU Session ID used for the session by the SMF, so this information is not available at the UPF. The PDU Session ID can be retrieved by the LEMF from the IRIs generated by the IRI-POI at the SMF and delivered by the MDF2.

6.2.3.6 Generation of xCC at CC-POI in the UPF over LI_X3

The CC-POI present in the UPF shall send xCC over LI_X3 for each IP packet matching the criteria specified in the Triggering message (i.e. ActivateTask message) received over LI_T3 from the CC-TF in the SMF.

NOTE: Implementers are reminded of the completeness and non-duplication requirements (see TS 33.127 [5]).

Each X3 PDU shall contain the contents of the user plane packet given using the GTP-U, IP or Ethernet payload format.

The CC-POI present in the UPF shall set the payload format to indicate the appropriate payload type (5 for IPv4 Packet, 6 for IPv6 Packet, 7 for Ethernet frame or 12 for GTP-U Packet as described in ETSI TS 103 221-2 [8] clauses 5.4 and 5.4.13.

If handover of the entire GTP-U packet is required over LI_HI3 (see clause 6.2.3.8), then consideration shall be made of the correct choice of LI_X3 payload type to ensure that the MDF3 has the necessary CC information. Support for delivery of LI_X3 as payload type 12 (GTP-U packet) is mandatory.

The CC-POI present in the UPF may use the Additional XID Related Information attributes to facilitate efficient delivery of xCC, as specified in ETSI TS 103 221-2 [8] clause 5.3.22.

6.2.3.7 Generation of IRI over LI_HI2

When an xIRI is received over LI_X2 from the IRI-POI in the SMF or the IRI-POI in the UPF, 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 SMF event was observed (i.e. the timestamp field of the xIRI).

Tables 6.2.3-14 shows the IRI type (see ETSI TS 102 232-1 [9] clause 5.2.10) to be used for each record type.

Table 6.2.3-14: IRI type for messages

Record type	IRI Type
SMFPDUSessionEstablishment	BEGIN
SMFPDUSessionRelease	END
SMFPDUSessionModification	CONTINUE
SMFStartOfInterceptionWithEstablishedPDUSession	BEGIN
SMFUnsuccessfulProcedure	REPORT
SMFMAPDUSessionEstablishment	BEGIN
SMFMAPDUSessionRelease	END
SMFMAPDUSessionModification	CONTINUE
SMFStartOfInterceptionWithEstablishedMAPDUSession	BEGIN
SMFMAUnsuccessfulProcedure	REPORT
PDHeaderReport	REPORT
PDSummaryReport	REPORT

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.

When an additional warrant is activated on a target UE and the LIPF uses the same XID for the additional warrant, the MDF2 shall be able to generate and deliver the IRI message containing the SMFStartOfInterceptionWithEstablishedPDUSession record and the SMFStartOfInterceptionWithEstablishedMAPDUSession record to the LEMF associated with the additional warrant without receiving a corresponding xIRI. The payload of the SMFStartOfInterceptionWithEstablishedPDUSession record is specified in table 6.2.3-4, while the payload of the SMFStartOfInterceptionWithEstablishedMAPDUSession record is specified in table 6.2.3-9. The MDF2 shall generate and deliver the IRI message containing the SMFStartOfInterceptionWithEstablishedPDUSession record for each of the established PDU sessions to the LEMF associated with the new warrant. The MDF2 shall generate and deliver the IRI message containing the

SMFStartOfInterceptionWithEstablishedMAPDUSession record for each of the established MA PDU sessions to the LEMF associated with the new warrant.

When the delivery of packet header information is required and approach 2 described in clause 6.2.3.9 is used, the MDF2 shall generate the IRI message and send it over LI_HI2 without undue delay when xCC is received over LI_MDF from the MDF3. The MDF2 shall generate packet data header information as described in clause 6.2.3.5.

6.2.3.8 Generation of CC over LI_HI3

When the xCC is received over LI_X3, the MDF3 shall emit the CC over LI_HI3 without undue delay.

The timestamp field of the ETSI TS 102 232-1 [9] PSHeader structure shall be set to the time that the UPF 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.

The MDF3 shall populate the threeGPP33128DefinedCC field (see clause 5.5.3 of the present document) with a BER-encoded CCPayload structure containing either:

1. The uPFCCPDU field containing the GTP-U packet received over LI_X3. It shall only be used if the content of the GTP-U packet is an IPv4 or IPv6 packet.
2. The extendedUPFCCPDU field as described in Table 6.2.3-15.

The MDF3 shall support delivery using either option.

Table 6.2.3-15: ExtendedUPFCCPDU structure

Field name	Description	M/C/O
payload	Payload of the GTP-U packet without GTP-U encapsulation. Content shall be supplied according to Table 6.2.3-16.	M
qFI	Shall be populated with the QoS Flow Identifier value from the GTP-U header extension (see TS 38.415 [41] clause 5.5.3.3) if present over LI_X3.	C

Table 6.2.3-16: UPFCCPDUPayload structure

Field name	Description
uPFIPCC	Contains an IPv4 or IPv6 packet
uPFEthernetCC	Contains an Ethernet frame
uPFUnstructuredCC	Contains an unstructured packet

6.2.3.9 Packet Data Information Reporting

As described in TS 33.127 [5] clause 6.2.3.1, the warrants that do not require the interception of communication contents may require IRI messages that require access to the user plane packets. One such service that requires such a capability is the packet data header information reporting which includes the following two IRI messages:

- Packet Data Header Reporting (PDHR).
- Packet Data Summary Reporting (PDSR).

NOTE: Packet Data Header Reporting is done using the IRI messages containing the PDHeaderReport record and the Packet Data Summary Reporting is done using the IRI messages containing the PDSummaryReport record.

TS 33.127 [5] clause 6.2.3.1 provides two approaches for the generation of such IRI messages.

In approach 1, the IRI-TF present in the SMF triggers the IRI-POI present in the UPF to construct and deliver xIRIs to the MDF2 as described in clause 6.2.3.4. The details of these xIRIs are described in clause 6.2.3.5.

In approach 2, the CC-TF present in the SMF triggers the CC-POI present in the UPF to deliver the xCC to the MDF3 as described in clause 6.2.3.6. The MDF3 forwards the xCC to the MDF2 over the LI-MDF interface and MDF2 generates the IRI messages containing the PDHeaderReport and PDSummaryReport records from the xCC. The payload of PDHeaderReport and PDSummaryReport records are as described in clauses 6.2.3.5.3 and 6.2.3.5.4, tables 6.2.3-12 and 6.2.3-13. Note that in approach 2, the MDF2 generates these IRI messages containing PDHeaderReport

and PDSummaryReport records without receiving the equivalent xIRI from an IRI-POI. The actions of MDF2, MDF3 and CC-TF in SMF are managed as part of the intercept data provisioned to them over the LI_X1 interface.

6.2.3.10 Sharing LI state information over LI_ST

6.2.3.10.1 Overview

TFs in SMFs in SMF sets need to share LI state information to avoid losing track of the XIDs and CorrelationIDs used in the tasks activated in the POI in the UPF when the triggered task control is transferred from one TF to another.

POIs in SMFs in SMF sets need to share LI state information to avoid losing track of the CorrelationIDs and sequence numbers used in the generation of xIRI when the interception is moved to another POI in the same SMF set.

The LIPF may request, store or remove any LI state records at any moment. The LIPF may revoke the credentials of any LI function to use the LI_ST function via LI_X0.

6.2.3.10.2 Storing LI state

The TF in the SMF shall store the LI state (related to a task active in the UPF POI) in the LISSF whenever the parent SMF stores session state for the relevant PDU session in the UDSF and whenever the parent SMF sends session state for the relevant PDU session to another SMF.

The POI in the SMF shall store the LI state (related to a task active in the SMF POI) in the LISSF whenever the parent SMF stores session state for the relevant PDU session in the UDSF and whenever the parent SMF sends session state for the relevant PDU session to another SMF.

When storing state, the LI function in the SMF shall use the state storage procedure specified in clause 5.10.2. During this procedure, the LI function shall add the following metadata to the RecordMeta for the record.

Table 6.2.3.10.2-1: Additional metadata for the RecordMeta

Field Name	Description	M/C/O
PDUSessionID	Identifier for the PDU session related to task.	M
UDSFRecordID	The recordID used by the parent SMF to store the associated SMF session information in the UDSF.	M
LIStateRecordType	Identifier for the record type which can be "TFLIState" or "POILIState".	M

The TF shall store the following information as the first record block (see TS 29.598 [50] clause 6.1.3.3.3.2), encoded as XML following the XSD schema given in Annex G.

Table 6.2.3.10.2-2: TFLIState structure for storing TF state information in the LISSF

Field Name	Description	M/C/O
PDUSessionID	Identifier for the PDU session related to task.	M
XID	XID of the task object associated with the interception at the TF in SMF.	M
CorrelationID	Correlation ID to assign to interception product generated by the POI in the UPF.	M
TriggeredTasks	Collection of information about tasks that the TF in SMF has activated in triggered POIs in UPF due to interception for this PDU session. As a list of TriggeredTask, see Table 6.2.3.10.2-3 below.	M

Table 6.2.3.10.2-3: TriggeredTask

Field Name	Description	M/C/O
XID	XID of the task object associated with the interception at the triggered POI in UPF.	M
NEID	NEID used in LI_T2/LI_T3 communication by the triggered POI in UPF.	M

The TF needs to specify the XID in order to avoid removing the LI state related to the same ProductID but a different task in the UPF POI, for example if there is more than one PDU session.

The SMF POI shall store the following information as the first record block (see TS 29.598 [50] clause 6.1.3.3.3.2), encoded as XML following the XSD schema given in Annex G.

Table 6.2.3.10.2-4: POILIState structure for storing POI state information in the LISSF

Field Name	Description	M/C/O
PDUSessionID	Identifier for the PDU session related to task.	M
XID	XID of the task object associated with the interception at the POI in SMF.	M
SequenceNumber	Last sequence number used in the generation of xIRI.	M
CorrelationID	Correlation ID to assign to interception product generated by the POI in the SMF.	M

6.2.3.10.3 Retrieving LI state

When the TF in an SMF in an SMF set is provisioned by the LIPF with a specific XID and access to an LISSF function, the TF shall use the LISSF to retrieve LI state information.

If the implementation of the SMF set does not ensure that active SM contexts are always present in some SMF of the SMF set, when a task previously provisioned by the LIPF in the TF is deactivated, the TF shall request the records associated to the XID (received from the LIPF) from the LISSF, by performing a search as described in clause 5.10.3, using the XID as a search criteria. If no records are found, the TF may assume that no previous interception has occurred and proceed accordingly.

When a TF detects that its parent SMF is retrieving state for a targetted PDU session from the UDSF, the TF shall request records associated with that PDU session from the LISSF by performing a search as described in clause 5.10.3 and using the UDSFRecordID used by the SMF as a search criteria. When a TF detects that its parent SMF is receiving state for a targetted PDU session from another SMF, the TF shall request records associated with that PDU session from the LISSF by performing a search as described in clause 5.10.3 and using the XID of the task related to the target of that PDU session. If no records are found, the TF may assume that no previous interception has occurred and proceed accordingly. Implementers should be aware that multiple records may be returned.

When an SMF POI detects that its parent SMF is retrieving state for a targetted PDU session from the UDSF, the POI shall request records associated with that PDU session from the LISSF by performing a search as described in clause 5.10.3 and using the UDSFRecordID used by the SMF as a search criteria. When an SMF POI detects that its parent SMF is receiving state for a targetted PDU session from another SMF, the SMF POI shall request records associated with that target PDU session from the LISSF by performing a search as described in clause 5.10.3 and using the XID of the task related to the target of that PDU session. If no records are found, the SMF POI may assume that no previous interception has occurred and proceed accordingly.

6.2.3.10.4 Removing LI state

When a task is deactivated successfully in the UPF POI, the TF shall remove the LI state record from the LISSF as described in clause 5.10.4.

When a task is deactivated in the SMF POI, the POI shall remove the LI state record from the LISSF as described in clause 5.10.4.

6.2.4 LI at UDM for 5G

6.2.4.1 General description

In 5G packet core network, the UDM provides the unified data management for UE. The UDM shall have LI capabilities to generate the target UE's service area registration related xIRI. See clause 7.2.2 for the details.

6.2.5 LI at SMSF

6.2.5.1 Provisioning over LI_X1

The IRI-POI present in the SMSF is provisioned over LI_X1 by the LIPF using the X1 protocol as described in clause 5.2.2.

The IRI-POI in the SMSF shall support the following target identifier formats in the ETSI TS 103 221-1 [7] messages:

- SUPIIMSI.

- SUPINAI.
- PEIIMEI.
- PEIIMEISV.
- GPSIMSISDN.
- GPSINAI.

Table 6.2.5-1 shows the minimum details of the LI_X1 ActivateTask message used for provisioning the IRI-POI in the SMSF.

Table 6.2.5-1: ActivateTask message for the IRI-POI in the SMSF

ETSI TS 103 221-1 [7] field name	Description	M/C/O
XID	XID assigned by LIPF.	M
TargetIdentifiers	One of the target identifiers listed in the paragraph above.	M
DeliveryType	Set to “X2Only”.	M
ListOfDIDs	Delivery endpoints for LI_X2 for the IRI-POI in the SMSF. These delivery endpoints are configured using the CreateDestination message as described in ETSI TS 103 221-1 [7] clause 6.3.1 prior to the task activation.	M
TaskDetailsExtensions/ SMSFExtensions	This field shall be included if the delivery of the full TPDU is not authorised. See Table 6.2.5-2.	C

Table 6.2.5-2: TruncateTPUserData Parameters

Field Name	Description	M/C/O
TruncateTPUserData	If included, the truncatedSMSTPDU field of the sMSTPDUData (as described in Table 6.2.5-7) structure shall be used when applicable (see text below table). If absent, the sMSTPDU field of the sMSTPDUData structure shall be used.	C

If the TruncateTPUserData field of the LI_X1 ActivateTask message is included, the IRI-POI in the SMSF shall use the truncatedSMSTPDU field in xIRI generated at the IRI-POI in the SMSF for SMS-SUBMIT and SMS-DELIVER TPDUs, otherwise, the sMSTPDU field shall be used.

The MDF2 listed as the delivery endpoint for the LI_X2 generated by the IRI-POI in the SMSF shall be provisioned over LI_X1 by the LIPF using the X1 protocol as described in clause 5.2.2. If SMS Content delivery is not authorized, the MDF2 shall be provisioned with the TruncateTPUserData included, otherwise it shall be be left absent.

Table 6.2.5-3 shows the minimum details of the LI_X1 ActivateTask message used for provisioning the MDF2.

Table 6.2.5-3: ActivateTask message for MDF2

ETSI TS 103 221-1 [7] field name	Description	M/C/O
XID	XID assigned by LIPF.	M
TargetIdentifiers	One of the target identifiers listed in clause 6.2.5.1.	M
DeliveryType	Set to “X2Only”. (Ignored by the MDF2).	M
ListOfDIDs	Delivery endpoints for LI_X2 for the IRI-POI in the SMSF. These delivery endpoints are configured using the CreateDestination message as described in ETSI TS 103 221-1 [7], clause 6.3.1 prior to the task activation.	M
ListOfMediationDetails	Sequence of Mediation Details, See Table 6.2.5-4.	M
TaskDetailsExtensions/ SMSFExtensions	This field shall be included if the delivery of the full TPDU is not authorised. See Table 6.2.5-2.	C

Table 6.2.5-4: Mediation Details for MDF2

ETSI TS 103 221-1 [7] field name	Description	M/C/O
LIID	Lawful Interception ID associated with the task.	M
DeliveryType	Set to "HI2Only".	M
ListOfDIDs	Details of where to send the IRI for this LIID. Shall be included if deviation from the ListofDIDs in the ActivateTask message is necessary. If included, the ListOfDIDs in the Mediation Details shall be used instead of any delivery destinations specified in the ListOfDIDs field in the ActivateTask Message.	C
ServiceScoping	Shall be included to Identify the service(s) and associated service-related delivery settings for this LIID. May include more than one instance of this parameter to allow for different combinations of sub-parameters associated with a single LIID. This parameter is defined in ETSI TS 103 221-1 [7], Annex C, Table C.2.	C

6.2.5.2 Generation of xIRI over LI_X2

The IRI-POI present in the SMSF shall send xIRI over LI_X2 for the event listed in TS 33.127 [5] clause 6.2.5.3, the details of which are described in the following sub-clause.

6.2.5.3 SMS Message

The IRI-POI in the SMSF shall generate an xIRI containing an SMSMessage record for the following cases:

SMS-MO case:

- When a target UE originates an SMS message or when any UE originates an SMS message destined to a target non-local ID.

SMS-MT case:

- When an SMS message delivery to a target UE is attempted or when an SMS message delivery originated from a target non-local ID is attempted to any UE.
- When an SMS message is successfully delivered to a target UE or when an SMS message originated from a target non-local ID is successfully delivered to any UE.

The SMS-MT case can also apply to the scenario when a receipt of SMS delivery from the far end is delivered successfully to the target UE or when a receipt of SMS delivery from a target non-Local ID is successfully delivered to the originating UE.

The IRI-POI present in the SMSF shall generate the xIRI containing the SMSMessage record when it detects following events:

- The SMSF receives an SMCP message CP-DATA_RP-DATA [SMS-SUBMIT, SMS-COMMAND] (via AMF in Nsmsf_SMService_UplinkSMS message) from a target UE.
- The SMSF receives an SMCP message CP-DATA_RP-DATA [SMS-SUBMIT] (via AMF in Nsmsf_SMService_UplinkSMS message) from any UE with TP-DA field within the SMS-SUBMIT containing a target non-Local ID and SMSF returns the SMCP: CP-ACK to that originating UE.
- The SMSF receives an SMCP message CP-DATA_RP-DATA [SMS-COMMAND] (via AMF in Nsmsf_SMService_UplinkSMS message) from any UE with TP-DA field within the SMS-COMMAND containing a target non-Local ID and SMSF returns the SMCP: CP-ACK to that originating UE.
- The SMSF receives a TCAP message MAP MT-FORWARD-SHORT-MESSAGE Request [SMS-DELIVER, SMS-STATUS-REPORT] destined to a target UE.
- The SMSF receives a TCAP message MAP MT-FORWARD-SHORT-MESSAGE Request [SMS-DELIVER] destined to any UE with the TP-OA field within the SMS-DELIVER containing a target non-Local ID.
- The SMSF receives a TCAP message MAP MT-FORWARD-SHORT-MESSAGE Request [SMS-STATUS-REPORT] destined to any UE with the TP-RA field within the SMS-STATUS-REPORT containing a target non-Local ID.

The IRI-POI present in the SMSF shall generate the xIRI containing the SMSReport record when it detects following events:

- The SMSF sends a SMCP message CP-DATA_RP-ACK [SMS-SUBMIT-REPORT] (via AMF in Namf_ Communication_N1N2MessageTransfer message) in response to a previously intercepted CP-DATA_RP-DATA.

- The SMSF sends a SMCP message CP-DATA_RP-ERROR [SMS-SUBMIT-REPORT] (via AMF in Namf_ Communication_N1N2MessageTransfer message) in response to a previously intercepted CP-DATA_RP-DATA.

- The SMSF sends a TCAP message MAP MT-FORWARD-SHORT-MESSAGE Response [SMS-DELIVER-REPORT] in response to a previously intercepted MAP MT-FORWARD-SHORT-MESSAGE Request.

NOTE 1: In the above-mentioned descriptions, the requirements of target Non-Local ID do not apply when both originating and terminating users of an SMS message are served by the same CSP. The method used to identify a target non-Local ID is different from the method used to identify a local target ID.

If the IRI-POI is provisioned with the TruncateTPUserData parameter included and the IRI-POI is generating xIRI for the SMS-SUBMIT type (TS 23.040 [18] Clause 9.2.2.2) or SMS-DELIVER type (TS 23.040 [18] Clause 9.2.2.1) TPDUs, the IRI-POI shall use the truncatedSMSTPDU (as described in Table 6.2.5-7), otherwise, the IRI-POI shall use the sMSTPDU.

Table 6.2.5-5: Payload for SMSMessage record

Field name	Description	M/C/O
originatingSMSParty	Identity of the originating SMS party. See NOTE 2.	M
terminatingSMSParty	Identity of the terminating SMS party. See NOTE 3.	M
direction	Direction of the SMS with respect to the target. See NOTE 4.	M
linkTransferStatus	Indicates whether the SMSF sent the TPDU to the next network element. See NOTE 5.	M
otherMessage	In the event of a server-initiated transfer, indicates whether the server will send another SMS. May be omitted if the transfer is target-initiated. See NOTE 6.	C
location	Location information associated with the target sending or receiving the SMS, if available and authorised. See NOTE 7. Encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.	C
peerNFAddress	Address of the other network function (SMS-GMSC/IWMSC/SMS-Router) involved in the communication of the SMS, if available.	C
peerNFType	Type of the other network function (SMS-GMSC/IWMSC/SMS-Router) involved in the communication of the SMS, if available.	C
sMSTPDUData	See Table 6.2.5-7. This is conditional only for backwards compatibility.	C
messageType	See Table 6.2.5-8. This is conditional only for backwards compatibility.	C
rPMessageReference	The SM-RL Message Reference of the message per TS 24.011 [46] clause 7.3. This is conditional only for backwards compatibility.	C

The sMSTPDU field shall always be used for the sMSTPDUData field of the SMSReport record.

Table 6.2.5-6: Payload for SMSReport record

Field name	Description	M/C/O
location	Location information associated with the target sending or receiving the SMS, if available and authorised. See NOTE 7.	C
sMSTPDUData	SMS TPDU, encoded as per TS 23.040 [18] clause 9.	M
messageType	See Table 6.2.5-8.	M
rPMessageReference	The SM-RL Message Reference of the message per TS 24.011 [46] clause 7.3.	M

Table 6.2.5-7: SMSTPDUData field

Field name	Description
sMSTPDU	SM-TL PDU encoded per the PDUs defined in TS 23.040 [18] clause 9.2.2. Shall be chosen if the TruncateTPUserData Parameter is absent.
truncatedSMSTPDU	SM-TL PDU encoded per the PDUs defined in TS 23.040 [18] clause 9.2.2 but truncated to remove TP-User-Data (TS 23.040 [18] clause 9.2.3.24). Shall be chosen if the TruncateTPUserData Parameter is set.

Table 6.2.5-8: SMSMessageType values

messageType value	RP MTI Value	RP Message Type	TP-MTI Value	SMS TPDU Message Type
deliver	001	RP-DATA (network→UE)	00	SMS-DELIVER
deliverReportAck	010	RP-ACK (UE→network)	00	SMS-DELIVER-REPORT
deliverReportError	100	RP-ERROR (UE→network)	00	SMS-DELIVER-REPORT
statusReport	001	RP-DATA (network→UE)	10	SMS-STATUS-REPORT
command	000	RP-DATA (UE→network)	10	SMS-COMMAND
submit	000	RP-DATA (UE→network)	01	SMS-SUBMIT
submitReportAck	011	RP-ACK (network→UE)	01	SMS-SUBMIT-REPORT
submitReportError	101	RP-ERROR (network→UE)	01	SMS-SUBMIT-REPORT
reserved		Reserved	11	Reserved

The IRI-POI in the SMSF shall populate the messageType field with the values listed in table 6.2.5-8 based on the SMS TPDU message type (see TS 23.040 [18] clause 9.2.2) and the RP Message Type (see TS 24.011 [46] clause 8.2.2) that triggered the generation of the xIRI. The SMS TPDU Message Type is indicated by the value of the TP-Message Type Indicator (TP-MTI) (see TS 23.040 [18] clause 9.2.3.1) as described in TS 23.040 [18] clause 9.2.3.1. The RP Message Type is indicated by the value of the RP MTI (See TS 24.011 [46] clause 8.2.2).

NOTE 2: For the SMS-MO case, the originating party is the address of the UE from which the SMSF receives the CP-DATA_RP-DATA [SMS-SUBMIT, SMS-COMMAND] message (via AMF in the Nsmsf_SMService_UplinkSMS). The GPSI is one of the data fields used in the Nsmsf related messages (see TS 29.540 [21]). Alternatively, the SMSF may find the originating party address in the same way it finds the address when generating charging records. For SMS-MT case, this is derived from TP-OA field (TS 23.040 [18]) for SMS-DELIVER TPDUs or the TP-RA field (TS 23.040 [18]) for SMS-STATUS-REPORT TPDUs. In cases where the originatingSMSParty is not a GPSI, PEI, or SUPI, the sMSAddress parameter is populated with the octets received in the field used to derive the address (as per TS 23.040 [18] clause 9.1.2.5).

NOTE 3: For SMS-MT case, the terminating party is the address of the UE to which the SMSF sends the CP-DATA_RP-DATA [SMS-DELIVER, SMS-STATUS-REPORT] message (via AMF in Namf_Communications_N1N2MessageTransfer). The GPSI is one of the data fields used in the Namf related messages (TS 29.518 [22]). Alternatively, the SMSF may find the terminating party address in the same way it finds the address when generating charging records. For SMS-MO case, this is derived from the TP-DA field (TS 23.040 [18]). In cases where the terminatingSMSParty is not a GPSI, PEI, or SUPI, the sMSAddress parameter is populated with the octets received in the field used to derive the address (as per TS 23.040 [18] clause 9.1.2.5).

NOTE 4: For the SMS-MO case, for SMS originated from the target UE, the value fromTarget is used and for SMS destined to target Non-local ID, the toTarget is used. For SMS-MT case, for SMS terminated to the target UE, the value toTarget is used and for SMS originated from a target Non-local ID, the fromTarget is used.

NOTE 5: This field is set to transferSucceeded or transferFailed as follows:

- SMS-MO case:
  - To transferSucceeded: when the IRI-POI in the SMSF detects that SMSF sends the MO-FORWARD-SHORT-MESSAGE-Request [SMS-SUBMIT] message to the SMS-IWMSC.
  - To transferFailed: when the IRI-POI in SMSF detects the scenarios where SMSF cannot send the MO-FORWARD-SHORT-MESSAGE-Request [SMS-SUBMIT] to the SMS-IWMSC, but still generates an xIRI containing the SMSMessage record.
- SMS-MT case:

- To transferSucceeded: when the IRI-POI in the SMSF detects that SMSF sends the MT-FORWARD-SHORT-MESSAGE-Response [SMS-DELIVER-REPORT] message to the SMS-IWMSC.

- To transferFailed: when the IRI-POI in SMSF detects the scenarios where SMSF cannot send the MT-FORWARD-SHORT-MESSAGE-Response [SMS-DELIVER-REPORT] to the SMS-GMSC, but an xIRI containing the SMSMessage record is still generated.

NOTE 6: This is only applicable to the SMS-MT case and can be derived from the TP-MMS (More Message to Send) field present in the SMS-DELIVER sent to the UE (via AMF in the Namf_Communications_N1N2MessageTransfer).

NOTE 7: This is derived from the ueLocation field of SmsRecord IE received from the AMF in the Nsmsf_SMService_UplinkSMS message (TS 29.540 [21]). For the SMSMessage record, the SMCP message is CP-DATA_RP-DATA [SMS-SUBMIT, SMS-COMMAND] and for the SMSReport record, the SMCP message is CP-DATA-RP-ACK [SMS-DELIVER-REPORT]. This value is encoded as a *userLocation* parameter (*location>locationInfo>userLocation*), see Annex A.

6.2.5.4 Generation of IRI over LI_HI2

When an xIRI containing the SMSMessage record is received over LI_X2 from the IRI-POI in SMSF, the MDF2 shall send the IRI message over LI_HI2 without undue delay. The IRI message shall contain a copy of the SMSMessage record received over LI_X2. The SMSMessage record may be enriched by other information available at the MDF (e.g. additional location information).

If the MDF2 is provisioned with the TruncateTPUserData parameter included, the truncatedSMSTPDU field shall be used in SMSMessage IRI message, otherwise, the sMSTPDU field shall be used.

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

The timestamp field of the psHeader structure shall be set to the time that the SMSF event was observed (i.e. the timestamp field of the xIRI).

Each SMSMessage record shall be delivered as an IRI REPORT (see ETSI TS 102 232-1 [9] clause 5.2.10) with a new CIN assigned (see ETSI TS 102 232-1 [9] clause 5.2.4).

Each SMSReport record shall be delivered as a separate IRI REPORT (see ETSI TS 102 232-1 [9] clause 5.2.10) with the same CIN as the IRI REPORT of the associated SMSMessage record.

6.2.6 LI support at NRF

The SIRF present within the NRF provides SBA-related information to the LIPF over the LI_SI interface. Details for this interface are not considered in the present document and are for further study.

6.3 4G

6.3.1 General

The present document allows two options for EPC LI stage 3 interfaces for 4G / LTE:

1. Use LI_X1, LI_X2 and LI_X3 interfaces specified below in the present document for stage 3.
2. Use TS 33.107 [36] clause 12 natively as defined in that document.

In both cases, the present document specifies the stage 3 for the LI_HI1, LI_HI2 and LI_HI3 interfaces.

6.3.2 LI at MME

6.3.2.1 Provisioning over LI_X1

The IRI-POI present in the MME is provisioned over LI_X1 by the LIPF using the X1 protocol as described in clause 5.2.2.

The POI in the MME shall support the target identifiers specified in TS 33.107 [36] clause 12.2.1.1:

- IMSI (using the IMSI target identifier format from ETSI TS 103 221-1 [7]).
- MSISDN (using the E164Number target identifier format from ETSI TS 103 221-1 [7]).
- ME Identity (using the IMEI target identifier format from ETSI TS 103 221-1 [7]).

6.3.2.2 Generation of xIRI over LI_X2

6.3.2.2.1 General

The IRI-POI present in the MME shall send the xIRIs over LI_X2 for each of the events listed in TS 33.107 [36] clause 12.2.1.1, the details of which are specified in clause 12.2.3 of the same TS, and in case of SMS over NAS as specified in clause 18.2.4 of TS 33.107 [36].

For all records except MMEIdentifierAssociation (see clause 6.3.2.2.2), the IRI-POI present in the MME shall set the payload format to EpsHI2Operations.EpsIRIContent (value 14), see clause 5.3 and ETSI TS 103 221-2 [8] clause 5.4. The payload field shall contain an EpsHI2Operations.EpsIRIContent structure encoded according to TS 33.108 [12] clauses 10.5, 15.2 and B.9.

As the LIID may be not available at the MME but is mandatory in EpsHI2Operations.EpsIRIContent according to Annex B.9 of TS 33.108 [12], its value in the lawfulInterceptionIdentifier field of the encoded PDU shall be set to the fixed string "LIIDNotPresent".

In addition to the xIRIs events listed in TS 33.107 [36], the MME shall support xIRI containing the MMEIdentiferAssociation record in clause 6.3.2.2.2.

The IRI-POI in the MME shall only generate xIRI containing the MMEIdentifierAssociation record in the following scenarios;

- IdentifierAssociation: MMEIdentifierAssociation and Tracking Area/EPS Location Update (see TS 33.107 [36] clause 12.2.1.2) records shall be generated. No other record types shall be generated for that target.
- All: All MME record types shall be generated.

6.3.2.2.2 MME identifier association

The IRI-POI present in the MME shall generate an xIRI containing an MMEIdentifierAssociation record when the IRI-POI present in the MME detects a new identifier association for a UE matching one of the target identifiers provided via LI_X1. Generation of this record is subject to this record type being enabled for a specific target (see clause 6.3.2.2.1).

Table 6.3.2-1: Payload for MMEIdentifierAssociation record

Field name	Description	M/C/O
iMSI	IMSI associated with the procedure. (see NOTE 1).	M
iMEI	IMEI used in the procedure, if available (see NOTE 1).	C
mSISDN	MSISDN used in the procedure, if available (see NOTE 1).	C
gUTI	LTE GUTI used in the procedure.	M
location	Location information available when identifier association occurs. Encoded as a *userLocation* parameter (*location>locationInfo> userLocation*) and, when Dual Connectivity is activated, as an *additionalCellIDs* parameter (*location>locationInfo>additionalCellIDs*), see Annex A.	M
tAIList	List of tracking areas associated with the registration area within which the UE is current registered. (See NOTE 2).	C
NOTE 1: IMSI shall always be provided, in addition to the warrant target identifier if different to IMSI. Other identifiers shall be provided if available. NOTE 2: List shall be included each time there is a change to the registration area.		

When transmitting the xIRI, the IRI-POI present in the MME shall set the payload format to 2, and provide the payload as a BER-encoded TS33128Payloads.XIRIPayloads structure.

6.3.2.3 Generation of IRI over LI_HI2

When an xIRI is received over LI_X2 from the IRI-POI in the MME, the MDF2 shall generate the corresponding IRI message and deliver it over LI_HI2 without undue delay. The IRI message shall contain a copy of the relevant record received in the xIRI over LI_X2.

When option 2 specified in clause 6.3.1 is used, the MDF2 shall generate IRI messages based on the proprietary information received from the MME and provide it over LI_HI2 without undue delay.

For all messages except MMEIdentifierAssociation, the IRI messages shall include an IRI payload encoded according to Annex B.9 of TS 33.108 [12]. The MDF2 shall encode the correct value of LIID in the IRI message, replacing the value "LIIDNotPresent" given in the xIRI (see clause 6.3.2.2).

For MMEIdentifierAssociation messages, the IRI message shall be encoded as an IRIEvent structure according to Annex B, and used to populate the threeGPP33128DefinedIRI field in ETSI TS 102 232-7 [10] clause 15.

The IRI messages shall be delivered over LI_HI2 according to clause 10 of ETSI TS 102 232-7 [10].

6.3.3 LI at SGW/PGW and ePDG

6.3.3.1 Provisioning over LI_X1

The IRI-POI and CC-POI present in the SGW/PGW and ePDG are provisioned over LI_X1 by the LIPF using the X1 protocol as described in clause 5.2.2. A single task may be used.

The POIs in the SGW/PGW and ePDG shall support the target identifiers specified in TS 33.107 [36] clause 12.2.1.1:

- IMSI (using the IMSI target identifier format from ETSI TS 103 221-1 [7]).
- MSISDN (using the E164Number target identifier format from ETSI TS 103 221-1 [7]).
- ME Identity (using the IMEI target identifier format from ETSI TS 103 221-1 [7]).

6.3.3.2 Generation of xIRI over LI_X2

The IRI-POI present in the SGW/PGW and ePDG shall send the xIRIs over LI_X2 for each of the events listed in TS 33.107 [36] clause 12.2.1.2, the details of which are specified in clause 12.2.3 of the same TS.

The IRI-POI present in the SGW/PGW and ePDG shall set the payload format to EpsHI2Operations.EpsIRIContent (value 14), see clause 5.3 and ETSI TS 103 221-2 [8] clause 5.4. The payload field shall contain an EpsHI2Operations.EpsIRIContent structure encoded according to TS 33.108 [12] clauses 10.5 and B.9.

As the LIID may be not available at the SGW/PGW and ePDG but is mandatory in EpsHI2Operations.EpsIRIContent according to Annex B.9 of TS 33.108 [12], its value in the lawfulInterceptionIdentifier field of the encoded PDU shall be set to the fixed string "LIIDNotPresent".

6.3.3.3 Generation of xCC at CC-POI in the SGW/PGW and ePDG over LI_X3

The CC-POI present in the SGW/PGW and ePDG shall send xCC over LI_X3 for each IP packet belonging to the target's communication.

Each X3 PDU shall contain the contents of the user plane packet given using the GTP-U, IP or Ethernet payload format.

The CC-POI present in the SGW/PGW and ePDG shall set the payload format to indicate the appropriate payload type (5 for IPv4 Packet, 6 for IPv6 Packet, 7 for Ethernet frame or 12 for GTP-U packet as per ETSI TS 103 221-2 [8] clause 5.4).

If it is required to send the ICE-type for the xCC, the CC-POI shall set the NFID attribute (see ETSI TS 103 221-2 [8] clause 5.3.7) to the appropriate value from the ICE-type enumeration in TS 33.108 [12] Annex B.10 as a single octet. As an example, an ICE-type of "sgw" is indicated by setting the attribute to value 3.

The CC-POI present in the SGW/PGW and ePDG may use the Additional XID Related Information attributes to facilitate efficient delivery of xCC, as specified in ETSI TS 103 221-2 [8] clause 5.3.22.

6.3.3.4 Generation of IRI over LI_HI2

When an xIRI is received over LI_X2 from the IRI-POI in the SGW/PGW or ePDG, the MDF2 shall generate the corresponding IRI message and deliver it over LI_HI2 without undue delay. The IRI message shall contain a copy of the relevant record received in the xIRI over LI_X2.

When option 2 specified in clause 6.3.1 is used, the MDF2 shall generate IRI messages based on the proprietary information received from the SGW/PGW or ePDG and provide it over LI_HI2 without undue delay.

The IRI messages shall include an IRI payload encoded according to Clause 10.5 and Annex B.9 of TS 33.108 [12]. The MDF2 shall encode the correct value of LIID in the IRI message, replacing the value "LIIDNotPresent" given in the xIRI (see clause 6.3.2.2).

The IRI messages shall be delivered over LI_HI2 according to clause 10 of ETSI TS 102 232-7 [10].

6.3.3.5 Generation of CC over LI_HI3

When xCC is received over LI_X3 from the CC-POI in the SGW/PGW or ePDG, the MDF3 shall generate the corresponding CC and deliver it over LI_HI3 without undue delay. The CC message shall contain a copy of the relevant xCC received over LI_X3.

When option 2 specified in clause 6.3.1 is used, the MDF3 shall generate CC based on the proprietary information received from the SGW/PGW or ePDG and provide it over LI_HI3 without undue delay.

The CC shall include a CC payload encoded according to Annex B.10 of TS 33.108 [12].

The CC shall be delivered over LI_HI3 according to clause 10 of ETSI TS 102 232-7 [10].

6.4 3G

The Present document does not specify details of the LI interfaces for 3G / UMTS. Details for this release are specified in TS 33.108 [12].

7 Service Layer Based Interception

7.1 Introduction

This clause describes any remaining fields, behaviours or details necessary to implement the required LI interfaces for specific 3GPP-defined services which are not described in clauses 4 and 5.

7.2 Central Subscriber Management

7.2.1 General description

This clause describes interception at central subscriber management functions or databases (e.g. UDM and HSS).

7.2.2 LI at UDM

7.2.2.1 General description

In 3GPP network, the UDM provides the unified data management for UE. The UDM shall have LI capabilities to generate the target UE's service area registration and subscription management related xIRI.

7.2.2.2 Provisioning over LI_X1

The IRI-POI present in the UDM is provisioned over LI_X1 by the LIPF using the X1 protocol as described in clause 5.2.2.

The POI in the UDM shall support the following target identifier formats in the ETSI TS 103 221-1 [7] messages:

- SUPIIMSI.
- SUPINAI.
- PEIIMEI.
- PEIIMEISV.
- GPSIMSISDN.
- GPSINAI.

7.2.2.3 Generation of xIRI over LI_X2

7.2.2.3.1 General description

The IRI-POI present in the UDM shall send xIRI over LI_X2 for each of the events listed in TS 33.127 [5] clause 7.2.2.4, the details of which are described in the following sub-clauses.

7.2.2.3.2 Serving system

The IRI-POI in the UDM shall generate an xIRI containing the UDMServingSystemMessage record when it detects the following events:

- When the UDM receives the amf3GPPAccessRegistration from the AMF as part of the Nudm_UEContextManagement_Registration service operation (see TS 29.503 [25], clause 5.3.2.2.2).
- When the UDM receives the amfNon3GPPAccessRegistration from the AMF as part of the Nudm_UEContextManagement_Registration service operation (see TS 29.503 [25], clause 5.3.2.2.3).

When a target UE registers to both 3GPP and non-3GPP access, two separate xIRIs each containing the UDMServingSystemMessage record may be generated by the IRI-POI in the UDM.

Table 7.2.2.3-1: Payload for UDMServingSystemMessage record

Field name	Description	M/C/O
sUPI	SUPI associated with the target UE, see TS 29.571 [17].	M
pEI	PEI associated with the target UE, when known, see TS 29.571 17].	C
gPSI	GPSI associated with the target UE, when known, see TS 29.571 [17].	C
gUAMI	Serving AMF's GUAMI, when known. See NOTE 1.	C
gUMMEI	Serving MME's GUMMEI See NOTE 2.	C
pLMNID	Serving PLMN Id. See TS 29.571 [17]. See NOTE 3.	C
servingSystemMethod	Identifies method used to access the serving system, see NOTE 4.	M
serviceID	Identifies the target UE's 5G service identifiers (e.g. SNSSAI, CAGID) when the AMF Registration is executed, when known, see TS 29.571 [17].	C

NOTE 1: GUAMI is the global unique identifier of an AMF [2] and its format is defined in TS 29.571 [17]. As defined in TS 23.501 [2], clause 5.9.4, GUAMI consists of <MCC> <MNC> <AMF Region ID> <AMF Set ID> <AMF Pointer>. The GUAMI is reported if the UDM receives the same from the AMF.

NOTE 2: GUMMEI is the global unique identifier of an MME and its format is defined in TS 23.003 [19]. As defined in TS 23.003 [19], clause 2.8.1, GUMMEI consists of <MCC> <MNC> <MME Identifier>. The GUMMEI is reported if the UDM has this information (e.g. in a combined UDM/HSS).

NOTE 3: PLMN Id provides the VPLMN Id when the target UE is roaming.

NOTE 4: This identifies whether the xIRI containing the UDMServingSystemMessage record is generated due to the reception of an amf3GPPAccessRegistration, or an amfNon3GPPAccessRegistration. See TS 29.503 [25].

TS 29.571 [17] requires that the encoding of 3GPP defined identifiers (e.g. IMSI, NAI) shall be prefixed with its corresponding prefix (e.g. with reference to SUPI it requires 'imsi-','nai-'). However, identifiers and parameters shall be coded over the LI_X2 and LI_HI2 according to Annex A of the present document, so without the prefix specified in TS 29.571 [17].

7.2.2.3.3 Subscriber record change

The IRI-POI in the UDM shall generate an xIRI containing the UDMSubscriberRecordChangeMessage record when it detects the following events:

- When the UDM receives the Amf3GppAccessRegistration from the AMF as part of the Nudm_UEContextManagement Registration service operation (see TS 29.503 [25], clause 5.3.2.2.2) and detects a change in the SUPI/GPSI/PEI association for a target.

- When the UDM receives the AmfNon3GppAccessRegistration from the AMF as part of the Nudm_UEContextManagement Registration service operation (see TS 29.503 [25], clause 5.3.2.2.3) and detects a change in the SUPI/GPSI/PEI association for a target.

- When the UDM receives the Amf3GppAccessRegistrationModification from the AMF as part of Nudm_UEContextManagement Update service operation (see TS 29.503 [25], clause 5.3.2.6.2) and detects a change in the SUPI/GPSI/PEI association for a target.

- When the UDM receives the AmfNon3GppAccessRegistrationModification from the AMF as part of Nudm_UEContextManagement Update service operation (see TS 29.503 [25], clause 5.3.2.6.3) and detects a change in the SUPI/GPSI/PEI association for a target.

- When the UDM receives the PeiUpdateInfo from the HSS as part of the Nudm_UEContextManagement PEI Update service operation (see TS 29.503 [25], clause 5.3.2.10.2) and detects a change in the SUPI/GPSI/PEI association for a target.

- Upon detection of modification between SUPI and GPSI association (if UDR is deployed, when UDM receives the DataChangeNotify from the UDR including the modified GPSI as part of the Nudr_DataRepository Notification service operation (see TS 29.504 [48], clause 5.2.2.8.3 and TS 29.505 [49], clause 5.4.2.6); if UDR is not deployed, when the modification is detected as result of UDM provisioning).

- Upon UE de-provisioning (if UDR is deployed, when UDM receives the DataChangeNotify from the UDR including the deleted SUPI as part of the Nudr_DataRepository Notification service operation (see TS 29.504 [48], clause 5.2.2.8.3 and TS 29.505 [49], clause 5.4.2.6); if UDR is not deployed, when the modification is detected as result of UDM deprovisioning).

- When a new SUPI is provisioned (if UDR is deployed, when UDM receives the DataChangeNotify from the UDR including the new and the old SUPI as part of the Nudr_DataRepository Notification service operation (see TS 29.504 [48], clause 5.2.2.8.3 and TS 29.505 [49], clause 5.4.2.6); if UDR is not deployed, when the modification is detected as result of UDM provisioning).

- When the UDM receives the Amf3GppAccessRegistrationModification from the AMF as part of Nudm_UEContextManagement Update service operation (see TS 29.503 [25], clause 5.3.2.2.2) and detects a change in the ServiceID association for a target.

- Upon detection of modification in the Service ID association (if UDR is deployed, when UDM receives the DataChangeNotify from the UDR including the modified Service ID as part of the Nudr_DataRepository Notification service operation (see TS 29.504 [48], clause 5.2.2.8.3 and TS 29.505 [49], clause 5.4.2.6); if UDR is not deployed, when the modification is detected as a result of UDM provisioning.

When a target UE registers to both 3GPP and non-3GPP access, two separate xIRIs each containing the UDMSubscriberRecordChangeMessage report record may be generated by the IRI-POI in the UDM.

Table 7.2.2.3-2: Payload for UDMSubscriberRecordChangeMessage record

Field name	Description	M/C/O
sUPI	SUPI currently associated with the target UE, see TS 29.571 [17], see NOTE 1	C
pEI	PEI currently associated with the target UE, when known, see TS 29.571 17].	C
gPSI	GPSI currently associated with the target UE, when known, see TS 29.571 [17].	C
oldSUPI	Old SUPI associated with the target UE, when known.	C
oldServiceID	Identifies the target UE's old service identifiers (e.g. SNSSAI, CAGID), when known, see TS 29.571.	C
oldPEI	Old PEI associated with the target UE, when known.	C
oldGPSI	Old GPSI associated with the target UE, when known.	C
subscriberRecordChangeMethod	Identifies the trigger of Subscriber Record Change operation, see NOTE 2.	M
serviceID	Identifies the target UE's 5G service identifiers that have been modified (e.g. SNSSAI, CAGID), when known, see TS 29.571.	C

NOTE 1: When an identity is changed, both the old one and the current one are reported; the target identity is always reported either as current identity or old identity depending on the change, together with the other current identities (e.g. ServiceIDs), if available. If the target identity is changed, the old identity represents the target otherwise the current identity represents the target (as examples, when SUPI is the target and PEI is changing, SUPI (target), PEI and old PEI, along with GPSI, if available, are reported; when SUPI is the target and SUPI is changed, SUPI and oldSUPI (target), along with PEI and GPSI, if available, are reported).

NOTE 2: This identifies whether the xIRI containing the UDMSubscriberRecordChangeMessage record is generated due to a PEI change, a GPSI, a SUPI modification or ServiceID change, or a UE de-provisioning.

TS 29.571 [17] requires that the encoding of 3GPP defined identifiers (e.g. IMSI, NAI) shall be prefixed with its corresponding prefix (e.g. with reference to SUPI it requires 'imsi-','nai-'). However, identifiers and parameters shall be coded over the LI_X2 and LI_HI2 according to Annex A of the present document, so without the prefix specified in TS 29.571 [17].

7.2.2.3.4 Cancel location

The IRI-POI in the UDM shall generate an xIRI containing the UDMCancelLocation record when it detects the following events:

- When the UDM sends DeregistrationData to AMF as part of the Nudm_UEContextManagement DeregistrationNotification service operation (see TS 29.503 [25], clause 5.3.2.3.2).

- When the UDM receives the Amf3GppAccessRegistrationModification with PurgeFlag set from the AMF as part of Nudm_UEContextManagement Deregistration service operation (see TS 29.503 [25], clause 5.3.2.4.2).

- When UDM receives the AmfNon3GppAccessRegistrationModification with PurgeFlag set from the AMF as part of Nudm_UEContextManagement Deregistration service operation (see TS 29.503 [25], clause 5.3.2.4.3).

When a target UE deregisters from both 3GPP and non-3GPP access, two separate xIRIs each containing the UDMCancelLocation report record may be generated by the IRI-POI in the UDM.

Table 7.2.2.3.4-1: Payload for UDMCancelLocationMessage record

Field name	Description	M/C/O
sUPI	SUPI associated with the target UE, see TS 29.571 [17].	M
pEI	PEI associated with the target UE, when known, see TS 29.571 17].	C
gPSI	GPSI associated with the target UE, when known, see TS 29.571 [17].	C
gUAMI	Previous serving AMF's GUAMI, when known. See NOTE 1.	C
pLMNID	Previous serving PLMN ID. See TS 29.571 [17]. See NOTE 2.	C
cancelLocationMethod	Identifies method used to access the serving system, see NOTE 3.	M

NOTE 1: GUAMI is the global unique identifier of an AMF [2] and its format is defined in TS 29.571 [17]. As defined in TS 23.501 [2], clause 5.9.4, GUAMI consists of <MCC> <MNC> <AMF Region ID> <AMF Set ID> <AMF Pointer>. The GUAMI is reported if the UDM receives the same from the AMF.

NOTE 2: PLMN ID provides the vPLMN ID when the target UE is roaming.

NOTE 3: This identifies whether the xIRI containing the UDMCancelLocationMessage record is generated due to the reception of a UDM deregistration, and AMF 3GPP Access deregistration, or an AMF Non 3GPP access deregistration.

TS 29.571 [17] requires that the encoding of 3GPP defined identifiers (e.g. IMSI, NAI) shall be prefixed with its corresponding prefix (e.g. with reference to SUPI it requires 'imsi-','nai-'). However, identifiers and parameters shall be coded over the LI_X2 and LI_HI2 according to Annex A of the present document, so without the prefix specified in TS 29.571 [17].

7.2.2.3.5 Location information request

Location information request is not supported in the present document.

7.2.2.4 Generation of IRI over LI_HI2

When an xIRI is received over LI_X2 from the IRI-POI in UDM, the MDF2 shall send an IRI message over LI_HI2 without undue delay.

The timestamp field of the psHeader structure shall be set to the time that the UDM event was observed (i.e. the timestamp field of the xIRI).

Each UDMServiceSystemMessage record shall be delivered as an IRI REPORT (see ETSI TS 102 232-1 [9] clause 5.2.10). The CIN shall be omitted (see ETSI TS 102 232-1 [9] clause 5.2.4).

7.2.3 LI at HSS

7.2.3.1 General

The HSS provides the support functions in the mobility management, session setup and user authentication and access authorization.

The present document allows two options for HSS LI stage 3 interfaces:

1. Use LI_X1 and LI_X2 interfaces specified below in the present document for stage 3.
2. Use TS 33.107 [36] natively as defined in that document.

In both cases, the present document specifies the stage 3 for the LI_HI1 and LI_HI2 interfaces.

7.2.3.2 Provisioning over LI_X1

The IRI-POI present in the HSS is provisioned over LI_X1 by the LIPF using the X1 protocol as described in clause 5.2.2 of the present document.

The IRI-POI in the HSS shall support the target identifiers specified in TS 33.107 [36]:

- IMSI (using the IMSI target identifier format from ETSI TS 103 221-1 [7]).
- MSISDN (using the E164Number target identifier format from ETSI TS 103 221-1 [7]).
- IMEI (using the IMEI target identifier format from ETSI TS 103 221-1 [7]).
- IMPU (using the IMPU target identifier format from ETSI TS 103 221-1 [7]).
- IMPI (using the IMPI target identifier format from ETSI TS 103 221-1 [7]).

7.2.3.3 Generation of xIRI over LI_X2

The IRI-POI present in the HSS shall send the xIRIs over LI_X2 for each of the events listed in TS 33.107 [36], the details of which are also specified in the same TS [36].

The IRI-POI present in the HSS shall set the payload format to EpsHI2Operations.EpsIRIContent (value 14), see clause 5.3 of the present document and ETSI TS 103 221-2 [8] clause 5.4. The payload field shall contain an EpsHI2Operations.EpsIRIContent structure encoded according to clause B.9 of TS 33.108 [12].

As the LIID may be not available at the HSS but is mandatory in EpsHI2Operations.EpsIRIContent according to clause B.9 of TS 33.108 [12], its value in the lawfulInterceptionIdentifier field of the encoded PDU shall be set to the fixed string "LIIDNotPresent".

7.2.3.4 Generation of IRI over LI_HI2

When an xIRI is received over LI_X2 from the IRI-POI in the HSS, the MDF2 shall generate the corresponding IRI message and deliver it over LI_HI2 without undue delay. The IRI message shall contain a copy of the relevant record received in the xIRI over LI_X2.

When option 2 specified in clause 7.2.3.1 above is used, the MDF2 shall generate IRI messages based on the proprietary information received from the HSS and provide it over LI_HI2 without undue delay.

The IRI messages shall include an IRI payload encoded according to clause B.9 of TS 33.108 [12]. The MDF2 shall encode the correct value of LIID in the IRI message, replacing the value "LIIDNotPresent" given in the xIRI (see clause 7.2.3.3 above).

The IRI messages shall omit the CIN (see ETSI TS 102 232-1 [9] clause 5.2.4).

The IRI messages shall be delivered over LI_HI2 according to clause 10 of ETSI TS 102 232-7 [10].

7.3 Location

7.3.1 Lawful Access Location Services (LALS)

7.3.1.1 General description

The LALS architecture and functionality is specified in TS 33.127 [5], clause 7.3.3.

7.3.1.2 Provisioning over LI_X1

7.3.1.2.1 Target positioning service

For the LALS target positioning service (TS 33.127 [5], clause 7.3.3.2) the IRI-POI provided by the LI-LCS Client is directly provisioned over LI_X1 by the LIPF using the LI_X1 protocol as described in clause 5.2.2 with the TaskDetailsExtensions field of the ActivateTask message specifying the type of the target positioning request, immediate vs. periodic, and, in the latter case, the periodicity of the positioning requests.

Based on national regulatory requirements and CSP policy, the TaskDetailsExtensions may also include the QoS parameters (specified in OMA-TS-MLP-V3_5-20181211-C [20]) for the use on the Le interface towards the LCS Server/GMLC. Alternatively, the QoS parameters may be statically configured in the LI-LCS Client.

Table 7.3.1.2-1 shows the details of the LI_X1 ActivateTask message used for the LI-LCS Client provisioning for the target positioning service.

The LI_X1 DeactivateTask shall be issued by the LIPF to terminate the target positioning service and withdraw the associated provisioning data, except for the Immediate target positioning service in which case the LI_X1 DeactivateTask is not used.

Table 7.3.1.2-1: ActivateTask message for LI-LCS Client target positioning provisioning

ETSI TS 103 221-1 field name	Description	M/C/O
XID	XID assigned by LIPF.	M
TargetIdentifiers	One of the following (see ETSI TS 103 221-1 [7]): - SUPIIMSI. - SUPINAI. - GPSIMSISDN. - GPSINAI. - IMSI. - MSISDN (E164Number target ID format, per ETSI TS 103 221-1 [7]). - IMPU.	M
DeliveryType	Set to “X2Only”.	M
ListOfDIDs	Delivery endpoints of LI_X2 interface. These delivery endpoints are configured in LI-LCS Client using the CreateDestination message as described in ETSI TS 103 221-1 [7], clause 6.3.1 prior to the task activation.	M
TaskDetailsExtensions/ PositioningServiceType	“Immediate” or “Periodic”.	M
TaskDetailsExtensions/ PositioningPeriodicity	Time interval between the positioning requests in case of Periodic positioning, in seconds.	C
TaskDetailsExtensions/ PositioningParameters	Set of optional parameters for MLP SLIR message, per OMA-TS-MLP-V3_5-20181211-C [20]: - requested location type (clause 5.3.60). - requested response type (clause 5.3.112.1). - max location age (clause 5.3.65). - response timing required (clause 5.3.106). - response timer (clause 5.3.107). - horizontal accuracy with QoS class (clause 5.3.44). - altitude accuracy with QoS class (clause 5.3.6). - motion state request (clause 5.3.70).	O

7.3.1.2.2 Triggered location service

For the LALS triggered location service (TS 33.127 [5], clause 7.3.3.3) the LTF, as an IRI-TF, is provisioned by the LIPF using the LI_X1 protocol as described in clause 5.2.2. The “TaskDetailsExtensions” parameter of the ActivateTask message in this case will carry the address of LI-LCS Client to be used for the service and, optionally, the positioning parameters for use on the Le interface, similar to the target positioning provisioning.

Prior to issuing one or more "ActivateTask" requests towards an LTF, the LIPF shall provision the LTF with the LI_X2 destinations by using the "CreateDestination" operation(s), as per clause 5.2.2.

Table 7.3.1.2-2 defines the details of the LI_X1 ActivateTask message used for the LTF provisioning for the Triggered Location service.

Table 7.3.1.2-2: ActivateTask message for LTF triggered location service provisioning

ETSI TS 103 221-1 field name	Description	M/C/O
XID	XID assigned by LIPF.	M
TargetIdentifiers	One or more of the following (see ETSI TS 103 221-1 [7]): - SUPIIMSI. - SUPINAI. - GPSIMSISDN. - GPSINAI. - IMSI. - MSISDN (E164Number target ID format, per ETSI TS 103 221-1 [7]). - IMPU. NOTE: An ActivateTask for an LTF may be issued by the LIPF if and only if at least one of the identifiers in the above list was specified in the warrant.	M
DeliveryType	Set to "X2Only".	M
ListOfDIDs	Delivery endpoints for LI-LCS Client LI_X2. These delivery endpoints are configured in LTF using the CreateDestination message as described in ETSI TS 103 221-1 [7], clause 6.3.1 prior to the task activation.	M
TaskDetailsExtensions/ LI-LCSClientAddress	The IP address of the LI-LCS Client for triggering.	M
TaskDetailsExtensions/ PositioningParameters	Set of optional parameters for MLP SLIR message, per OMA-TS-MLP-V3_5-20181211-C [20]: - requested location type (clause 5.3.60). - requested response type (clause 5.3.112.1). - max location age (clause 5.3.65). - response timing required (clause 5.3.106). - response timer (clause 5.3.107). - horizontal accuracy with QoS class (clause 5.3.44). - altitude accuracy with QoS class (clause 5.3.6). - motion state request (clause 5.3.70).	O

7.3.1.3 Triggering over LI_T2

An LTF, as an IRI-TF, provisioned as described in clause 7.3.1.2.2, triggers the LI-LCS Client (which plays the role of a triggered IRI-POI) using the LI_T2 protocol as described in clause 5.2.4. The "TaskDetailsExtensions" in the LI_T2 "ActivateTask" message carries the positioning parameters mapped from information the LTF receives from the ADMF over the LI_X1. The LI_T2 "ActivateTask" message header may include a correlation ID from the triggering xIRI, if available.

Prior to issuing one or more "ActivateTask" requests towards an LI-LCS Client, the LTF shall provision the LI-LCS Client with the LI_X2 destinations by using the "CreateDestination" operation(s), as per clause 5.2.2. The LI-LCS Client shall deactivate the task on its own upon issuing the final xIRI for the trigger. There is no DeactivateTask operation on the LI_T2 for the LI-LCS Client.

The Table 7.3.1.3-1 shows the details of the LI_T2 ActivateTask message used by the LTF to trigger LI-LCS Client for the triggered location service.

Table 7.3.1.3-1: ActivateTask message from LTF to LI-LCS Client for the triggered location service triggering

ETSI TS 103 221-1 field name	Description	M/C/O
XID	The same value as in the LTF provisioning (clause 7.3.3.2.2).	M
TargetIdentifiers	One or more of the following (see ETSI TS 103 221-1 [7]): - SUPIIMSI. - SUPINAI. - GPSIMSISDN. - GPSINAI. - IMSI. - MSISDN (E164Number target ID format, per ETSI TS 103 221-1 [7]). - IMPU. NOTE: The target identifier used shall correspond to one of the target identifiers in the xIRI observed by the LTF, and shall be one of the identifiers provided in the ActivateTask for the LTF (clause 7.3.1.2.2).	M
DeliveryType	Set to "X2Only".	M
ListOfDIDs	Delivery endpoints for LI-LCS Client LI_X2. These delivery endpoints are configured in LI-LCS Client by the LTF using the CreateDestination message as described in ETSI TS 103 221-1 [7], clause 6.3.1 prior to the task activation.	M
CorrelationID	Correlates the requested location to the triggering xIRI, if available.	C
TaskDetailsExtensions/ PositioningParameters	Set of optional parameters for MLP SLIR message, per OMA-TS-MLP-V3_5-20181211-C [20]: - requested location type (clause 5.3.60). - requested response type (clause 5.3.112.1). - max location age (clause 5.3.65). - response timing required (clause 5.3.106). - response timer (clause 5.3.107). - horizontal accuracy with QoS class (clause 5.3.44). - altitude accuracy with QoS class (clause 5.3.6). - motion state request (clause 5.3.70).	O

7.3.1.4 Generation of xIRI over LI_X2

The IRI-POI provided by the LI-LCS client shall deliver the target location reports to respective MDF(s) as xIRI over the LI_X2 interface.

Table 7.3.1.4-1: LALSReport record

Field name	Description	M/C/O
sUPI	SUPI of the target, if used for the service (see NOTE).	C
gPSI	GPSI of the target, if used for the service (see NOTE).	C
iMSI	IMSI of the target, if used for the service (see NOTE).	C
mSISDN	MSISDN of the target, if used for the service (see NOTE).	C
iMPU	IMPU of the target, if used for the service (see NOTE).	C
location	Location of the target, if obtained successfully. Encoded as a *positioningInfo* parameter (*location>positioningInfo*). Both the *positionInfo* (*location>positioningInfo>positionInfo*) and the *mLPPositionData* (*location>positioningInfo>rawMLPResponse>mLPPositionData*) are present in the case of successful positioning. In the case of positioning failure only the *mLPErrorCode (location>positioningInfo>rawMLPResponse>mLPErrorCode)* is present. See Annex A.	C
NOTE: One and only one of SUPI, GPSI, IMSI, MSISDN, IMPU shall be present and it shall correspond to the target identifier included in the respective ActivateTask message for the LI-LCS Client.		

The LI_X2 header (as per clause 5.3.2) of the LALSReport record presented in Table 7.3.1.4-1 shall contain the correlation ID (if provided) from a respective LI_T2 ActivationTask message.

7.3.1.5 Generation of IRI over LI_HI2

The LALSReport payload, defined in clause 7.3.1.4, shall be used as the payload of the respective LALSReport record, no payload mediation is required.

A LALSReport message shall be assigned the same CIN (see ETSI TS 102 232-1 [9] clause 5.2.4) as the IRI message that triggered the LALS reporting, if that triggering IRI message is assigned a CIN. Otherwise, i.e. when the LALSReport is a result of the LALS Target Positioning, or the triggering IRI message has no CIN assigned, the CIN in the LALSReport shall be omitted.

NOTE: In some specific scenarios the amount of LALS reports data may overload the LI-HI2 and/or LI_X2 interfaces. To prevent the overload, a flow control for LALS triggered location reports may be implemented in MDF and/or LI-LCS client, e.g. by limiting the frequency of the reports for individual targets.

7.3.2 Cell database information reporting

7.3.2.1 General description

When the location information present within an xIRI includes the cell identity, the MDF2 that receives the xIRI may retrieve the cell site information for that cell from a CSP database and deliver the same to the LEMF either within the IRI message generated from the received xIRI or in a separate IRI message containing the MDFCellSiteReport record.

For each intercept, if the MDF2 reports the cell site information, then it shall provide such information at least on the initial appearance of the cell identity in the related xIRI.

NOTE: The CSP needs to ensure that the most recent cell site information is reported to the LEA.

7.3.2.2 Delivery of cell site information over LI_HI2

The cell site information is encoded as the cellSiteInformation ASN.1 parameter and delivered either within the location field of an IRI message carrying the respective cell identity, or in a stand-alone IRI message containing the MDFCellSiteReport record.

The MDF2 shall use the IRI message containing the MDFCellSiteReport record to convey cell site information retrieved asynchronously with the sending of the IRI message that caused the retrieval. The MDFCellSiteReport record shall be delivered as an IRI REPORT (see ETSI TS 102 232-1 [9] clause 5.2.10) and allocated the same CIN, if any, as the IRI message that caused the retrieval.

When the cell site information is readily available at MDF2 or is retrieved synchronously (i.e. blocking the sending of the IRI message until the retrieval is complete), the cell site information shall be conveyed within the location field of the IRI message that caused the retrieval.

The cell site information for multiple cell identities can be delivered to the LEMF within an IRI message that carries the respective cell identities or within the IRI message containing the MDFCellSiteReport record (see Annex A).

7.3.3 Use of the Location structure

7.3.3.1 General description

The *Location* structure is used to convey geolocation information.

When the reference datum used for a latitude and longitude given in the *GeographicalCoordinates* structure is known by the operator, the reference datum shall be identified in the *mapDatumInformation* field. The reference datum identity shall be specified as an Open Geospatial Consortium URN, as defined in [35].

7.4 Messaging

7.4.1 Introduction

Stage 3 intercept capabilities for SMS at an SMSF are defined in clause 6.2.5. Stage 3 for MMS interception follows in clause 7.4.3.

7.4.2 LI at the MMS Proxy-Relay

7.4.2.1 Provisioning over LI_X1

The IRI-POI present in the MMS Proxy-Relay is provisioned over LI_X1 by the LIPF using the X1 protocol as described in clause 5.2.2.

The POI in the MMS Proxy-Relay shall support the following target identifier formats in the ETSI TS 103 221-1 [7] messages:

- E164Number.
- EmailAddress.
- GPSIMSISDN.
- IMPI.
- IMPU.
- IMSI.
- SUPIIMSI.
- NAI.
- SUPINAI.

7.4.2.2 Generation of xIRI over LI_X2

The IRI-POI present in the MMS Proxy-Relay shall send xIRI over LI_X2 for the events listed in clause 7.5.2.3 of TS 33.127 [5], which is further expanded in the present document in clause 7.4.2.4 below.

7.4.2.3 Generation of xCC over LI_X3

The CC-POI present in the MMS Proxy-Relay shall send xCC over LI_X3 for any MMS event where CC is available and authorized for reporting for the events listed in clause 7.5.2.3 of TS 33.127 [5].

The xCC payload shall consist of the MMS contents given as a MIME encoded document (RFC 2045) according to OMA-TS-MMS_ENC [39]. The payload format shall be set to "MIME document" (value 15).

7.4.2.4 MMS Record Generation Cases

The triggers for MMS record generation are detailed in each of the clauses 7.4.3.1 through 7.4.3.20. All triggers are defined by the detection of messages at the local MMS Proxy-Relay. They belong to one of two following high-level categories:

- at the local MMS Proxy-Relay, the sending or arrival of a message, either to or from the local target UE, using OMA-TS-MMS_ENC [39] definitions, or
- at the local MMS Proxy-Relay, the sending or arrival of a message to or from a non-local MMS Proxy-Relay, pertaining to messages either to or from a non-local target UE served by that non-local MMS Proxy-Relay, using the inter-proxy MM4 reference point, 3GPP TS 23.140 [40] clause 8.4 definitions.

The present document assumes that the intercepted MMS complies with version 1.3 of OMA-TS-MMS_ENC [39]. If the intercepted messages do not comply fully, or the version is other than 1.3, parameters are required to be provided only if available.

In the following tables, the acronym Multimedia Message (MM) refers to a message in particular, while Multimedia Message Service (MMS) refers to the service in general.

7.4.3 MMS Records

7.4.3.1 MMSSend

The IRI-POI in the MMS Proxy-Relay shall generate an xIRI containing an MMSSend record when the MMS Proxy-Relay sends *m-send-conf* (as defined in OMA-TS-MMS_ENC [39] clause 6.1.1) to local target UE.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-send-req* message (from the local target UE to the MMS Proxy-Relay), and the *m-send-conf* message (from MMS Proxy-Relay to the local target UE).

Table 7.4.3-1: Payload for MMSSend

Field name	Description	M/C/O
transactionID	An ID used to correlate an MMS request and response between the target and the MMS Proxy-Relay. As defined in OMA-TS-MMA_ENC [39] clause 7.3.63.	M
version	The version of MM, to include major and minor version.	M
dateTime	Date and Time when the MM was last handled (either originated or forwarded). For origination, included by the sending MMS client or the originating MMS Proxy-Relay.	M
originatingMMSParty	ID(s) of the originating party in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address by the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included.	M
terminatingMMSParty	ID(s) of the terminating party in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address by the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included. This parameter is included if the corresponding MM includes a “TO” field. At least one of the terminatingMMSParty, cCRecipients, or bCCRecipients must be included.	C
cCRecipients	Address of a recipient; the "CC" field may include addresses of multiple recipients. When address translation occurs, both the pre and post translated addresses (with appropriate correlation) are included. This parameter is included if the corresponding MM includes a “CC” field. At least one of the terminatingMMSParty, cCRecipients, or bCCRecipients must be included.	C
bCCRecipients	Address of a recipient; the "BCC" field may include addresses of multiple recipients. When address translation occurs, both the pre and post translated addresses (with appropriate correlation) are included. This parameter is included if the corresponding MM includes a “BCC” field. At least one of the terminatingMMSParty, cCRecipients, or bCCRecipients must be included.	C
direction	Indicates the direction of the MM. This shall be encoded as “from target.”	M
subject	The subject of the MM. Include if sent to the MMS Proxy-Relay.	C
messageClass	Class of the MM. For example, a value of "auto" is automatically generated by the UE. If the field is not present, the class should be interpreted as "personal." Include if sent to the MMS Proxy-Relay.	C
expiry	Length of time in seconds the MM will be stored in MMS Proxy-Relay or time to delete the MM. The field has two formats, either absolute or relative.	M
desiredDeliveryTime	Date and Time of desired delivery. Indicates the earliest possible delivery of the MM to the recipient. Include if sent to the MMS Proxy-Relay.	C
priority	Priority of the MM assigned by the originator MMS Client. Include if sent to the MMS Proxy-Relay.	C
senderVisibility	An indication that the sender's address should not be delivered to the recipient. Sent by the target to indicate the target's visibility to the other party or if not signalled by the target and the default is to not make target visible to the other party. The values given in OMA-TS-MMA_ENC [39] clause 7.3.52 shall be encoded as follows: “Show” = True, “Hide” = False. Include if sent to the MMS Proxy-Relay.	C
deliveryReport	Specifies whether the originator MM UE requests a delivery report from each recipient. Sent by the target to indicate the desired delivery report. The values given in OMA-TS-MMA_ENC [39] clause 7.3.13. shall be encoded as follows: “Yes” = True, “No” = False. Include if sent to the MMS Proxy-Relay.	C
readReport	Specifies whether the originator MM UE requests a read report from each recipient. Sent by the target to indicate the desired read report. The values given in OMA-TS-MMA_ENC [39] clause 7.3.52 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent to the MMS Proxy-Relay.	C
store	Specifies whether the originator MM UE wants the submitted MM to be saved in the user's MMBox, in addition to sending it. Sent by the target to indicate the MM is to be stored. The values given in OMA-TS-MMA_ENC [39] clause 7.3.52 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent to the MMS Proxy-Relay.	C

state	Identifies the value of the MM State associated with a to be stored or stored MM. See OMA-TS-MMA_ENC [39] clause 7.3.33. Include if sent to the MMS Proxy-Relay.	C
flags	Identifies a keyword to add or remove from the list of keywords associated with a stored MM. See OMA-TS-MMA_ENC [39] clause 7.3.32. Include if sent to the MMS Proxy-Relay.	C
replyCharging	If this field is present its value is set to “accepted” or “accepted text only” and the MMS-version-value of the M-Notification.ind PDU is higher than 1.0, this header field will indicate that a reply to this particular MM is free of charge for the recipient. If the Reply-Charging service is offered and the request for reply-charging has been accepted by the MMS service provider the value of this header field SHALL be set to “accepted” or “accepted text only”. See OMA-TS-MMA_ENC [39] clause 7.3.43. Include if sent to the MMS Proxy-Relay.	C
applicID	Identification of the originating application of the original MM. Sent by the target to identify the destination application as defined in OMA-TS-MMA_ENC [39] clause 7.3.2. Include if sent to the MMS Proxy-Relay.	C
replyApplicID	Identification of an application to which replies, delivery reports, and read reports are addressed. Sent by the target to identify the application to which replies, delivery reports, and read reports are addressed as defined in OMA-TS-MMS_ENC [39] clause 7.3.42. Include if sent to the MMS Proxy-Relay.	C
auxApplicInfo	Auxiliary application addressing information as indicated in the original MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.4. Include if sent to the MMS Proxy-Relay.	C
contentClass	Classifies the content of the MM to the smallest content class to which the message belongs. Sent by the target to identify the class of the content. See OMA-TS-MMS_ENC [39] clause 7.3.9. Include if sent to the MMS Proxy-Relay.	C
dRMContent	Indicates if the MM contains any DRM-protected element. Provide when sent by the target to indicate if the MM contains any DRM-protected element. The values given in OMA-TS-MMA_ENC [39] clause 7.3.54 shall be encoded as follows: “Yea” = True, “No” = False. Include if sent to the MMS Proxy-Relay.	C
adaptationAllowed	Provide when sent by the target to identify whether the target wishes the MM to be adapted or not. If overridden, an indication shall be included in the parameter. Include if sent to the MMS Proxy-Relay.	C
contentType	The content type of the MM. See OMA-TS-MMS_ENC [39] clause 7.3.11	M
responseStatus	MMS specific status. See OMA-TS-MMS_ENC [39] clause 7.3.48.	M
responseStatusText	Text that qualifies the Response Status. Include if sent to the target. As defined in OMA-TS-MMA_ENC [39] clause 7.3.49. Include if sent by the MMS Proxy-Relay.	C
messageID	An ID assigned by the MMS Proxy-Relay to uniquely identify an MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29.	M

7.4.3.2 MMSSendByNonLocalTarget

The IRI-POI in the MMS Proxy-Relay shall generate an xIRI containing an MMSSendByNonLocalTarget record when the MMS Proxy-Relay receives *MM4_forward.REQ* (as defined in TS 23.140 [40] clause 8.4.1) from the non-local MMS Proxy-Relay, that contains a non-local target ID.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *MM4_forward.REQ* message (from the non-local MMS Proxy-Relay to the local MMS Proxy-Relay).

Table 7.4.3-2: Payload for MMSSendByNonLocalTarget

Field name	Description	M/C/O
version	The version of MM, to include major and minor version.	M
transactionID	An ID used to correlate an MMS request and response between the proxies. As defined in TS 23.140 [40] clause 8.4.1.4.	M
messageID	An ID assigned by the MMS Proxy-Relay to uniquely identify an MM. As defined in TS 23.140 [40] clause 8.4.1.4.	M
terminatingMMSParty	ID(s) of the terminating party in one or more of the formats described in 7.4.2.1.	M
originatingMMSParty	ID(s) of the originating party in one or more of the formats described in 7.4.2.1.	M
direction	Indicates the direction of the MM. This shall be encoded as “from target.”	M
contentType	The content type of the MM. See OMA-TS-MMS_ENC [39] clause 7.3.11	M
messageClass	Class of the MM. For example, a value of "auto" is automatically generated by the UE. If the field is not present, the class should be interpreted as "personal." Include if sent to the MMS Proxy-Relay.	C
dateTime	Date and Time when the MM was last handled (either originated or forwarded).	M
expiry	Length of time in seconds the MM will be stored in MMS Proxy-Relay or time to delete the MM. The field has two formats, either absolute or relative. Include if sent to the MMS Proxy-Relay.	C
deliveryReport	Specifies whether the originator MM UE requests a delivery report from each recipient. Indicates the desired delivery report. The values given in TS 23.140 [40] clause 8.4.1.4 shall be encoded as follows: “Yes” = True, “No” = False. Included if it exists in the MMS Proxy-Relay message. Include if sent to the MMS Proxy-Relay.	C
priority	Priority of the MM assigned by the originator MMS Client. Reported if sent by the target. Include if sent to the MMS Proxy-Relay.	C
senderVisibility	An indication that the sender's address should not be delivered to the recipient. Indicates the target's visibility to the other party or if not signalled by the target and the default is to not make target visible to the other party. The values given in TS 23.140 [40] clause 8.4.1.4 shall be encoded as follows: “Show” = True, “Hide” = False. Include if sent to the MMS Proxy-Relay.	C
readReport	Specifies whether the originator MM UE requests a read report from each recipient. Provide when sent by the target to indicate the desired read report. The values given in TS 23.140 [40] clause 8.4.1.4 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent to the MMS Proxy-Relay.	C
subject	The subject of the MM. Include if sent by the target.	C
forwardCount	The number of times the MM was forwarded	C
previouslySentBy	History of UEs that have forwarded (including originally submitted) the MM. Include if sent to the MMS Proxy-Relay.	C
previouslySentByDateTime	The timestamp associated with the previous forward events. Include if sent to the MMS Proxy-Relay.	C
applicID	Identification of the originating application of the original MM. Provide when sent by the target to identify the destination application as defined in TS 23.140 [40] clause 8.4.1.4. Include if sent to the MMS Proxy-Relay.	C
replyApplicID	Identification of an application to which replies, delivery reports, and read reports are addressed. Provide when sent by the target to identify the application to which replies, delivery reports, and read reports are addressed as defined in TS 23.140 [40] clause 8.4.1.4. Include if sent to the MMS Proxy-Relay.	C
auxApplicInfo	Auxiliary application addressing information as indicated in the original MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.4. Include if sent to the MMS Proxy-Relay.	C
contentClass	Classifies the content of the MM to the smallest content class to which the message belongs. Identifies the class of the content. Include if sent to the MMS Proxy-Relay. Include if sent to the MMS Proxy-Relay.	C
dRMContent	Indicates if the MM contains any DRM-protected element. Indicates if the MM contains any DRM-protected element. The values given as defined in TS 23.140 [40] clause 8.4.1.4 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent to the MMS Proxy-Relay.	C
adaptationAllowed	Identifies whether the target wishes the MM to be adapted or not. If overridden, an indication shall be included in the parameter. Include if sent to the MMS Proxy-Relay.	C

7.4.3.3 MMSNotification

The IRI-POI in the MMS Proxy-Relay shall generate an xIRI containing an MMSNotification record when the MMS Proxy-Relay sends a *m-notification-ind* (as defined in OMA-TS-MMS_ENC [39] clause 6.2) to the MMS client in the local target UE.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-notification-ind* message (from the local MMS Proxy-Relay to the local target).

Table 7.4.3-3: Payload for MMSNotification

Field name	Description	M/C/O
transactionID	An ID used to correlate an MMS request and response between the target and the MMS Proxy-Relay. As defined in OMA-TS-MMA_ENC[AA] clause 7.3.29.	M
version	The version of MM, to include major and minor version.	M
originatingMMSParty	ID(s) of the originating party in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address by the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included. If the originating MMS client requested address hiding, but the MMS Proxy-Relay has access to the "From" field, this shall be reported, regardless of the fact that it may be hidden from the recepient.	C
direction	Indicates the direction of the MM. This shall be encoded as “to target."	M
subject	The subject of the MM. Include if sent by the MMS Proxy-Relay.	C
deliveryReportRequested	Specifies whether the originator MMS UE requests a delivery report from each recipient. The values given in OMA-TS-MMA_ENC [39] clause 7.3.13 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent by the MMS Proxy-Relay.	C
stored	Specifies whether the MM was stored in the target's MMBox, and that the *content-location-value* field is a reference to it. "Stored" is coded as True, and "not Stored" is coded as False. As defined in OMA-TS-MMA_ENC [39] clause 7.3.57. Include if sent by the MMS Proxy-Relay.	C
messageClass	Class of the MM. For example, a value of "auto" is automatically generated by the UE.	M
priority	Priority of the MM assigned by the originator MMS Client. Include if sent by the MMS Proxy-Relay.	C
messageSize	Specifies the size of the MM that was viewed or uploaded. Specified in bytes.	M
expiry	Length of time in seconds the MM will be stored in MMS Proxy-Relay or time to delete the MM. The field has two formats, either absolute or relative.	M
replyCharging	If this field is present its value is set to “accepted” or “accepted text only” and the MMS-version-value of the M-Notification.ind PDU is higher than 1.0, this header field will indicate that a reply to this particular MM is free of charge for the recipient. If the Reply-Charging service is offered and the request for reply-charging has been accepted by the MMS service provider the value of this header field SHALL be set to “accepted” or “accepted text only”. See OMA-TS-MMA_ENC [39] clause 7.3.43. Include if sent by the MMS Proxy-Relay.	C

7.4.3.4 MMSSendToNonLocalTarget

The IRI-POI in the MMS Proxy-Relay shall generate an xIRI containing an MMSSendToNonLocalTarget record when the local MMS Proxy-Relay sends a *MM4_forward.REQ* (as defined in TS 23.140 [40] clause 8.4.1) to the non-local MMS Proxy-Relay, that contains a non-local target ID.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *MM4_forward.REQ* message (from the non-local MMS Proxy-Relay to the local MMS Proxy-Relay).

Table 7.4.3-4: Payload for MMSSendToNonLocalTarget

Field name	Description	M/C/O
version	The version of MM, to include major and minor version.	M
transactionID	An ID used to correlate an MMS request and response between the proxies. As defined in TS 23.140 [40] clause 8.4.1.4.	M
messageID	An ID assigned by the MMS Proxy-Relay to uniquely identify an MM. As defined in TS 23.140 [40] clause 8.4.1.4.	M
terminatingMMSParty	ID(s) of the terminating party in one or more of the formats described in 7.4.2.1.	M
originatingMMSParty	ID(s) of the originating party in one or more of the formats described in 7.4.2.1.	M
direction	Indicates the direction of the MM. This shall be encoded as “to target.”	M
contentType	The content type of the MM. See OMA-TS-MMS_ENC [39] clause 7.3.11	M
messageClass	Class of the MM. For example, a value of "auto" is automatically generated by the UE. If the field is not present, the class should be interpreted as "personal." Include if sent by the MMS Proxy-Relay message.	C
dateTime	Date and Time when the MM was last handled (either originated or forwarded).	M
expiry	Length of time in seconds the MM will be stored in MMS Proxy-Relay or time to delete the MM. The field has two formats, either absolute or relative. Include if sent by the MMS Proxy-Relay message.	C
deliveryReportRequested	Specifies whether the originator MMS UE requests a delivery report from each recipient. Indicates the desired delivery report. The values given in TS 23.140 [40] clause 8.4.1.4 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent by the MMS Proxy-Relay message.	C
priority	Priority of the MM assigned by the originator MMS Client. Reported if sent by the target. Include if sent by the MMS Proxy-Relay message.	C
senderVisibility	Indicates whether the sender's address should not be delivered to the recipient. Indicates the target's visibility to the other party or if not signalled by the target and the default is to not make target visible to the other party. The values given in TS 23.140 [40] clause 8.4.1.4 shall be encoded as follows: “Show” = True, “Hide” = False. Include if sent by the MMS Proxy-Relay message.	C
readReport	Specifies whether the originator MMS UE requests a read report from each recipient. Indicates the desired read report. The values given in TS 23.140 [40] clause 8.4.1.4 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent by the MMS Proxy-Relay message.	C
subject	The subject of the MM. Include if sent to the target.	C
forwardCount	The number of times the MM was forwarded	C
previouslySentBy	History of UEs that have forwarded (including originally submitted) the MM. Include if sent by the MMS Proxy-Relay message.	C
previouslySentByDateTime	The timestamp associated with the previous forward events. Include if sent by the MMS Proxy-Relay message.	C
applicID	Identification of the originating application of the original MM. Provide when sent by the target to identify the destination application as defined in TS 23.140 [40] clause 8.4.1.4. Include if sent by the MMS Proxy-Relay message.	C
replyApplicID	Identification of an application to which replies, delivery reports, and read reports are addressed. identifies the application to which replies, delivery reports, and read reports are addressed as defined in TS 23.140 [40] clause 8.4.1.4. Include if sent by the MMS Proxy-Relay message.	C
auxApplicInfo	Auxiliary application addressing information as indicated in the original MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.4. Include if sent by the MMS Proxy-Relay message.	C
contentClass	Classifies the content of the MM to the smallest content class to which the message belongs. Identifies the class of the content. Include if sent by the MMS Proxy-Relay message.	C
dRMContent	Indicates if the MM contains any DRM-protected element. Indicates if the MM contains any DRM-protected element. The values given as defined in TS 23.140 [40] clause 8.4.1.4 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent by the MMS Proxy-Relay message.	C
adaptationAllowed	identifies whether the target wishes the MM to be adapted or not. If overridden, an indication shall be included in the parameter. Include if sent by the MMS Proxy-Relay message.	C
store	Specifies whether the originator MMS UE wants the submitted MM to be saved in the user's MMBox, in addition to sending it. Indicates whether the MMS is to be stored. The values given in TS 23.140 [40] clause 8.4.1.4 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent by the MMS Proxy-Relay message.	C

applicID	Identification of the originating application of the original MM. Identifies the destination application as defined in TS 23.140 [40] clause 8.4.1.4. Include if sent by the MMS Proxy-Relay message.	C
replyApplicID	Identification of an application to which replies, delivery reports, and read reports are addressed. Identifies the application to which replies, delivery reports, and read reports are addressed as defined in TS 23.140 [40] clause 8.4.1.4. Include if sent by the MMS Proxy-Relay message.	C
auxApplicInfo	Auxiliary application addressing information as indicated in the original MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.4. Include if sent by the MMS Proxy-Relay message.	C
contentClass	Classifies the content of the MM to the smallest content class to which the message belongs. Identifies the class of the content. Include if sent by the MMS Proxy-Relay message.	C
dRMContent	Indicates if the MM contains any DRM-protected element. Indicates whether the MM contains any DRM-protected element. The values given as defined in TS 23.140 [40] clause 8.4.1.4 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent by the MMS Proxy-Relay message.	C

7.4.3.5 MMSNotificationResponse

The IRI-POI in the MMS Proxy-Relay shall generate an xIRI containing an MMSNotificationResponse record when the MMS Proxy-Relay receives a *m-notifyresp-ind* (as defined in OMA-TS-MMS_ENC [39] clause 6.2, Table 4) from the MMS client in the target UE for the deferred retrieval case only. The immediate retrieval trigger on *m-notifyresp-ind* is in clause 7.4.3.7.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-notifyresp-ind* message (from the local target UE to the MMS Proxy-Relay).

Table 7.4.3-5: Payload for MMSNotificationResponse

Field name	Description	M/C/O
transactionID	An ID used to correlate an MMS request and response between the target and the MMS Proxy-Relay. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29.	M
version	The version of MM, to include major and minor version.	M
direction	Indicates the direction of the MM. This shall be encoded as “to target”	M
status	Provides a MM status. A status of "retrieved" is only signalled by the retrieving UE after retrieval of the MM.	M
reportAllowed	Indication whether or not the sending of delivery report is allowed by the recipient MMS Client. The values given in OMA-TS-MMA_ENC [39] clause 7.3.47 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent to the MMS Proxy-Relay.	C

7.4.3.6 MMSRetrieval

The IRI-POI in the MMS Proxy-Relay shall generate an xIRI containing an MMSRetrieval record when the MMS Proxy-Relay sends a *m-retrieve-conf* (as defined in OMA-TS-MMS_ENC [39] clause 6.3) to the MMS client in the target UE.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-retrieve-conf* message (from the MMS Proxy-Relay to the local target UE).

Table 7.4.3-6: Payload for MMSRetrieval

Field name	Description	M/C/O
transactionID	An ID used to correlate an MMS request and response between the target and the MMS Proxy-Relay. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29.	M
version	The version of MM, to include major and minor version.	M
messageID	An ID assigned by the MMS Proxy-Relay to uniquely identify an MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29.	M
dateTime	Date and Time when the MM was last handled (either originated or forwarded). For origination, included by the sending MMS client or the originating MMS Proxy-Relay.	M
originatingMMSParty	ID(s) of the originating party in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address by the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included. Include if sent by the MMS Proxy-Relay.	C
previouslySentBy	History of UEs that have forwarded (including originally submitted) the MM. Include if sent by the MMS Proxy-Relay.	C
previouslySentByDateTime	The timestamp associated with the previous forward events. Include if sent by the MMS Proxy-Relay.	C
terminatingMMSParty	ID(s) of the terminating party in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address by the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included. Include if sent by the MMS Proxy-Relay. At least one of the terminatingMMSParty or cCRecipients must be included.	C
cCRecipients	Address of a recipient; the "CC" field may include addresses of multiple recipients. When address translation occurs, both the pre and post translated addresses (with appropriate correlation) are included. Include if sent by the MMS Proxy-Relay. At least one of the terminatingMMSParty or cCRecipients must be included.	C
direction	Indicates the direction of the MM. This shall be encoded as “to target,” or "fromTarget," as appropriate.	M
subject	The subject of the MM. Include if sent by the MMS Proxy-Relay.	C
state	Identifies the value of the MM State associated with a to be stored or stored MM. See OMA-TS-MMA_ENC [39] clause 7.3.33. Include if sent by the MMS Proxy-Relay.	C
flags	Identifies a keyword to add or remove from the list of keywords associated with a stored MM. Include if sent. See OMA-TS-MMA_ENC [39] clause 7.3.32. Include if sent by the MMS Proxy-Relay.	C
messageClass	Class of the MM. For example, a value of "auto" is automatically generated by the UE. If the field is not present, the class should be interpreted as "personal." Include if sent by the MMS Proxy-Relay.	C
priority	Priority of the MM assigned by the originator MMS Client. Include if sent by the MMS Proxy-Relay.	C
deliveryReport	Specifies whether the originator MM UE requests a delivery report from each recipient. Indicates whether a delivery report is desired. The values given in OMA-TS-MMA_ENC [39] clause 7.3.13. shall be encoded as follows: “Yes” = True, “No” = False. Include if sent by the MMS Proxy-Relay.	C
readReport	Specifies whether the originator MM UE requests a read report from each recipient. Indicates whether a read report is desired. The values given in OMA-TS-MMA_ENC [39] clause 7.3.52 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent by the MMS Proxy-Relay.	C
replyCharging	If this field is present its value is set to “accepted” or “accepted text only” and the MMS-version-value of the PDU is higher than 1.0, this header field will indicate that a reply to this particular MM is free of charge for the recipient. If the Reply-Charging service is offered and the request for reply-charging has been accepted by the MMS service provider the value of this header field SHALL be set to “accepted” or “accepted text only”. See OMA-TS-MMA_ENC [39] clause 7.3.43. Include if sent by the MMS Proxy-Relay.	C
retrieveStatus	MMS specific status. It is used by the recipient MMS Proxy-Relay to inform the recipient MMS Client about errors, if any that occurred during the preceding retrieval operation. Include if sent by the MMS Proxy-Relay.	C
retrieveStatusText	Text that qualifies the Retrieve Status. As defined in OMA-TS-MMA_ENC [39] clause 7.3.55. Include if sent by the MMS Proxy-Relay.	C

applicID	Identification of the originating application of the original MM. Sent by the target to identify the destination application as defined in OMA-TS-MMA_ENC [39] clause 7.3.2. Include if sent by the MMS Proxy-Relay.	C
replyApplicID	Identification of an application to which replies, delivery reports, and read reports are addressed. Sent by the target to identify the application to which replies, delivery reports, and read reports are addressed as defined in OMA-TS-MMS_ENC [39] clause 7.3.42. Include if sent by the MMS Proxy-Relay.	C
auxApplicInfo	Auxiliary application addressing information as indicated in the original MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.4. Include if sent by the MMS Proxy-Relay.	C
contentClass	Classifies the content of the MM to the smallest content class to which the message belongs. Sent by the target to identify the class of the content. See OMA-TS-MMS_ENC [39] clause 7.3.9. Include if sent by the MMS Proxy-Relay.	C
dRMContent	Indicates if the MM contains any DRM-protected element. Provide when sent by the target to indicate if the MM contains any DRM-protected element. The values given in OMA-TS-MMA_ENC [39] clause 7.3.54 shall be encoded as follows: “Yea” = True, “No” = False. Include if sent by the MMS Proxy-Relay.	C
replaceID	Indicates the message ID of the message this one is intended to replace. Include if sent by the MMS Proxy-Relay.	C
contentType	The content type of the MM. See OMA-TS-MMS_ENC [39] clause 7.3.11.	M

7.4.3.7 MMSDeliveryAck

The IRI-POI in the MMS Proxy-Relay shall generate an xIRI containing an MMSDeliveryAck record when

- the MMS Proxy-Relay receives an m-acknowledge-ind (as defined in OMA-TS-MMS_ENC [39] clause 6.4) from the MMS client in the target UE (for deferred retrieval), or
- the MMS Proxy-Relay receives an m-notifyresp-ind (as defined in OMA-TS-MMS_ENC [39] clause 6.4) from the MMS client in the target UE (for immediate retrieval).

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-acknowledge-ind* message (from the local target UE to the MMS Proxy-Relay), and the *m-notifyresp-ind* message (from the local target UE to the MMS Proxy-Relay).

Table 7.4.3-7: Payload for MMSDeliveryAck

Field name	Description	M/C/O
transactionID	An ID used to correlate an MMS request and response between the target and the MMS Proxy-Relay. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29.	M
version	The version of MM, to include major and minor version.	M
reportAllowed	Indicates whether the target allows sending of a delivery report. Encoded as "Yes" = True, "No" = False. Include if received by the MMS Proxy-Relay.	C
status	Provides a MM status. A status of "retrieved" is only signalled by the retrieving UE after retrieval of the MM. Include if received by the MMS Proxy-Relay and if generated from a ***m-notifyresp-ind***.	C
direction	Indicates the direction of the MM. This shall be encoded as “to target.”	M

7.4.3.8 MMSForward

The IRI-POI in the MMS Proxy-Relay shall generate an xIRI containing an MMSForward record when the MMS Proxy-Relay sends an *m-forward-conf* (as defined in OMA-TS-MMS_ENC [39] clause 6.5.2) to the MMS client in the target UE.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-forward-req* message (from the local target UE to the MMS Proxy-Relay), and the *m-forward-conf* message (from the MMS Proxy-Relay to the local target UE).

Table 7.4.3-8: Payload for MMSForward

Field name	Description	M/C/O
transactionID	An ID used to correlate an MMS request and response between the target and the MMS Proxy-Relay. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29.	M
version	The version of MM, to include major and minor version.	M
dateTime	Date and Time when the MM was last handled (either originated or forwarded). For origination, included by the sending MMS client or the originating MMS Proxy-Relay. Include if sent to the MMS Proxy-Relay.	C
originatingMMSParty	ID(s) of the originating (forwarding) party in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address to the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included.	M
terminatingMMSParty	ID(s) of the terminating party in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address by the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included. Include if sent to the MMS Proxy-Relay. At least one of the terminatingMMSParty, cCRecipients, or bCCRecipients must be included.	C
cCRecipients	Address of a recipient; the "CC" field may include addresses of multiple recipients. When address translation occurs, both the pre and post translated addresses (with appropriate correlation) are included. This parameter is included if the corresponding MM includes a “CC” field. Include if sent to the MMS Proxy-Relay. At least one of the terminatingMMSParty, cCRecipients, or bCCRecipients must be included.	C
bCCRecipients	Address of a recipient; the "BCC" field may include addresses of multiple recipients. When address translation occurs, both the pre and post translated addresses (with appropriate correlation) are included. This parameter is included if the corresponding MM includes a “BCC” field. Include if sent to the MMS Proxy-Relay. At least one of the terminatingMMSParty, cCRecipients, or bCCRecipients must be included.	C
direction	Indicates the direction of the MM. This shall be encoded as “from target.”	M
expiry	Length of time in seconds the MM will be stored in MMS Proxy-Relay or time to delete the MM. The field has two formats, either absolute or relative. Include either the signalled expiry or the default, whichever applies. Include if sent to the MMS Proxy-Relay.	C
desiredDeliveryTime	Date and Time of desired delivery. Indicates the earliest possible delivery of the MM to the recipient. Include if sent to the MMS Proxy-Relay.	C
deliveryReportAllowed	An indication that the target requested reporting to the original sender or the default, whichever applies. The values given in OMA-TS-MMA_ENC [39] clause 7.3.47 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent to the MMS Proxy-Relay.	C
deliveryReport	Specifies whether the originator MMS UE requests a delivery report from each recipient. The values given in OMA-TS-MMA_ENC [39] clause 7.3.13. shall be encoded as follows: “Yes” = True, “No” = False. Include if sent to the MMS Proxy-Relay.	C
store	Specifies whether the originator MMS UE wants the submitted MM to be saved in the user's MMBox, in addition to sending it. Sent by the target to have the forwarded MM stored. The values given in OMA-TS-MMA_ENC [39] clause 7.3.52 shall be encoded as follows: “Yes” = True, “No” = False. Include if sent to the MMS Proxy-Relay.	C
state	Identifies the value of the MM State associated with a MM to be stored or stored MM. Sets the state for the forwarded MM when it is stored. As defined in OMA-TS-MMA_ENC [39] clause 7.3.33. Include if sent to the MMS Proxy-Relay.	C

flags	Identifies a keyword to add or remove from the list of keywords associated with a stored MM. Include if sent to the MMS Proxy-relay. See OMA-TS-MMA_ENC [39] clause 7.3.32.	C
contentLocationReq	The content-location-value field defines the URL for the MMS server location of the content to be retrieved as it appears in the m-forward-req. As defined in OMA-TS-MMA_ENC [39] clause 7.3.10.	M
replyCharging	If this field is present its value is set to “accepted” or “accepted text only” and the MMS-version-value is higher than 1.0, this header field will indicate that a reply to this particular MM is free of charge for the recipient. If the Reply-Charging service is offered and the request for reply-charging has been accepted by the MMS service provider the value of this header field SHALL be set to “accepted” or “accepted text only”. See OMA-TS-MMA_ENC [39] clause 7.3.43. Include if sent to the MMS Proxy-Relay.	C
responseStatus	MMS specific status. See OMA-TS-MMS_ENC [39] clause 7.3.48.	M
responseStatusText	Text that qualifies the Response Status. Include if sent to the target. As defined in OMA-TS-MMA_ENC [39] clause 7.3.49. Include if sent by the MMS Proxy-Relay.	C
messageID	An ID assigned by the MMS Proxy-Relay to uniquely identify an MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29. Include if sent by the MMS Proxy-Relay.	C
contentLocationConf	The *content-location-value* field defines the URL for the MMS server location of the MM as it appears in the *m-forward-conf*. As defined in OMA-TS-MMA_ENC [39] clause 7.3.10. Include if sent by the MMS Proxy-Relay.	C
storeStatus	Indicates if the MM was successfully stored in the MMBox. Include if sent by the MMS Proxy-Relay.	C
storeStatusText	Text that qualifies the Store Status. As defined in OMA-TS-MMA_ENC [39] clause 7.3.59. Include if sent by the MMS Proxy-Relay.	C

7.4.3.9 MMSDeleteFromRelay

The IRI-POI present in the MMS Proxy-Relay shall generate an xIRI containing an MMSDeleteFromRelay record when the MMS Proxy-Relay sends a *m-delete-conf* (defined in OMA-TS-MMS_ENC [39]) to the MMS client in the target UE.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-delete-req* message (from the local target UE to the MMS Proxy-Relay), and the *m-delete-conf* message (from the MMS Proxy-Relay to the local target UE).

Table 7.4.3-9: Payload for MMSDeleteFromRelay

Field name	Description	M/C/O
transactionID	An ID used to correlate an MMS request and response between the target and the MMS Proxy-Relay.	M
version	The version of MM, to include major and minor version.	M
direction	Indicates the direction of the MM. This shall be encoded as “to target,” or "fromTarget," as appropriate.	M
contentLocationReq	The *content-location-value* field defines the URL for the MMS server location of the MM as it appears in the *m-delete-conf,* as defined in OMA-TS-MMA_ENC [39] clause 7.3.10. Include if sent to the MMS Proxy-Relay.	M
contentLocationConf	The *content-location-value* field defines the URL for the MMS server location of the MM as it appears in the *m-delete-conf*, as defined in OMA-TS-MMA_ENC [39] clause 7.3.10. Include if sent by the MMS Proxy-Relay.	C
deleteResponseStatus	The delete response, as defined in OMA-TS-MMA_ENC [39] clause 7.3.48.	M
deleteResponseText	The delete response, as defined in OMA-TS-MMA_ENC [39] clause 7.3.49. Include if sent by the MMS Proxy-Relay.	C

7.4.3.10 MMSMBoxStore

The IRI-POI in the MMS Proxy-Relay shall generate an xIRI containing an MMSMBoxStore record when the MMS Proxy-Relay sends a m-mbox-store-conf (defined in OMA-TS-MMS_ENC [39] clause 6.8) to the MMS client in the target UE.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the m-mbox-store-req message (from the local target UE to the MMS Proxy-Relay), and from the *m-mbox-store-conf* message (from the MMS Proxy-Relay to the local target UE).

Table 7.4.3-10: Payload for MMSMBoxStore

Field name	Description	M/C/O
transactionID	An ID used to correlate an MMS request and response between the target and the MMS Proxy-Relay. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29.	M
version	The version of MM, to include major and minor version.	M
direction	Indicates the direction of the MM. This shall be encoded as “to target.”	M
contentLocationReq	The *content-location-value* field defines the URL for the MMS server location of the MM as it appears in the *m-mbox-store-req*. As defined in OMA-TS-MMA_ENC [39] clause 7.3.10. Include if sent by the MMS Proxy-Relay.	M
state	Identifies the value of the MM State associated with a MM to be stored or stored MM. Sets the state for the forwarded MM when it is stored. As defined in OMA-TS-MMA_ENC [39] clause 7.3.33. Include if sent by the MMS Proxy-Relay.	C
flags	Identifies a keyword to add or remove from the list of keywords associated with a stored MM. See OMA-TS-MMA_ENC [39] clause 7.3.32. Include if sent by the MMS Proxy-Relay.	C
contentLocationConf	The *content-location-value* field defines the URL for the MMS server location of the MM as it appears in the *m-mbox-store-conf*. As defined in OMA-TS-MMA_ENC [39] clause 7.3.10. Include if sent by the MMS Proxy-Relay.	C
storeStatus	Indicates if the MM was successfully stored in the MMBox.	M
storeStatusText	Text that qualifies the Store Status. Include if sent to the target. As defined in OMA-TS-MMA_ENC [39] clause 7.3.59. Include if sent by the MMS Proxy-Relay.	C

7.4.3.11 MMSMBoxUpload

The IRI-POI present in the MMS Proxy-Relay shall generate an xIRI containing an MMSMBoxUpload record when the MMS Proxy-Relay sends a *m-mbox-upload-conf* (defined in OMA-TS-MMS_ENC [39] clause 6.10) to the MMS client in the target UE.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-mbox-upload-req* message (from the local target UE to the MMS Proxy-Relay), and from the *m-mbox-upload-conf* message (from the MMS Proxy-Relay to the local target UE).

Table 7.4.3-11: Payload for MMSMBoxUpload

Field name	Description	M/C/O
transactionID	An ID used to correlate an MMS request and response between the target and the MMS Proxy-Relay. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29.	M
version	The version of MM, to include major and minor version.	M
direction	Indicates the direction of the MM. This shall be encoded as “to target,” or "fromTarget," as appropriate.	M
state	Identifies the value of the MM State associated with a MM to be stored or stored MM. Sets the state for the forwarded MM when it is stored. As defined in OMA-TS-MMA_ENC [39] clause 7.3.33. Include if sent by the MMS Proxy-Relay.	C
flags	Identifies a keyword to add or remove from the list of keywords associated with a stored MM. See OMA-TS-MMA_ENC [39] clause 7.3.32. Include if sent by the MMS Proxy-Relay.	C
contentType	The content type of the MM. See OMA-TS-MMS_ENC [39] clause 7.3.11	M
contentLocation	The *content-location-value* field defines the URL for the MMS server location of the MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.10. Include if sent by the MMS Proxy-Relay.	C
storeStatus	Indicates if the MM was successfully stored in the MMBox.	M
storeStatusText	Text that qualifies the Store Status. Include if sent to the target. As defined in OMA-TS-MMA_ENC [39] clause 7.3.59. Include if sent by the MMS Proxy-Relay.	C
mMBoxDescription	The MMBox description PDU as defined in 7.4.3.20 corresponds to the particular MM. include if sent by the MMS Proxy-Relay.	C

7.4.3.12 MMSMBoxDelete

The IRI-POI present in the MMS Proxy-Relay shall generate an xIRI containing an MMSMBoxDelete record when the MMS Proxy-Relay sends a *m-mbox-delete.conf* (defined in OMA-TS-MMS_ENC [39]) to the MMS client in the target UE.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-mbox-delete-req* message (from the local target UE to the MMS Proxy-Relay), and from the *m-mbox-delete-conf* message (from the MMS Proxy-Relay to the local target UE).

Table 7.4.3-12: Payload for MMSMBoxDelete

Field name	Description	M/C/O
transactionID	An ID used to correlate an MMS request and response between the target and the MMS Proxy-Relay. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29.	M
version	The version of MM, to include major and minor version.	M
direction	Indicates the direction of the MM. This shall be encoded as “to target,” or "fromTarget," as appropriate.	M
contentLocationReq	The *content-location-value* field defines the URL for the MMS server location of the MM as it appears in the *m-mbox-delete-req*. As defined in OMA-TS-MMA_ENC [39] clause 7.3.10.	M
contentLocationConf	The *content-location-value* field defines the URL for the MMS server location of the MM as it appears in the *m-mbox-delete-conf*. As defined in OMA-TS-MMA_ENC [39] clause 7.3.10. Include if sent by the MMS Proxy-Relay.	C
responseStatus	MMS specific status.	M
responseStatusText	Text that qualifies the Response Status. As defined in OMA-TS-MMA_ENC [39] clause 7.3.49.	C

7.4.3.13 MMSDeliveryReport

The IRI-POI present in the MMS Proxy-Relay shall generate an xIRI containing an MMSDeliveryReport record when the MMS Proxy-Relay sends an *m-delivery-ind* (as defined in OMA-TS-MMS_ENC [39] clause 6.11) to the MMS client in the target UE.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-delivery-ind* message (from the MMS Proxy-Relay to the local target UE).

Table 7.4.3-13: Payload for MMSDeliveryReport

Field name	Description	M/C/O
version	The version of MM, to include major and minor version.	M
messageID	An ID assigned by the MMS Proxy-Relay to uniquely identify an MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29. Include if sent by the MMS Proxy-Relay.	M
terminatingMMSParty	ID(s) of the terminating party of the original message this Delivery Report refers to, in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address by the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included.	M
dateTime	Date and Time when the MM was last handled (either originated or forwarded).. Include if sent by the MMS Proxy-Relay.	M
responseStatus	MMS specific status.	M
responseStatusText	Text that qualifies the Response Status. As defined in OMA-TS-MMA_ENC [39] clause 7.3.49. Include if sent by the MMS Proxy-Relay.	C
applicID	Identification of the originating application of the original MM. Sent by the target to identify the destination application as defined in OMA-TS-MMA_ENC [39] clause 7.3.2. Include if sent by the MMS Proxy-Relay.	C
replyApplicID	Identification of an application to which replies, delivery reports, and read reports are addressed. Sent by the target to identify the application to which replies, delivery reports, and read reports are addressed as defined in OMA-TS-MMS_ENC [39] clause 7.3.42. Include if sent by the MMS Proxy-Relay.	C
auxApplicInfo	Auxiliary application addressing information as indicated in the original MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.4. Include if sent by the MMS Proxy-Relay.	C

7.4.3.14 MMSDeliveryReportNonLocalTarget

The IRI-POI in the MMS Proxy-Relay shall generate an xIRI containing an MMSDeliveryReportNonLocalTarget record when the MMS Proxy-Relay:

- sends MM4_delivery_report.REQ (as defined in TS 23.140 [40] clause 8.4.2), that contains a non-local target ID, to the non-local MMS Proxy-Relay, or

- receives MM4_delivery_report.REQ, that contains a non-local target ID, from the non-local MMS Proxy-Relay.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *MM4_delivery_report.REQ* message (from the local MMS Proxy-Relay to the non-local MMS Proxy-Relay, or inversely).

Table 7.4.3-14: Payload for MMSDeliveryReportNonLocalTarget

Field name	Description	M/C/O
version	The version of MM, to include major and minor version.	M
transactionID	An ID used to correlate an MMS request and response between the proxies. As defined in TS 23.140 [40] clause 8.4.1.4.	M
messageID	An ID assigned by the MMS Proxy-Relay to uniquely identify an MM. As defined in TS 23.140 [40] clause 8.4.1.4.	M
terminatingMMSParty	ID(s) of the terminating party of the original message this Delivery Report refers to, in one or more of the formats described in 7.4.2.1.	M
originatingMMSParty	ID(s) of the originating party of the original message this Delivery Report refers to, in one or more of the formats described in 7.4.2.1.	M
direction	Indicates the direction of the MM. This shall be encoded as "toTarget," or “from target,” as appropriate.	M
dateTime	Date and Time when the MM was last handled (either originated or forwarded).	M
forwardToOriginator	Indicates whether the MMS Proxy-Relay is allowed to forward the delivery report to the originating UE. "Yes" is coded as True, and "No" is coded as False. Include if sent to/by the MMS Proxy-Relay.	C
mMStatus	Provides a MM status. A status of "retrieved" is only signalled by the retrieving UE after retrieval of the MM.	M
mMStatusExtension	Extension of the MMStatus, that provides more granularity. Include if sent to/by the MMS Proxy-Relay.	C
mMStatusText	Text that qualifies the MM Status. As defined in OMA-TS-MMA_ENC [39] clause 7.3.55. Include if sent to/by the MMS Proxy-Relay.	C
applicID	Identification of the originating application of the original MM. Identifies the destination application as defined in TS 23.140 [40] clause 8.4.1.4. Include if sent to/by the MMS Proxy-Relay.	C
replyApplicID	Identification of an application to which replies, delivery reports, and read reports are addressed. Identifies the application to which replies, delivery reports, and read reports are addressed as defined in TS 23.140 [40] clause 8.4.1.4. Include if sent to/by the MMS Proxy-Relay.	C
auxApplicInfo	Auxiliary application addressing information as indicated in the original MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.4. Include if sent to/by the MMS Proxy-Relay.	C

7.4.3.15 MMSReadReport

The IRI-POI present in the MMS Proxy-Relay shall generate an xIRI containing an MMSReadReport record when the MMS Proxy-Relay:

- sends a m-read-orig-ind (as defined in OMA-TS-MMS_ENC [39] clause 6.7.2) to the MMS client in the target UE, or
- receives a m-read-rec-ind (as defined in OMA-TS-MMS_ENC [39] clause 6.7.2) from the MMS client in the target UE.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-read-orig-ind* message (from the MMS Proxy-Relay to the local target UE), and from the *m-read-rec-ind* message (from the local target UE to the MMS Proxy-Relay).

Table 7.4.3-15: Payload for MMSReadReport

Field name	Description	M/C/O
version	The version of MM, to include major and minor version.	M
messageID	An ID assigned by the MMS Proxy-Relay to uniquely identify an MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29.	M
terminatingMMSParty	ID(s) of the terminating party (i.e. the intended recipient of the read report or the originator of the initial MM message to which the read report applies) in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address by the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included.	M
originatingMMSParty	ID(s) of the originating party (i.e. the originator of the read report or the recipient the initial MM message to which the read report applies) in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address by the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included.	M
direction	Indicates the direction of the original MM (**not** of this message). This shall be encoded either as "from target," or “to target,” as appropriate.	M
dateTime	Date and Time when the MM was last handled (either originated or forwarded). Include if sent to/by the MMS Proxy-Relay.	C
readStatus	Status of the MMS (e.g.read or deleted without reading.)	M
applicID	Identification of the originating application of the original MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.2. Include if sent to/by the MMS Proxy-Relay.	C
replyApplicID	Identification of an application to which replies, delivery reports, and read reports are addressed. As defined in OMA-TS-MMA_ENC [39] clause 7.3.42. Include if sent to/by the MMS Proxy-Relay.	C
auxApplicInfo	Auxiliary application addressing information as indicated in the original MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.4. Include if sent to/by the MMS Proxy-Relay.	C

7.4.3.16 MMSReadReportNonLocalTarget

The IRI-POI present in the MMS Proxy-Relay shall generate an xIRI containing an MMSReadReportNonLocalTarget record when the MMS Proxy-Relay:

- sends a MM4_read_reply_report.REQ (as defined in TS 23.140 [40] clause 8.4.3), that contains a non-local target ID, to the non-local MMS Proxy-Relay, or
- receives a MM4_read_reply_report.REQ (as defined in TS 23.140 [40] clause 8.4.3), that contains a non-local target ID, from the non-local MMS Proxy-Relay.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the ***MM4_read_reply_report.REQ*** message (from the local MMS Proxy-Relay to the non-local MMS Proxy-Relay, or inversely).

Table 7.4.3-16: Payload for MMSReadReportNonLocalTarget

Field name	Description	M/C/O
version	The version of MM, to include major and minor version.	M
transactionID	An ID used to correlate an MMS request and response between the proxies. As defined in TS 23.140 [40] clause 8.4.1.4.	M
terminatingMMSParty	ID(s) of the terminating party in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address by the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included.	M
originatingMMSParty	ID(s) of the originating party in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address by the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included.	M
direction	Indicates the direction of the original MM (**not** of this message). This shall be encoded either as "from target" = True, or “to target” = False.	M
messageID	An ID assigned by the MMS Proxy-Relay to uniquely identify an MM. As defined in TS 23.140 [40] clause 8.4.1.4.	M
dateTime	Date and Time when the MM was last handled (either originated or forwarded).	M
readStatus	Status of the MMS (e.g.read or deleted without reading.)	M
readStatusText	Text explanation corresponding to the Read Status. Include if sent to/by the MMS Proxy-Relay.	C
applicID	Identification of the originating application of the original MM. Identifies the destination application as defined in TS 23.140 [40] clause 8.4.1.4. Include if sent to/by the MMS Proxy-Relay.	C
replyApplicID	Identification of an application to which replies, delivery reports, and read reports are addressed. Identifies the application to which replies, delivery reports, and read reports are addressed, as defined in TS 23.140 [40] clause 8.4.1.4. Include if sent to/by the MMS Proxy-Relay.	C
auxApplicInfo	Auxiliary application addressing information as indicated in the original MM. As defined in OMA-TS-MMA_ENC [39] clause 7.3.4. Include if sent to/by the MMS Proxy-Relay.	C

7.4.3.17 MMSCancel

The IRI-POI present in the MMS Proxy-Relay shall generate an xIRI containing an MMSCancel record when the MMS Proxy-Relay sends a *m-cancel-req* (as defined in OMA-TS-MMS_ENC [39] clause 6.13) to the MMS client in the target UE.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-cancel-req* message (from the MMS Proxy-Relay to the local target UE).

Table 7.4.3-17: Payload for MMSCancel

Field name	Description	M/C/O
transactionID	An ID used to correlate an MMS request and response between the target and the MMS Proxy-Relay. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29.	M
version	The version of MM, to include major and minor version.	M
cancelID	This field includes the Message ID identifying the message to be cancelled. As defined in OMA-TS-MMA_ENC [39] clause 7.3.6.	M
direction	Indicates the direction of the original MM. This shall be encoded as “to target."	M

7.4.3.18 MMSMBoxViewRequest

The IRI-POI present in the MMS Proxy-Relay shall generate an xIRI containing an MMSViewRequest record when the MMS Proxy-Relay receives a *m-mbox-view-req* (as defined in OMA-TS-MMS_ENC [39] clause 6.9) from the MMS client in the target UE.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-mbox-vew-req* message (from the local target UE to the MMS Proxy-Relay).

Table 7.4.3-18: Payload for MMSMBoxViewRequest

Field name	Description	M/C/O
transactionID	An ID used to correlate an MMS request and response between the target and the MMS Proxy-Relay. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29.	M
version	The version of MM, to include major and minor version.	M
contentLocation	The *content-location-value* field defines the URL for the MMS Proxy-Relay location of the content to be retrieved. As defined in OMA-TS-MMA_ENC [39] clause 7.3.10. Include if sent to the MMS Proxy-Relay.	C
state	Specifies a MM State value to use in selecting the messages to return. As defined in OMA-TS-MMA_ENC [39] clause 7.3.33. Include if sent to the MMS Proxy-Relay.	C
flags	Specifies a MM Flags keyword to use in selecting the messages to return in the response. See OMA-TS-MMA_ENC [39] clause 7.3.32. Include if sent to the MMS Proxy-Relay.	C
start	A number, indicating the index of the first MM of those selected to have information returned in the response. Include if sent to the MMS Proxy-Relay.	C
limit	A number indicating the maximum number of selected MMs whose information are to be returned in the response. If this is absent, information elements from all remaining MMs are to be returned. If this is zero then no MM-related information are to be returned. Include if sent to the MMS Proxy-Relay.	C
mMSAttributes	A list of information elements that should appear in the view for each selected message. Include if sent to the MMS Proxy-Relay.	C
mMSTotals	Indicates a request for or the actual count of messages currently stored in the MMBox. The values given in OMA-TS-MMA_ENC [39] clause 7.3.62. shall be encoded as follows: “Yes” = True, “No” = False. Include if sent to the MMS Proxy-Relay.	C
mMSQuotas	Indicates a request for or the actual quotas for the user's MMBox in messages or bytes. The values given in OMA-TS-MMA_ENC [39] clause 7.3.36. shall be encoded as follows: “Yes” = True, “No” = False. Include if sent to the MMS Proxy-Relay.	C

7.4.3.19 MMSMBoxViewResponse

The IRI-POI present in the MMS Proxy-Relay shall generate an xIRI containing an MMSViewConfirm record when the MMS Proxy-Relay sends a *m-mbox-view.conf* (as defined in OMA-TS-MMS_ENC [39] clause 6.9) to the MMS client in the target UE.

The following table contains parameters generated by the IRI-POI, along with parameters derived from the *m-mbox-vew-conf* message (from the local target UE to the MMS Proxy-Relay).

Table 7.4.3-19: Payload for MMSMBoxViewResponse

Field name	Description	M/C/O
version	The version of MM, to include major and minor version.	M
responseStatus	MMS specific status.	M
responseStatusText	Text that qualifies the Response Status. As defined in OMA-TS-MMA_ENC [39] clause 7.3.49.	C
contentLocation	The *content-location-value* field defines the URL for the MMS server location of the content to be retrieved. As defined in OMA-TS-MMA_ENC [39] clause 7.3.10. Include if sent by the MMS Proxy-Relay.	C
state	Specifies a MM State value to use in selecting the messages to return. As defined in OMA-TS-MMA_ENC [39] clause 7.3.33. Include if sent by the MMS Proxy-Relay.	C
flags	Specifies a MM Flags keyword to use in selecting the messages to return in the response. See OMA-TS-MMA_ENC [39] clause 7.3.32. Include if sent by the MMS Proxy-Relay.	C
start	A number, indicating the index of the first MM of those selected to have information returned in the response. Include if sent by the MMS Proxy-Relay.	C
limit	A number indicating the maximum number of selected MMs whose information are to be returned in the response. If this is absent, information elements from all remaining MMs are to be returned. If this is zero then no MM-related information are to be returned. Include if sent by the MMS Proxy-Relay.	C
mMSAttributes	A list of information elements that should appear in the view for each selected message. Include if sent by the MMS Proxy-Relay.	C
mMSTotals	Indicates a request for or the actual count of messages currently stored in the MMBox. The values given in OMA-TS-MMA_ENC [39] clause 7.3.62. shall be encoded as follows: “Yes” = True, “No” = False. Include if sent by the MMS Proxy-Relay.	C
mMSQuotas	Indicates a request for or the actual quotas for the user's MMBox in messages or bytes. The values given in OMA-TS-MMA_ENC [39] clause 7.3.36. shall be encoded as follows: “Yes” = True, “No” = False. Include if sent by the MMS Proxy-Relay.	C
mMBoxDescription	The MMBox description PDU as defined in 7.4.3.20 corresponds to the particular MM.	M

7.4.3.20 MMBoxDescription

The MMBoxDescription used in MMSMBoxViewResponse and MMSMBoxUpload records is defined in table 7.4.3-20.

Table 7.4.3-20: Payload for MMBoxDescription

Field name	Description	M/C/O
contentLocation	The *content-location-value* field defines the URL for the MMS Proxy-relay location of the content to be retrieved. As defined in OMA-TS-MMA_ENC [39] clause 7.3.10. Include if sent by the MMS Proxy-Relay.	C
messageID	An ID assigned by the MMS Proxy-Relay to uniquely identify an MM. Included unconditionally for the MMS View Confirm report and is included for the MMS Upload report if a Message ID was previously assigned to the MM. In this latter case, if a Message ID was not previously assigned, this parameter is excluded. As defined in OMA-TS-MMA_ENC [39] clause 7.3.29. Include if sent by the MMS Proxy-Relay.	C
state	Identifies the value of the MM State associated with a MM to be stored or stored MM. Include for the MMS View Confirm. Include for the MMS View Request if provided by the target. As defined in OMA-TS-MMA_ENC [39] clause 7.3.33. Include if sent by the MMS Proxy-Relay.	C
flags	Identifies a keyword to add or remove from the list of keywords associated with a stored MM. This parameter may convey all the keywords associated with the MM. Include if at least one keyword is associated with the MM. If no keywords are associated with the MM, then this parameter may be excluded. Include if sent by the MMS Proxy-Relay.	C
dateTime	Date and Time when the MM request was detected. Include if sent by the MMS Proxy-Relay.	C
originatingMMSParty	ID(s) of the originating party in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address by the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included. Include if sent by the MMS Proxy-Relay.	C
terminatingMMSParty	ID(s) of the terminating party in one or more of the formats described in 7.4.2.1 When address translation occurs (such as the case of a token sent by the client and replaced with a proper address by the MMS Proxy-Relay), both the pre and post translated addresses (with appropriate correlation) are included. I Include if sent by the MMS Proxy-Relay.	C
cCRecipients	Address of a recipient; the "CC" field may include addresses of multiple recipients. When address translation occurs, both the pre and post translated addresses (with appropriate correlation) are included. This parameter is included if the corresponding MM includes a “CC” field. Include if sent by the MMS Proxy-Relay.	C
bCCRecipients	Address of a recipient; the "BCC" field may include addresses of multiple recipients. When address translation occurs, both the pre and post translated addresses (with appropriate correlation) are included. This parameter is included if the corresponding MM includes a “BCC” field. Include if sent by the MMS Proxy-Relay.	C
messageClass	Class of the MM. For example, a value of "auto" is automatically generated by the UE. If the field is not present, the class should be interpreted as "personal". Include if sent by the MMS Proxy-Relay.	C
subject	The subject of the MM. Include if sent by the MMS Proxy-Relay.	C
priority	Priority of the MM assigned by the originator MMS Client. Reported if sent by the target. Include if sent by the MMS Proxy-Relay.	C
deliveryTime	Date and Time of delivery. Include if sent by the MMS Proxy-Relay.	C

readReport	Specifies whether the originator MMS UE requests a read report from each recipient. The values given in OMA-TS-MMA_ENC [39] clause 7.3.37. shall be encoded as follows: “Yes” = True, “No” = False. Include if sent by the MMS Proxy-Relay.	C
messageSize	Specifies the size of the MM that was viewed or uploaded. Specified in bytes. Include if sent by the MMS Proxy-Relay.	C
replyCharging	If this field is present its value is set to “accepted” or “accepted text only” and the MMS-version-value of the M-Notification.ind PDU is higher than 1.0, this header field will indicate that a reply to this particular MM is free of charge for the recipient. If the Reply-Charging service is offered and the request for reply-charging has been accepted by the MMS service provider the value of this header field SHALL be set to “accepted” or “accepted text only”. See OMA-TS-MMA_ENC [39] clause 7.3.43. Include if sent by the MMS Proxy-Relay.	C
previouslySentBy	Address of the MMS Client that forwarded or previously sent the message. along with a sequence number and timestamp. A higher sequence number indicates a forwarding event at a later point in time. The sequence number indicates the correspondence to the MMS Client's address in the "X-Mms-Previously- Sent-By" header field with the same sequence number.This header field MAY appear multiple times. Include if sent by the MMS Proxy-Relay.	C
previouslySentByDateTime	Date/Time MM was previously sent.This header field MAY appear multiple times. Include if sent by the MMS Proxy-Relay.	C
contentType	The content type of the MM. Include if sent by the MMS Proxy-Relay.	C

7.4.3.21 MMS Content

If content delivery is authorized, the CC-POI in the MMS Proxy-Relay shall generate an xCC as per clause 7.4.2.3 when any of the events in clauses 7.4.3.1 through 7.4.3.19 are detected.

7.4.4 IRI and CC Generation

7.4.4.1 Generation of IRI over LI_HI2

When an IRI-POI in the MMS Proxy-Relay generated xIRI is received over LI_X2, the MDF2 shall send an xIRI over LI_HI2 without undue delay. The xIRI shall contain a copy of the record received over LI_X2. The record may be enriched by other information available at the MDF (e.g. additional location information).

The threeGPP33128DefinedCC field (see ETSI TS 102 232-7 [10] clause 15) shall be populated with the BER-encoded IRIPayload.

The timestamp field of the psHeader structure shall be set to the time that the MMS event was observed (i.e. the timestamp field of the xIRI). The LIID and CID fields shall correctly reflect the target identity and communication session to which the IRI belongs.

7.4.4.2 Generation of CC over LI_HI3

When a CC-POI in the MMS Proxy-Relay generated xCC message is received over LI_X3, the MDF2 shall send a CC message over LI_HI3 without undue delay. The CC message shall contain a copy of the MMS received over LI_X3. The record may be enriched with other information available at the MDF.

7.5 PTC service

7.5.1 Introduction

The Stage 3 intercept capabilities defined in this clause for the Push to Talk over Cellular (PTC) service apply when supported by a CSP. The term PTC represents either a Push to Talk over Cellular (PoC) or Mission Critical Push to Talk (MCPTT) type service. The use of the term PTC server represents either a MCPTT function or PoC server.

7.5.1.1 Provisioning over LI_X1

The IRI-POI present in the PTC server is provisioned over LI_X1 by the LIPF using the X1 protocol as described in clause 5.2.2 of the present document.

The POI in the PTC Server shall support the identifier types given in Table 7.5.1-1.

Table 7.5.1-1: TargetIdentifier Types for PTC service

Identifier	Owner	ETSI TS 103 221-1 [7] TargetIdentifier type	Definition
iMPU	ETSI	IMPU	See ETSI TS 103 221-1 [7]
iMPI	ETSI	IMPI	See ETSI TS 103 221-1 [7]
mCPTTID	ETSI	TargetIdentifierExtension	See XSD schema
instanceIdentifierURN	3GPP	TargetIdentifierExtension	See XSD schema
pTCChatGroupID	3GPP	TargetIdentifierExtension	See XSD schema

7.5.1.2 Generating xIRI over LI_X2

The IRI-POI present in the PTC server shall send xIRI over LI_X2 for each of the events listed in TS 33.127 [5] clause 7.6.3, each of which is described in the following clauses. The IRI events are based on the use of 3GPP MCPTT features as defined in 3GPP TS 24.379 [41] and OMA PoC features as defined in OMA-TS-PoC_System_Description-V2_1-20110802-A [42].

7.5.1.3 Generation of xCC over LI_X3

The CC-POI present in the PTC server shall send xCC over LI_X3.

The CC-POI shall set the payload format to indicate the appropriate payload type (5 for IPv4 Packet, 6 for IPv6 Packet) as per clause 6.2.3.6 of the present document.

7.5.2 IRI events

7.5.2.1 PTC registration

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCRegistration record when the IRI-POI present in the PTC server detects that a PTC target matching one of the PTC target identifiers, referenced in clause 7.5.1.1, provided via LI_X1 has registered, re-registered, or de-registered for PTC services , regardless of whether it is successful or unsuccessful. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following event is detected:

- when the PTC server receives a SIP REGISTER from a PTC target.

Table 7.5.2-1: Payload for PTCRegistration record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCServerURI	Shall include the identity of the PTC server serving the PTC target.	M
pTCRegistrationRequest	Identifies the type of registration request (register, re-register, or de-register).	M
pTCRegistrationOutcome	Identifies success or failure of the registration.	M

7.5.2.2 PTC session initiation

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCSessionInitiation record when the IRI-POI present in the PTC server detects that the PTC target initiates an on-demand session or the target receives an invitation to join an on-demand session regardless of the success or the final disposition of the invitation. The

PTCSessionIniation record shall also be reported when a chat group is the PTC target. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following events are detected:

- when the PTC server receives a SIP INVITE from a PTC target.
- when the PTC Server sends a SIP INVITE to the PTC target.
- when the PTC Server hosting a PTC chat group session, where the PTC chat group is the target, receives a SIP INVITE from a participating PTC server to initiate a PTC chat group session.

Table 7.5.2-2: Payload for PTCSessionInitiation record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCDirection	Indicates the direction of the session relative to the target: "toTarget" or "fromTarget."	M
pTCServerURI	Shall include the identity of the PTC server serving the PTC target.	M
pTCSessionInfo	Shall provide PTC session information such as PTC Session URI and PTC Session type (e.g. on-demand, pre-established, ad-hoc, pre-arranged, group session).	M
pTCOriginatingID	Shall identify the originating party.	M
pTCParticipants	Shall identify the individual PTC participants of the communication session, when known.	C
pTCParticipantPresenceStatus	Shall provide the Participant Presence Status, which is a list of: - *PresenceID*: Identity of PTC client(s) or PTC group, when known. - *PresenceType*: Identifies type of ID [PTC client(s) or PTC group]. - *PresenceStatus*: Presence state of each ID. True indicates PTC client is available, while false indicates PTC client is unavailable. Report when the Presence functionality is supported by the PTC server and the PTC server assumes the role of the watcher on behalf of the PTC target or in the case of a target PTC chat group, when the PTC server assumes the role of the watcher on behalf of any member of the chat group.	C
location	Shall include the PTC target's location when reporting of the PTC target's location information is authorized and available.	C
pTCBearerCapability	Shall provide when known the media characteristics information elements of the PTC session, encoded in SDP format as per RFC 4566 [43] clause 5.	C
pTCHost	Shall identify the PTC participant who has the authority to initiate and administrate a PTC session, if known.	C

7.5.2.3 PTC session abandon attempt

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCSessionAbandon record when the IRI-POI present in the PTC server detects that the PTC Session is not established and the request is abandoned before the PTC session starts. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following events are detected:

- when the PTC server serving the PTC target receives a SIP CANCEL from the PTC target or sends a SIP CANCEL to the PTC target.

Table 7.5.2-3: Payload for PTCSessionAbandonAttempt record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCDirection	Indicates the direction of the session relative to the target: "toTarget" or "fromTarget."	M
pTCSessionInfo	Shall provide PTC session information such as PTC Session URI and PTC Session type (e.g. on-demand, pre-established, ad-hoc, pre-arranged, group session).	M
location	Shall include the PTC target's location when reporting of the PTC target's location information is authorized and available.	C
pTCAbandonCause	Shall identify the reason for the abandoned PTC session based on the warning header field code provided in a response to a SIP INVITE per 3GPP TS 24.379 [41] clause 4.4.2.	M

7.5.2.4 PTC session start

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCSessionStart record when the IRI-POI present in the PTC server detects that the PTC Session is initiated and communication begins for both an on-demand and pre-established PTC session. The PTCSessionStart record shall also be reported when a chat group is the PTC target. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following events are detected:

- when the PTC server sends a SIP 200 OK to the PTC target in response to a SIP INVITE from the PTC target for an on-demand PTC session where the PTC target originates the PTC session.

- when the PTC server receives a SIP 200 OK from the PTC target in response to a SIP INVITE for an on-demand PTC session where the PTC target receives an invitation to join a PTC session.

- when the PTC server receives a SIP 200 OK from the participant PTC server in response to a SIP INVITE previously sent to that participating PTC server for PTC sessions initiated by the PTC target with a pre-established PTC session (PTC server sends a TBCP Connect to the PTC target with a pre-established session).

- when the PTC server sends a SIP 200 OK to the participant PTC server in response to a SIP INVITE previously received from that participating PTC server for PTC sessions terminated to the PTC target with a pre-established PTC session (PTC server sends a TBCP Connect to the PTC target with a pre-established session).

- when the PTC server hosting a PTC chat group session, where PTC chat group is the PTC target, sends a SIP 200 OK in response to a SIP INVITE previously received from the participant PTC server to initiate a PTC chat group session.

Table 7.5.2-4: Payload for PTCSessionStart record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCDirection	Indicates the direction of the session relative to the target: "toTarget" or "fromTarget."	M
pTCServerURI	Shall include the identity of the PTC server serving the PTC target.	M
pTCSessionInfo	Shall provide PTC session information such as PTC Session URI and PTC Session type (e.g. on-demand, pre-established, ad-hoc, pre-arranged, group session).	M
pTCOriginatingID	Shall identify the originating party.	M
pTCParticipants	Shall identify the individual PTC participants of the communication session, when known.	C
pTCParticipantPresenceStatus	Shall provide the Participant Presence Status, which is a list of: - *PresenceID*: Identity of PTC client(s) or PTC group, when known. - *PresenceType*: Identifies type of ID [PTC client(s) or PTC group]. - *PresenceStatus*: Presence state of each ID. True indicates PTC client is available, while false indicates PTC client is unavailable. Report when the Presence functionality is supported by the PTC server and the PTC server assumes the role of the watcher on behalf of the PTC target.	C
location	Shall include the PTC target's location when reporting of the PTC target's location information is authorized and available.	C
pTCHost	Shall identify the PTC participant who has the authority to initiate and administrate a PTC Session, if known.	C
pTCBearerCapability	Shall provide the media characteristics information elements of the PTC session, encoded in SDP format as per RFC 4566 [43] clause 5 when known.	C

7.5.2.5 PTC session end

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCSessionEnd record when the IRI-POI present in the PTC server detects that the PTC session is released for any reason (i.e. normal or abnormal release) and voice communications ends. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following events are detected:

- when the PTC server receives a SIP BYE from the PTC target to end the session.
- when the PTC server receives a SIP 200 OK from the PTC target in response to a SIP BYE.
- when the PTC server sends a SIP BYE to the participating PTC server to end the PTC session of a PTC target with a pre-established PTC session (PTC server also sends a TBCP Disconnect to the PTC target with a pre-established PTC session).
- when the PTC server receives a SIP BYE from the participant PTC server to end the PTC session of a PTC target with a pre-established PTC session (PTC server sends a TBCP Disconnect to the PTC target with a pre-established PTC session).
- when the PTC server hosting a PTC chat group session, where PTC chat group is the PTC target, sends a SIP 200 OK in response to a SIP BYE received from the participating PTC server of the last participant in the PTC chat group session.
- when the PTC server sends a SIP 487 to the PTC target in response to a SIP CANCEL to end the session.

Table 7.5.2-5: Payload for PTCSessionEnd record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCDirection	Indicates the direction of the session relative to the target: "toTarget" or "fromTarget."	M
pTCServerURI	Shall include the identity of the PTC server serving the PTC target.	M
pTCSessionInfo	Shall provide PTC session information such as PTC Session URI and PTC Session type (e.g. on-demand, pre-established, ad-hoc, pre-arranged, group session).	M
pTCParticipants	Shall identify the individual PTC participants of the communication session, when known.	C
location	Shall include the PTC target's location when reporting of the PTC target's location information is authorized and available.	C
pTCSessionEndCause	Shall identify the reason for the PTC session end based on the following events per OMA-TS-PoC_System_Description-V2_1-20110802-A [42] clause 4.5.7: - PTC session initiator leaves session - Defined participant leaves session - Number of participants less than certain value - PTC Session timer expired - PTC Speech inactive for specified time - All Media types inactive for specified time	M

7.5.2.6 PTC start of interception

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCStartOfInterception record when a PTC target or a PTC chat group as a target has an active PTC session in progress. If multiple PTC Sessions are active at the start of interception, a PTCStartOfInterception record is generated for each active session. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following event is detected:

- when the PTC server detects that LI is enabled on a PTC participant or a PTC chat group with an active PTC session.

Table 7.5.2-6: Payload for PTCStartOfIntercept record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCDirection	Indicates the direction of the session relative to the target: "toTarget" or "fromTarget."	M
pTCPreEstSessionID	Identifies the PTC Pre-Established Session Identity when available.	C
pTCOriginatingID	Shall identify the originating party.	M
pTCSessionInfo	Shall provide PTC session information such as PTC Session URI and PTC Session type (e.g. on-demand, pre-established, ad-hoc, pre-arranged, group session) when available.	C
pTCHost	Shall identify the PTC participant who has the authority to initiate and administrate a PTC session, if known.	C
pTCParticipants	Shall identify the individual PTC participants of the communication session, when known.	C
location	Shall include the PTC target's location when reporting of the PTC target's location information is authorized and available.	C
pTCMediaStreamAvail	Shall include this parameter to indicate if the PTC target is able/not able to receive media streams immediately. True indicates available for media, while false indicates not able to accept media.	M
pTCBearerCapability	Shall provide when known the media characteristics information elements of the PTC session, encoded in SDP format as per RFC 4566 [43] clause 5.	C

7.5.2.7 PTC pre-established session

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCPre-EstablishedSession record when the IRI-POI present in the PTC server detects that a pre-established session is setup/modified/released between the PTC target and the PTC server associated with the PTC target. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following events are detected:

- when the PTC Server receives a SIP INVITE from the PTC target to setup a pre-established session.
- when the PTC Server receives a SIP BYE from the PTC target to release a pre-established session.
- when the PTC Server receives a SIP UPDATE or SIP re-INVITE from the PTC target for a pre-established session to modify the current session.

Table 7.5.2-7: Payload for PTCPre-EstablishedSession record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCServerURI	Shall include the identity of the PTC server serving the PTC target.	M
rTPSetting	The IP address and the port number of the PTC target at the PTC server for the RTP Session.	M
pTCMediaCapability	The codec(s) and media parameters selected by the PTC server from those contained in the original SDP offer from the PTC target's SIP REFER and encoded in SDP format as per RFC 4566 [43] clause 5.	M
pTCPreEstSessionID	Identifies the PTC Pre-Established Session Identity.	M
pTCPreEstStatus	Indicates if the pre-established session is established (setup completed), modified, or released.	M
pTCMediaStreamAvail	Shall include for a pre-established session to indicate if the PTC target's PTC client is able/not able to receive media streams immediately, when the pre-established session is established. True indicates available for media, while false indicates not able to accept media.	M
location	Shall include the PTC target's location when reporting of the PTC target's location information is authorized and available.	C
pTCFailureCode	Provide when the pre-established session cannot be established or modified.	C

7.5.2.8 PTC instant personal alert

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCInstantPersonalAlert record when the IRI-POI present in the PTC server detects that an Instant Personal Alert (IPA) (i.e. a request for one participant to initiate a one-to-one PTC session) is initiated by or sent to the PTC target. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following events are detected:

- when the PTC server receives a SIP MESSAGE from a PTC target for an IPA.
- when the PTC Server sends a SIP MESSAGE to the PTC target for an IPA.

Table 7.5.2-8: Payload for PTCInstantPersonalAlert record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCIPAPartyID	Identifies the PTC participant that receives or has sent the Instant Personal Alert to the target.	M
pTCIPADirection	Identifies the direction (To PTC target or From PTC target) of the Instant Personal Alert.	M

7.5.2.9 PTC party join

The IRI-POI present in the PTC server hosting the PTC chat group session when the PTC chat group is the PTC target, shall generate an xIRI containing a PTCPartyJoin record when the IRI-POI present in that PTC server detects when a

PTC participant joins (or re-joins) an on-going PTC chat group session. The PTCPartyJoin record shall also be generated when the IRI-POI present in the participating PTC server of the PTC target detects when a PTC Participant joins (or re-joins) an on-going PTC chat group session. Accordingly, the IRI-POI in the participating PTC server generates the xIRI when the following event is detected:

- when the PTC server hosting a PTC chat group session sends a SIP 200 OK in response to a SIP INVITE indicating a PTC participant joining the PTC chat group session.

- when the participating PTC server of a PTC target forwards a SIP NOTIFY (received from the PTC server hosting the PTC chat group session) to the PTC target containing information about a PTC participant joining the PTC chat group session.

Table 7.5.2-9: Payload for PTCPartyJoin record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCDirection	Indicates the direction of the session relative to the target: "toTarget" or "fromTarget."	M
pTCSessionInfo	Shall provide PTC session information such as PTC Session URI and PTC Session type (e.g. on-demand, pre-established, ad-hoc, pre-arranged, group session).	M
pTCParticipants	Shall identify the individual PTC participants of the communication session, when known.	C
participantPresenceStatus	Shall provide the Participant Presence Status, which is a list of: - *PresenceID*: Identity of PTC client(s) or PTC group, when known. - *PresenceType*: Identifies type of ID [PTC client(s) or PTC group]. - *PresenceStatus*: Presence state of each ID. True indicates PTC client is available, while false indicates PTC client is unavailable. Report when the Presence functionality is supported by the PTC server and the PTC server assumes the role of the watcher on behalf of the PTC target.	C
pTCMediaStreamAvail	Shall include this parameter to indicate if the PTC target is able/not able to receive media streams immediately. True indicates available for media, while false indicates not able to accept media.	M
pTCBearerCapability	Shall provide when known the media characteristics information elements of the PTC session, encoded in SDP format as per RFC 4566 [43] clause 5.	C

7.5.2.10 PTC party drop

The IRI-POI present in the PTC server hosting the PTC chat group session, when the PTC chat group is the PTC target, shall generate an xIRI containing a PTCPartyDrop record when the IRI-POI present in that PTC server detects that a PTC participant leaves the PTC chat group session that still remains active with other PTC participants. The PTCPartyDrop record shall also be generated when the IRI-POI present in the participating PTC server of the PTC target detects when a PTC Participant leaves an on-going PTC chat group session. Accordingly, the IRI-POI in the participating PTC server generates the xIRI when the following event is detected:

- when the PTC server hosting a PTC chat group session, where the PTC chat group is the target, sends a SIP 200 OK in response to a SIP BYE with the PTC chat group session remaining active with other PTC participants.

- when the participating PTC server of a PTC target forwards a SIP NOTIFY (received from the PTC server hosting the PTC chat group session) to the PTC target containing information about a PTC participant leaving the PTC chat group session.

Table 7.5.2-10: Payload for PTCPartyDrop record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCDirection	Indicates the direction of the session relative to the target: "toTarget" or "fromTarget."	M
pTCSessionInfo	Shall provide PTC session information such as PTC Session URI and PTC Session type (e.g. on-demand, pre-established, ad-hoc, pre-arranged, group session).	M
pTCPartyDrop	Shall provide the identity of the participant that leaves the PTC session.	M
pTCParticipantPresenceStatus	Shall provide the Participant Presence Status, which is a list of: - *PresenceID*: Identity of PTC client(s) or PTC group, when known. - *PresenceType*: Identifies type of ID [PTC client(s) or PTC group]. - *PresenceStatus*: Presence state of each ID. True indicates PTC client is available, while false indicates PTC client is unavailable. Report when the Presence functionality is supported by the PTC server and the PTC server assumes the role of the watcher on behalf of the PTC target.	C

7.5.2.11 PTC party hold

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCPartyHold record when the IRI-POI present in the PTC server detects that an on-going PTC session is placed on hold or retrieved from hold by the PTC target or by a PTC participant in a PTC chat group, where the PTC chat group is the PTC target. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following event is detected:

- when the PTC server receives a SIP UPDATE or SIP re-INVITE from the PTC target and returns a SIP 200 OK to the PTC target for hold/resume operations.

- when the PTC server hosting a PTC chat group, where PTC chat group is the PTC target, receives a SIP UPDATE or SIP re-INVITE from a PTC participant for hold/resume operations.

Table 7.5.2-11: Payload for PTCPartyHold record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCDirection	Indicates the direction of the session relative to the target: "toTarget" or "fromTarget."	M
pTCSessionInfo	Shall provide PTC session information such as PTC Session URI and PTC Session type (e.g. on-demand, pre-established, ad-hoc, pre-arranged, group session).	M
pTCParticipants	Shall identify the individual PTC participants of the communication session, when known.	C
pTCHoldID	The identity of the PTC participant that placed the PTC session on hold or retrieved the held PTC session.	M
pTCHoldRetrieveInd	Shall indicate the PTC session is put on hold (i.e. deactivate Media Bursts or a PTC session is locked for talking/listening) or retrieved from hold. True indication equals placed on hold, false indication was retrieved from hold.	M

7.5.2.12 PTC media modification

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCMediaModification record when the IRI-POI present in the PTC server detects that a re-negotiation of the media parameters occurs during a PTC session involving the PTC target. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following event is detected:

- when the PTC server receives a SIP UPDATE or SIP reINVITE to indicate a PTC media modification on a PTC session being intercepted.

Table 7.5.2-12: Payload for PTCMediaModification record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCDirection	Indicates the direction of the session relative to the target: "toTarget" or "fromTarget."	M
pTCSessionInfo	Shall provide PTC session information such as PTC Session URI and PTC Session type (e.g. on-demand, pre-established, ad-hoc, pre-arranged, group session).	M
pTCMediaStreamAvail	Shall include this parameter to indicate if the PTC target is able/not able to receive media streams immediately. True indicates available for media, while false indicates not able to accept media.	M
pTCBearerCapability	Shall provide when known the media characteristics information elements of the PTC session, encoded in SDP format as per RFC 4566 [43] clause 5.	C

7.5.2.13 PTC group advertisement

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCGroupAdvertisement record when the IRI-POI present in the PTC server detects when a PTC target sends group advertisement information to a single PTC participant, a list of PTC participants, or to all members of a PTC chat group, as well as when a PTC target receives group advertisement information from a single PTC participant, a list of PTC participants, or from members of a PTC chat group using the group identity. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following events are detected:

- when the PTC server receives a SIP MESSAGE (containing group advertisement information) from a PTC target.
- when the PTC server sends a SIP MESSAGE (containing group advertisement information) to the PTC target.

Table 7.5.2-13: Payload for PTCGroupAdvertisement record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCDirection	Indicates the direction of the session relative to the target: "toTarget" or "fromTarget."	M
pTCIDList	Shall provide Identities of each participant from the target's contact list (i.e. individuals) and PTC group list (i.e. list of pre-identified individuals using a group identification) for a group call when available.	C
pTCGroupAuthRule	Identifies the action requested by the PTC target to the PTC Group Authorization Rules: - Report when action requested to the PTC Group Authorization Rules by the PTC target. - Report when the PTC target attempts a change or queries the access control list(s).	C
pTCGroupAdSender	Identifies the sender of the group advertisement.	M
pTCGroupNickname	The nickname is a human-readable tag (e.g. "display-name" in a SIP header associated with a PTC client or PTC group per OMA-TS-PoC_System_Description-V2_1-20110802-A [42]).	C

7.5.2.14 PTC floor control

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCFloorControl record when the IRI-POI present in the PTC server detects when the PTC target requests floor control (i.e. send media), when floor control is granted to PTC target, when floor control request from the PTC target is rejected/released, when the floor becomes open (e.g. idle), when the floor control request from the PTC target is queued, when the floor control request from the PTC target is dequeued, or when the floor control request is revoked. In addition, when the PTC chat group is the PTC target, the IRI-POI present in the PTC server hosting the PTC chat group shall generate an xIRI containing a PTCFloorControl record when the IRI-POI present in the PTC server detects any of the previously mentioned scenarios for all PTC

participants participating in the PTC chat group session. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following events are detected:

- when the PTC server receives a TBCP Talk Burst Request from the PTC target.
- when the PTC server hosting the PTC chat group, where the PTC chat group is the PTC target, receives a TBCP Talk Burst Request from a PTC participant.
- when the PTC server sends a TBCP Talk Burst Granted to a PTC target.
- when the PTC server hosting the PTC chat group, where the PTC chat group is the PTC target, sends a TBCP Talk Burst Granted to a PTC participant.
- when the PTC server sends a TBCP Talk Burst Taken to a PTC target.
- when the PTC server hosting the PTC chat group, where the PTC chat group is the PTC target, sends a TBCP Talk Burst Taken to a PTC participant.
- when the PTC server sends a TBCP Talk Burst Deny to a PTC target.
- when the PTC server hosting the PTC chat group, where the PTC chat group is the PTC target, sends a TBCP Talk Burst Deny to a PTC participant.
- when the PTC server sends a TBCP Talk Burst Release to a PTC target.
- when the PTC server hosting the PTC chat group, where the PTC chat group is the PTC target, sends a TBCP Talk Burst Release to a PTC participant.
- when the PTC server sends a TBCP Talk Burst Idle to a PTC target.
- when the PTC server hosting the PTC chat group, where the PTC chat group is the PTC target, sends a TBCP Talk Burst Idle to a PTC participant.
- when the PTC server sends a TBCP Talk Burst Request Queue Status Response to a PTC target.
- when the PTC server hosting the PTC chat group, where the PTC chat group is the PTC target, sends a TBCP Talk Burst Request Queue Status Response to a PTC participant.
- when the PTC server receives a TBCP Talk Burst Cancel from a PTC target.
- when the PTC server hosting the PTC chat group, where the PTC chat group is the PTC target, receives a TBCP Talk Burst Cancel from a PTC participant.
- when the PTC server sends a TBCP Talk Burst Revoke to a PTC target.
- when the PTC server hosting the PTC chat group, where the PTC chat group is the PTC target, sends a TBCP Talk Burst Revke to a PTC participant.

Table 7.5.2-14: Payload for PTCFloorControl record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCDirection	Indicates the direction of the session relative to the target: "toTarget" or "fromTarget."	M
pTCSessioninfo	Shall provide PTC session information such as PTC Session URI and PTC Session type (e.g. on-demand, pre-established, ad-hoc, pre-arranged, group session).	M
pTCFloorActivity	Sequence of: a) "TBCP_Request": Received by the PTC server to request permission for the PTC target or PTC participant to send a talk burst. b) "TBCP_Granted": Used by the PTC server to notify the PTC target or PTC participant that it has been granted permission to send a talk burst. c) "TBCP_Deny": Used by the PTC server to notify a PTC target or PTC participant that it has been denied permission to send a talk burst. d) "TBCP_Idle": Used by the PTC server to notify the PTC target or PTC participant that no one has the permission to send a Talk Burst at the moment and that it may accept the TBCP talk burst request message. e) "TBCP_Taken": Used by the PTC server to notify the PTC target or PTC participant that another PTC participant has been given permission to send a talk burst. f) "TBCP_Revoke": Used by the PTC server to revoke the media resource from the PTC target or PTC participant and can be used for pre-emption functionality but is also used by the system to prevent overly long use of the media resource. g) "TBCP_Queued": Indicates the request to talk is queued, if queued floor control is supported. Include identification of the PTC target or PTC participant that has the queued talk burst, if known. h) "TBCP_Release": Indicates the request to talk has completed.	M
pTCFloorSpeakerID	Include identification of the PTC participant that has initiated the talk burst, if known.	C
pTCMaxTBTime	Include the maximum duration value for the talk burst before the permission is revoked. This parameter is defined in seconds. Provide when known.	C
pTCQueuedFloorControl	Indicates if queuing is supported by the PTC server and the PTC target's device.	C
pTCQueuedPosition	Include if queue position in the TBCP is detected by the IRI-POI.	C
pTCTalkBurstPriority	If more than one level of priority is supported, indicates the talk burst priority level of the PTC target.	C
pTCTalkBurstReason	The reason for the denial or revoke of a Talk Burst. Provide when known.	C

7.5.2.15 PTC target presence

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCTargetPresence record when the IRI-POI present in the PTC server detects that the PTC server publishes network presence information to the Presence server on behalf of the PTC target. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following event is detected:

- when the PTC server sends a SIP PUBLISH message to the Presence server based on the PTC target’s PTC session involvement.

Table 7.5.2-15: Payload for PTCTargetPresence record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCTargetPresenceStatus	Shall provide the PTC target presence status, which is a list of: - *PresenceID*: Identity of PTC client(s) or PTC group, when known. - *PresenceType*: Identifies type of ID [PTC client(s) or PTC group]. - *PresenceStatus*: Presence state of each ID. True indicates PTC target is available, while false indicates PTC target is unavailable.	M

7.5.2.16 PTC participant presence

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCParticipantPresence record when the IRI-POI present in the PTC server (when it supports the Presence functionality and assumes the role of the Watcher on behalf of the PTC target) detects that the PTC server receives presence status notifications from the Presence servers after having subscribed to the PTC presence status of other PTC participants (i.e. participants in communication with the PTC target). Accordingly, the IRI-POI in the PTC server generates the xIRI when the following event is detected:

- when the PTC server receives a SIP NOTIFY in response to a SIP SUBSCRIBE updating presence information for a participant.

Table 7.5.2-16: Payload for PTCParticipantPresence record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCParticipantPresenceStatus	Shall provide the Participant Presence Status, which is a list of: - *PresenceID*: Identity of PTC client(s) or PTC group, when known. - *PresenceType*: Identifies type of ID [PTC client(s) or PTC group]. - *PresenceStatus*: Presence state of each ID. True indicates PTC client is available, while false indicates PTC client is unavailable. Report when the Presence functionality is supported by the PTC server and the PTC server assumes the role of the watcher on behalf of the PTC target.	M

7.5.2.17 PTC list management

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCListManagement record when the IRI-POI present in the PTC server detects that the PTC target attempts to change their contact list/group list(s) or those lists are updated by the network. Accordingly, the IRI-POI in the PTC server generates the xIRI when the following events are detected:

- when the PTC server receives a SIP PUBLISH from a PTC target to change the PTC target's contact list or group list(s).

- when the PTC server receives a SIP NOTIFY from other PTC participants updating the PTC target's contact list or group list(s) (e.g. participant reachability).

Table 7.5.2-17: Payload for PTCListManagement record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCDirection	Indicates the direction of the session relative to the target: "toTarget" or "fromTarget."	M
pTCListManagementType	The "List Management Attempts" identify the type of list being managed by the target when available: a) ContactListManagementAttempt b) GroupListManagementAttempt c) ContactListManagementResult d) GroupListManagementResult e) Request unsuccessful For example, a) and b) are reported when PTC target attempts changes to their contact list and their PTC group list(s). The "List Management Results" identify the network response to a modification by the PTC target. For example, c), d), or e) is reported when the network notifies the PTC target of changes to their contact list or their PTC group list(s).	C
pTCListManagementAction	Identifies the action requested by the PTC target to the contact lists or PTC group list(s). Report when PTC target attempts changes to his contact list or PTC group list(s): a) Create b) Modify c) Retrieve d) Delete e) Notify Also report when a notification is sent to the PTC target due to changes occurring to his contact list or PTC group list(s).	C
pTCListManagementFailure	Report when list management request is unsuccessful.	C
pTCContactID	Identity of the contact in the list. One contact per contact list or PTC group list. Report if known.	C
pTCIDList	Shall provide identities of each participant from the PTC target's contact list (i.e. individuals) and PTC group list (i.e. list of pre-identified individuals using a group identification) for a group call. Report if known.	C
pTCHost	Identifies the PTC participant who has authority to initiate and administrate an active PTC group session. Provide when known.	C

7.5.2.18 PTC access policy

The IRI-POI present in the PTC server shall generate an xIRI containing a PTCAccessPolicy record when the IRI-POI present in the PTC server detects when the PTC target attempts to change the access control lists (e.g. PTC user access policy and PTC group authorization rules) located in the PTC XML Document Management Server (XDMS). Accordingly, the IRI-POI in the PTC server generates the xIRI when the following event is detected:

- when the PTC server receives a SIP PUBLISH from a PTC target to change the access control lists.

Table 7.5.2-18: Payload for PTCAccessPolicy record

Field name	Description	M/C/O
pTCTargetInformation	Provide PTC target identity. At least one among MCPTT ID, IMPU, IMPI, InstanceIdentifierURN and PTCChatGroupID shall be provided for PTCTargetInformation.	M
pTCDirection	Indicates the direction of the session relative to the target: "toTarget" or "fromTarget."	M
pTCAccessPolicyType	Identifies the type of access policy list being managed or queried by the target when known: a) PTCUserAccessPolicyAttempt b) GroupAuthorizationRulesAttempt c) PTCUserAccessPolicyQuery d) GroupAuthorizationRulesQuery e) PTCUserAccessPolicyResult f) GroupAuthorizationRulesResult g) Request unsuccessful - Report a), b), c), or d) when the PTC target attempts a change or queries the Access Control list(s). - Report e), f), or g) when the network notifies the target of changes to the access control list(s) or the request was unsuccessful.	C
pTCUserAccessPolicy	Identifies the action requested by the PTC target to the PTC user or group access policy: a) Allow Incoming PTC session request b) Block Incoming PTC session request c) Allow Auto Answer Mode d) Allow Override Manual Answer Mode - Report when action requested to the PTC user access policy. - Report when the PTC target attempts a change or queries the access control list(s).	C
pTCGroupAuthRule	Identifies the action requested by the PTC target to the PTC Group Authorization Rules: a) Allow Initiating PTC session b) Block Initiating PTC session c) Allow Joining PTC session d) Block Joining PTC session e) Allow Add Participants f) Block Add Participants g) Allow Subscription PTC session state h) Block Subscription PTC session state i) Allow Anonymity j) Forbid Anonymity - Report when action requested to the PTC group authorization rules by the PTC target. - Report when the PTC target attempts a change or queries the access control List(s).	C
pTCContactID	Identity of the contact in the list. One contact per contact list or PTC group list. Report if known.	C
pTCAccessPolicyFailure	Reports the reason for failure when access policy request is unsuccessful.	C

7.5.3 IRI and CC Generation

7.5.3.1 Generation of IRI over LI_HI2

When an xIRI is received over LI_X2 from the IRI-POI in the PTC server, the MDF2 shall generate the corresponding IRI message and deliver it over LI_HI2 without undue delay. The IRI shall contain a copy of the record received over LI_X2. This record may be enriched with any additional information available at the MDF2 (e.g. additional location information).

7.5.3.2 Generation of CC over LI_HI3

When xCC is received over LI_X3 from the CC-POI in the PTC server, the MDF3 shall populate the threeGPP33128DefinedCC field with a CCPayload structure containing PTCCCPDU and send it over LI-HI3 interface to LEMF without undue delay.

The PTC media contents are structured in a CC payload as formatted in clause 5.5.3 of the present document.

7.6 Identifier Association Reporting

7.6.1 General

The IEF, ICF and IQF are responsible for detecting, storing and providing to the LEA permanent to temporary identifier associations, requested by the LEA in authorised requests. The IEF as defined in clause 6.2.2A is responsible for detecting and generating identifier associations records. The ICF is responsible for caching identifier associations for short duration and the IQF is responsible for handling requests from the LEA and providing those requests to the ICF in order to identify the matching identifier associations.

7.6.2 ICF

7.6.2.1 General

The ICF is responsible for caching identifier associations provided in event records from the IEF over LI_XER and handling queries and subsequent responses from the IQF for responses over LI_XQR.

7.6.2.2 ICF receipt of records over LI_XER

When the ICF receives an identifier association event record over LI_XER from an IEF (see clause 5.9), the ICF shall use the records to update the identifier associations cached by the ICF. The ICF shall handle the event records as described in clause 7.6.2.4.

7.6.2.3 ICF Query and Response over LI_XQR

When the ICF receives an identifier association query request from the IQF, the ICF shall search the cached identifier associations to establish a match, based on RequestValues received in the request (see clause 5.8), subject to clause 7.6.2.4.

Upon successful matching of one or more identifier associations which were active at or around (within a pre-defined search time window) the observed time specified in the query, the ICF shall provide a response to the IQF using the IdentityAssociationResponse message as defined in clause 5.8. Where the ICF is not able to provide a single identifier association based on the RequestValues, the IQF is responsible for any subsequent handling of multiple identifier associations in terms of whether to provide all associations to the LEA over LI_HIQR.

7.6.2.4 ICF Identifier Association Event Handling

Upon receipt of an Association event as defined in clause 6.2.2A.2, the ICF shall cache the identifier association(s) contained within the record as follows:

- SUPI to 5G-GUTI association received, in an IEFAssociationRecord is stored by ICF as an active association. The previous active association for the same SUPI, if any, is marked as a previously active association and cached until the cache time limit is reached.

- If the IEFAssociationRecord also contains a SUCI, the SUCI is stored as a part of the received SUPI to 5G-GUTI association, for the lifetime of that association.

- Where the IEFDeassociationRecord corresponds to an active SUPI to 5G-GUTI association at ICF, the association is marked as a previously active association and cached until the cache time limit is reached.

The ICF shall have a CSP defined maximum active association lifetime (upon expiry of which the association is deleted from the ICF).

NOTE 1: This is needed to prevent an association from not being deleted from ICF under some error conditions (e.g. a loss of IEF message carrying IEFDeassociationRecord caused by the implicit deregistration of an out-of-service UE). The selection of the maximum active association lifetime value needs to ensure that no valid active associations are deleted upon the lifetime expiry, i.e. the longest possible association refresh time supported by CSP's network needs to be accommodated.

For previous associations placed in the cache, the ICF shall store the times of association and disassociation, respectively.

Where an IEFAssociationRecord contains a PEI or a TAI list, the ICF shall store the received values and associate them both the current received SUPI to 5G-GUTI association and any future association until:

- A subsequent IEFAssociationRecord is received which updates the PEI or TAI list values.
  - The old PEI / TAI list shall be retained in association with previous SUPI to 5G-GUTI associations until those associations are deleted from cache.
  - New PEI / TAI list shall be used in association with both the association(s) with which it was received and any subsequent associations until another update is received.
- All SUPI associations for which the PEI / TAI list is valid are deleted from the cache.

When the ICF receives a query request from the IQF as defined in clause 7.6.2.3, the ICF shall search available identifier associations (both active associations and those marked for deletion in the cache) for a match. The ICF shall be able to use both time and TAI (as a single TAI and in relation to a TAI list) to identify the correct SUPI to 5G-GUTI association(s). For associations which have been disassociated (and will be deleted once the cache time limit is reached), the time of disassociation is used by the ICF to identify the correct association match (based on observed time in LEA request), where multiple associations are held in the cache.

NOTE 2: Use of nCGI to match associations based on physical location for SUCI / 5G-S-TMSI to SUPI requests, is out of scope of the present document.

As the LEA and CSP are unlikely to have synchronised the time of identifier observation / association provided by the LEA in the query request, with NF time of the IEFs, the ICF shall search the cached identifier associations using a short window time duration both before and after (subject to overall cache duration) the observed time provided by the LEA in the RequestValues over LI_XQR.

NOTE 3: While the search window duration before and after the LEA provided observed time value is outside the scope of the present document, selection of this value by the CSP needs to take into consideration, among other aspects, the duration of a potential period of recovery from a 5G-GUTI update error, in order to prevent missing of otherwise matching associations due to discrepancies between their stored association/disassociation time and the observed time provided by LEA.

NOTE 4: While the value of the short-term caching time is outside the scope of the present document, selection of this value by the CSP needs to take into consideration, among other aspects, the duration of potential period of recovery from a 5G-GUTI update error, in order to prevent previous associations being deleted before they have been fully disassociated by both the UE and AMF.

7.6.3 IQF

7.6.3.1 General

The IQF is responsible for receiving and responding to LEA requests over LI_HIQR. Following receipt of a request over LI_HIQR, the IQF shall validate the request and ensure that the request is within the cache period of associations stored in the ICF. If the request is valid and within the ICF cache period, the IQF shall send an association search request to the ICF over LI_XQR. If the request is not within the ICF cache period or overwise invalid, the IQF shall reject the request and respond to the LEA over LI_HIQR.

Following receipt of an association search request response from the ICF over LI_XQR, the IQF shall forward any matching identifier association(s) to the LEA over LI_HIQR. If the ICF indicates zero matches were found based on

the information provided in the initial request over LI_HIQR, the IQF shall respond to the LEA over LI_HIQR indicating that no identifier associations were found based on the request from the LEA.

If the ICF responds with multiple associations of 5G-GUTIs / SUCIs to a single SUPI, the IQF shall provide all matched associations to the LEA over LI_HIQR. Handling in the case of multiple SUPIs to a single 5G-GUTI (where the initial request over LI_HIQR is based on 5G-S-TMSI or SUCI) is outside the scope of the present document.

7.6.3.2 IQF Query and Response over LI_HIQR

The IQF is responsible for receiving query requests from and providing query responses to the LEA over LI_HIQR. Further details of LI_HIQR messages are defined in clause 5.7.

7.6.3.3 IQF Query and Response over LI_XQR

The IQF is responsible for generating queries to and receiving query responses requests from the ICF over LI_XQR, based on queries received from the LEA over LI_HIQR. Further details of LI_XQR messages are defined in clause 5.8.

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) r16(16) version7(7)}

DEFINITIONS IMPLICIT TAGS EXTENSIBILITY IMPLIED ::=

BEGIN

-- =============
-- Relative OIDs
-- =============

tS33128PayloadsOID          RELATIVE-OID ::= {threeGPP(4) ts33128(19) r16(16) version7(7)}

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
}

-- ==============
-- 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
}

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,
    pTCCCPDU            [4] PTCCCPDU
}

-- ============================
-- HI4 LI notification payload
-- ============================

LINotificationPayload ::= SEQUENCE
{
    lINotificationPayloadOID         [1] RELATIVE-OID,
    notification                     [2] LINotificationMessage
}

LINotificationMessage ::= CHOICE
{
    lINotification      [1] LINotification
}

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

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
}

-- =========
-- PTC CCPDU
-- =========

PTCCCPDU ::= OCTET STRING

-- =================
-- 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, deprecated in Release-16, do not re-use this tag number
    gPSI                [3] GPSI OPTIONAL,
    location            [4] Location OPTIONAL,
    iMPU                [5] IMPU OPTIONAL,
    iMSI                [7] IMSI OPTIONAL,
    mSISDN              [8] MSISDN 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,
    tNAPID                      [5] TNAPID OPTIONAL,
    tWAPID                      [6] TWAPID OPTIONAL,
    hFCNodeID                   [7] HFCNodeID OPTIONAL,
    gLI                         [8] GLI OPTIONAL,
    w5GBANLineType              [9] W5GBANLineType OPTIONAL,
    gCI                         [10] GCI 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,
    wAGFID  [5] WAGFID,
    tNGFID  [6] TNGFID
}

-- 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], clause 5.4.4.28 and table 5.4.2-1
TNGFID ::= UTF8String

-- TS 29.571 [17], clause 5.4.4.28 and table 5.4.2-1
WAGFID ::= UTF8String

-- TS 29.571 [17], clause 5.4.4.62
TNAPID ::= SEQUENCE
{
```

```
    sSID         [1] SSID OPTIONAL,
    bSSID        [2] BSSID OPTIONAL,
    civicAddress [3] CivicAddressBytes OPTIONAL
}

-- TS 29.571 [17], clause 5.4.4.64
TWAPID ::= SEQUENCE
{
    sSID         [1] SSID OPTIONAL,
    bSSID        [2] BSSID OPTIONAL,
    civicAddress [3] CivicAddressBytes OPTIONAL
}

-- TS 29.571 [17], clause 5.4.4.62 and clause 5.4.4.64
SSID ::= UTF8String

-- TS 29.571 [17], clause 5.4.4.62 and clause 5.4.4.64
BSSID ::= UTF8String

-- TS 29.571 [17], clause 5.4.4.36 and table 5.4.2-1
HFCNodeID ::= UTF8String

-- TS 29.571 [17], clause 5.4.4.10 and table 5.4.2-1
-- Contains the original binary data i.e. value of the YAML field after base64 encoding is removed
GLI ::= OCTET STRING (SIZE(0..150))

-- TS 29.571 [17], clause 5.4.4.10 and table 5.4.2-1
GCI ::= UTF8String

-- TS 29.571 [17], clause 5.4.4.10 and clause 5.4.3.33
W5GBANLineType ::= ENUMERATED
{
    dSL(1),
    pON(2)
}

-- 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 29.571 [17], clauses 5.4.4.62 and 5.4.4.64
-- Contains the original binary data i.e. value of the YAML field after base64 encoding is removed
CivicAddressBytes ::= OCTET STRING

-- 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
```

Annex B (normative): LI Notification

Based on clause 5.6 of the present document, this annex defines a system of management notification of LI system with the LI_HI4 interface.

The LI_HI4 interface shall be used to transport specific LI service O&M information (referred to as LI Notification) from the CSP to the LEMF. The individual parameters of the LI Notification message shall be coded using ASN.1 and the basic encoding rules (BER). The delivery of LI Notification shall be performed directly using the same mechanism as used for delivery of IRI messages over LI_HI2 and CC over LI_HI3.

The LI Notification shall be used to send electronic notification to the LEMF in the following cases:

1) after the activation of lawful interception;

2) after the deactivation of lawful interception;

3) after the modification of an active lawful interception.

Table B.1-1: LINotification message

Field name	Description	M/C/O
notificationType	Information on the type of notification: activation, deactivation or modification	M
deliveryInformation	Delivery Information which has been decided by the LEA in terms of delivery numbers, IP addresses for LI_HI2 and LI_HI3	O
appliedTargetID	Target Identifier applied in the ADMF for the warrant	O
appliedStartTime	Start time applied to the ADMF for the warrant	C
appliedEndTime	End time applied to the ADMF for the warrant	C

Conditional parameters shall be set as follows:

LI Activation Notification		
Field name	**Description**	**M/C/O**
notificationType	Activation	M
appliedStartTime	Always present and represents: The Start Date/Time in the warrant or, The Date/Time of the CSP activation in the ADMF or, The scheduled future Start Date/Time.	C
appliedEndTime	Absence means the interception has been activated with no predefined End Date/Time. Presence means the End time is scheduled to be applied at that (future) time.	C

LI Modification Notification		
Field name	**Description**	**M/C/O**
notificationType	Modification	M
appliedStartTime	Present and provides the new Start Date/Time if modified by the LI Modification command	C
appliedEndTime	Present and provides the new End Date/Time if modified by the LI Modification command	C

LI Deactivation Notification		
Field name	**Description**	**M/C/O**
notificationType	Deactivation	M
appliedStartTime	Absent	C
appliedEndTime	Present and provides the actual End Date/Time, e.g. timed stop as per initial warrant or as per new warrant, or as pre-emptive audited stop from the LEA, or major LI failure.	C

The individual notifications parameters shall be sent to the LEMF as soon as possible with the lowest latency at least once (if available).

The MDF2/3 will deliver the LINotification message to LEMF.

Annex C (normative): XSD Schema for LI_X1 extensions

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
           xmlns="urn:3GPP:ns:li:3GPPX1Extensions:r16:v3"
           targetNamespace="urn:3GPP:ns:li:3GPPX1Extensions:r16:v3"
           elementFormDefault="qualified">

  <xs:element name="X1Extensions" type="X1Extension"></xs:element>
  <xs:complexType name="X1Extensions">
    <xs:sequence>
      <xs:element name="Extension" type="X1Extension" minOccurs="1"
maxOccurs="unbounded"></xs:element>
    </xs:sequence>
  </xs:complexType>

<xs:element name="PTCLIX1TargetIdentifierExtensions"
type="PTCLIX1TargetIdentifierExtensions"></xs:element>
<xs:complexType name="PTCLIX1TargetIdentifierExtensions">
    <xs:sequence>
      <xs:element name="PTCLIX1TargetIdentifier" type="PTCLIX1TargetIdentifier"
minOccurs="1" maxOccurs="unbounded"></xs:element>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="PTCLIX1TargetIdentifier">
    <xs:choice>
      <xs:element name="MCPTTID" type="MCPTTID"></xs:element>
      <xs:element name="InstanceIdentifierURN" type="InstanceIdentifierURN"></xs:element>
      <xs:element name="PTCChatGroupID" type="PTCChatGroupID"></xs:element>
    </xs:choice>
  </xs:complexType>

  <xs:simpleType name="MCPTTID">
    <xs:restriction base="xs:anyURI"></xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="InstanceIdentifierURN">
    <xs:restriction base="xs:anyURI"></xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="PTCChatGroupID">
    <xs:restriction base="xs:anyURI"></xs:restriction>
  </xs:simpleType>

  <xs:element name="UPFLIT3TargetIdentifierExtensions"
type="UPFLIT3TargetIdentifierExtensions"></xs:element>
  <xs:complexType name="UPFLIT3TargetIdentifierExtensions">
    <xs:sequence>
      <xs:element name="UPFLIT3TargetIdentifier" type="UPFLIT3TargetIdentifier"
minOccurs="1" maxOccurs="unbounded"></xs:element>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="UPFLIT3TargetIdentifier">
    <xs:choice>
      <xs:element name="FSEID" type="FSEID"></xs:element>
      <xs:element name="PDRID" type="xs:unsignedInt"></xs:element>
      <xs:element name="QERID" type="xs:unsignedInt"></xs:element>
      <xs:element name="NetworkInstance" type="xs:hexBinary"></xs:element>
      <xs:element name="GTPTunnelDirection" type="GTPTunnelDirection"></xs:element>
```

```
      <xs:element name="FTEID" type="FTEID"></xs:element>
    </xs:choice>
  </xs:complexType>

  <xs:complexType name="FSEID">
    <xs:sequence>
      <xs:element name="SEID" type="xs:unsignedLong"></xs:element>
      <xs:element name="IPv4Address" type="IPv4Address" minOccurs="0"></xs:element>
      <xs:element name="IPv6Address" type="IPv6Address" minOccurs="0"></xs:element>
   </xs:sequence>
  </xs:complexType>

  <xs:complexType name="FTEID">
    <xs:sequence>
      <xs:element name="TEID" type="xs:unsignedInt"></xs:element>
      <xs:element name="IPv4Address" type="IPv4Address" minOccurs="0"></xs:element>
      <xs:element name="IPv6Address" type="IPv6Address" minOccurs="0"></xs:element>
   </xs:sequence>
  </xs:complexType>

  <xs:simpleType name="GTPTunnelDirection">
    <xs:restriction base="xs:string">
      <xs:enumeration value="Outbound"></xs:enumeration>
      <xs:enumeration value="Inbound"></xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:element name="IdentifierAssociationExtensions" type="IdentifierAssociationExtensions"
></xs:element>
  <xs:complexType name="X1Extension">
    <xs:choice>
      <xs:element name="LALSLILCSTargetProvisioning"
type="LALSLILCSTargetProvisioningExtensions"></xs:element>
      <xs:element name="LALSLTFProvisioning"
type="LALSLTFProvisioningExtensions"></xs:element>
      <xs:element name="HeaderReporting" type="PDHRReportingExtensions"></xs:element>
      <xs:element name="SMSFExtensions" type="SMSFProvisioningExtensions"></xs:element>
      <xs:element name="IdentifierAssociation"
type="IdentifierAssociationExtensions"></xs:element>
    </xs:choice>
  </xs:complexType>

  <xs:complexType name="LALSLILCSTargetProvisioningExtensions">
    <xs:sequence>
      <xs:element name="PositioningServiceType" type="PositioningServiceType"></xs:element>
      <xs:element name="PositioningPeriodicity" type="PositioningPeriodicity"
minOccurs="0"></xs:element>
      <xs:element name="PositioningParameters" type="PositioningParameters"
minOccurs="0"></xs:element>
    </xs:sequence>
  </xs:complexType>

  <xs:simpleType name="PositioningServiceType">
    <xs:restriction base="xs:string">
      <xs:enumeration value="Immediate"></xs:enumeration>
      <xs:enumeration value="Periodic"></xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="PositioningPeriodicity">
    <xs:restriction base="xs:nonNegativeInteger">
    </xs:restriction>
  </xs:simpleType>
```

```
  <xs:complexType name="PositioningParameters">
    <xs:sequence>
      <xs:element name="RequestedLocationType" type="RequestedLocationType"
minOccurs="0"></xs:element>
      <xs:element name="RequestedResponseType" type="RequestedResponseType"
minOccurs="0"></xs:element>
      <xs:element name="MaxLocationAge" type="xs:nonNegativeInteger"
minOccurs="0"></xs:element>
      <xs:element name="ResponseTimingRequired" type="ResponseTimingRequired"
minOccurs="0"></xs:element>
      <xs:element name="ResponseTimer" type="xs:nonNegativeInteger"
minOccurs="0"></xs:element>
      <xs:element name="HorizontalAccuracy" type="NumberWithQOSClass"
minOccurs="0"></xs:element>
      <xs:element name="AltitudeAccuracy" type="NumberWithQOSClass"
minOccurs="0"></xs:element>
      <xs:element name="MotionStateRequest" type="EmptyElement" minOccurs="0"></xs:element>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="RequestedLocationType">
    <xs:restriction base="xs:string">
      <xs:enumeration value="CURRENT"></xs:enumeration>
      <xs:enumeration value="CURRENT_OR_LAST"></xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="RequestedResponseType">
    <xs:restriction base="xs:string">
      <xs:enumeration value="SYNC"></xs:enumeration>
      <xs:enumeration value="ASYNC"></xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="ResponseTimingRequired">
    <xs:restriction base="xs:string">
      <xs:enumeration value="NO_DELAY"></xs:enumeration>
      <xs:enumeration value="LOW_DELAY"></xs:enumeration>
      <xs:enumeration value="DELAY_TOL"></xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="NumberWithQOSClass">
    <xs:simpleContent>
      <xs:extension base="xs:nonNegativeInteger">
        <xs:attribute name="qos_class" type="QOSClass"></xs:attribute>
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>

  <xs:simpleType name="QOSClass">
    <xs:restriction base="xs:string">
      <xs:enumeration value="ASSURED"></xs:enumeration>
      <xs:enumeration value="BEST_EFFORT"></xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="EmptyElement">
    <xs:restriction base="xs:string">
      <xs:enumeration value=""></xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="LALSLTFProvisioningExtensions">
    <xs:sequence>
```

```
      <xs:element name="LILCSClientAddress" type="LILCSClientIPAddress"></xs:element>
      <xs:element name="PositioningParameters" type="PositioningParameters"
minOccurs="0"></xs:element>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="LILCSClientIPAddress">
    <xs:sequence>
      <xs:choice>
        <xs:element name="IPv4Address" type="IPv4Address"/>
        <xs:element name="IPv6Address" type="IPv6Address"/>
      </xs:choice>
    </xs:sequence>
  </xs:complexType>

  <xs:simpleType name="IPv4Address">
    <xs:restriction base="xs:token">
      <xs:pattern value="((25[0-5]|2[0-4][0-9]|[01]?[0-9]?[0-9])\.){3}(25[0-5]|2[0-4][0-
9]|[01]?[0-9]?[0-9])"/>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="IPv6Address">
    <xs:restriction base="xs:token">
      <xs:pattern value="([0-9a-f]{4}:){7}([0-9a-f]{4})"/>
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="PDHRReportingExtensions">
    <xs:sequence>
      <xs:element name="PDHType" type="PDHType"></xs:element>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="PDHType">
    <xs:choice>
      <xs:element name="PDHR" type="EmptyElement"></xs:element>
      <xs:element name="PDSR" type="PDSRParameters"></xs:element>
    </xs:choice>
  </xs:complexType>

  <xs:complexType name="PDSRParameters">
    <xs:sequence>
      <xs:element name="PDSRTriggerType" type="PDSRTriggerType" minOccurs="1"
maxOccurs="unbounded"></xs:element>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="PDSRTriggerType">
    <xs:choice>
      <xs:element name="TimerExpiry" type="TimerExpiryInSeconds"></xs:element>
      <xs:element name="PacketCount" type="xs:nonNegativeInteger"></xs:element>
      <xs:element name="ByteCount" type="xs:nonNegativeInteger"></xs:element>
    </xs:choice>
  </xs:complexType>

  <xs:complexType name="SMSFProvisioningExtensions">
    <xs:sequence>
      <xs:element name="TruncateTPUserData" type="EmptyElement" minOccurs="0"></xs:element>
    </xs:sequence>
  </xs:complexType>

  <xs:simpleType name="TimerExpiryInSeconds">
    <xs:restriction base="xs:nonNegativeInteger">
```

```
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="IdentifierAssociationExtensions">
    <xs:sequence>
      <xs:element name="IdentifierAssociationEventsGenerated"
type="IdentifierAssociationEventsGenerated"></xs:element>
    </xs:sequence>
  </xs:complexType>

  <xs:simpleType name="IdentifierAssociationEventsGenerated">
    <xs:restriction base="xs:string">
      <xs:enumeration value="IdentifierAssociation"></xs:enumeration>
      <xs:enumeration value="All"></xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:element name="IdentityAssociationTargetIdentifier" type="EmptyElement"></xs:element>

</xs:schema>
```

Annex D (informative): Drafting Guidance

D.1 Introduction

This annex provides drafting guidance for contributors wishing to propose changes to the present document.

D.2 Drafting conventions

Table D.2-1: Drafting conventions

D.2.1	The details for each field, including a complete description of the usage, format, cardinality and conditionality of that field, are given in the prose in the main body of the document.
D.2.2	The field names used in the main body of the document match those used in the ASN.1.
D.2.3	ASN.1 comments are not used, except for to indicate where to find a description of the field or structure in the main body of the specification.
D.2.4	If a field is made conditional, the condition for its presence or absence is specified.

D.3 Naming conventions

Table D.3-1: Naming conventions

D.3.1	To meet ASN.1 syntax rules, the first character of each ASN.1 field name are lower-cased.
D.3.2	To meet ASN.1 syntax rules, the first character of an ASN.1 type name are upper-cased.
D.3.3	To meet ASN.1 syntax rules, the first character of a field or a type name is not a number.
D.3.4	Only the character ranges A-Z, a-z and 0-9 are used in names.
D.3.5	Names are be CamelCased, where the first character of each word is upper-cased (except for the first character of the name – see rule D.3.1).
D.3.6	Any acronyms in a name should be entirely upper-cased (except for the first character of the name – see rule D.3.1).

```
ExampleBadStructure ::= SEQUENCE
{
    FirstField      [1] FirstFieldType,     -- D.3.1 First letter of field is upper case
    secondField     [2] secondFieldType,    -- D.3.2 First letter of type is lower case
    3rdField        [3] 3rdFieldType,       -- D.3.3 Names starts with digit
    fourth-field    [4] Fourth_Field_Type,  -- D.3.4 Names include hyphen and underscore
    fifthfield      [5] Fifthfieldtype,     -- D.3.5 Names are not camelCased
    msisdn          [6] MSISDN,             -- D.3.6 Acronyms in field name not wholly upper-cased
    mSISDN          [7] Msisdn              -- D.3.6 Acronyms in type name not wholly upper-cased
}
```

Figure 1 – Naming convention counter-examples

D.4 ASN.1 Syntax conventions

Table D.4-1: ASN.1 Syntax conventions

D.4.1	Modules are be defined with EXTENSIBILITY IMPLIED unless there is a specific reason to limit extensibility.
D.4.2	The AUTOMATIC TAGS module directive is not used.
D.4.3	SEQUENCE and CHOICE tag numbers start at one.
D.4.4	ENUMERATED tag numbers start at one.
D.4.5	Anonymous types are not used. Non-trivial fields are assigned their own named type.
D.4.6	Consideration should be given to making types re-usable and independent of a particular release. Re-using or extending an existing type, where the intent is similar, is preferable to creating a new type.
D.4.7	Consideration should be given to making types extensible by declaring them as a SEQUENCE or CHOICE where possible.
D.4.8	Multiple smaller messages or structures with fewer OPTONAL fields are preferred to larger structures with many OPTIONAL fields, as this increases the ability of the ASN.1 schema to enforce the intent of the specification.
D.4.9	Field names, tag numbers, field types and optional flags are be space-aligned where possible. An indent of four spaces is used.
D.4.10	Field and type names (when defining a type) are not in bold.
D.4.11	Braces are given their own line.
D.4.12	OIDs containing a version number are updated when the structure that uses the OID is changed, even if the change is solely to correct a syntactic error. Other OIDs in the same module need not be updated if they are not associated with structures that have been changed.

```
ConformatModule
{itu-t(0) identified-organization(4) etsi(0) securityDomain(2) lawfulIntercept(2) ... }

DEFINITIONS EXTENSIBILITY IMPLIED ::=

BEGIN


Structure1 ::= SEQUENCE
{
    field1  [1] Field1,
    field2  [2] Field2
}

Field1 ::= ENUMERATED
{
    choice1(1),
    choice2(2),
    choice3(3)
}

Field2 ::= OCTET STRING

END
```

Figure 2 – Syntax convention example

```
NonconformantModule
{itu-t(0) identified-organization(4) etsi(0) securityDomain(2) lawfulIntercept(2) ... }

DEFINITIONS AUTOMATIC TAGS ::=          -- D.4.1 Not declared with EXTENSIBILITY IMPLIED
                                        -- D.4.2 Declared AUTOMATIC TAGS
BEGIN

Structure1 ::= SEQUENCE {               -- D.4.11 Braces not given their own line
    field1  [0] ::= ENUMERATED          -- D.4.3 SEQUENCE tags don't start at 1
    {                                   -- D.4.5 Anonymous type used
        choice1(0),                     -- D.4.4 ENUMERATED tag numbers don't start at 1
        choice2(2),
        choice3(3)
    },
    field2  [2] Field2                  -- D.4.10 Field name is bold
}

Field2 ::= OCTET STRING                 -- D.4.10 Type names in definitions is bold
```

```
END
```

Figure 3 – Syntax convention counter-examples

Annex E (normative): XSD Schema for Identity Association

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
           xmlns="urn:3GPP:ns:li:3GPPIdentityExtensions:r16:v4"
           xmlns:x1="http://uri.etsi.org/03221/X1/2017/10"
           xmlns:common="http://uri.etsi.org/03280/common/2017/07"
           targetNamespace="urn:3GPP:ns:li:3GPPIdentityExtensions:r16:v4"
           elementFormDefault="qualified">

  <xs:import namespace="http://uri.etsi.org/03221/X1/2017/10"/>
  <xs:import namespace="http://uri.etsi.org/03280/common/2017/07"/>

  <xs:complexType name="IdentityAssociationRequest">
    <xs:complexContent>
      <xs:extension base="x1:X1RequestMessage">
        <xs:sequence>
          <xs:element name="RequestDetails" type="RequestDetails"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:complexType name="RequestDetails">
    <xs:sequence>
      <xs:element name="Type" type="DictionaryEntry"/>
      <xs:element name="ObservedTime" type="common:QualifiedDateTime"/>
      <xs:element name="RequestValues" type="RequestValues"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="RequestValues">
    <xs:sequence>
      <xs:element name="RequestValue" type="RequestValue" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="RequestValue">
    <xs:sequence>
      <xs:element name="FormatType" type="FormatType"/>
      <xs:element name="Value" type="common:LongString"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="FormatType">
    <xs:sequence>
      <xs:element name="FormatOwner" type="common:ShortString"/>
      <xs:element name="FormatName" type="common:ShortString"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="DictionaryEntry">
    <xs:sequence>
      <xs:element name="Owner" type="common:ShortString"/>
      <xs:element name="Name" type="common:ShortString"/>
      <xs:element name="Value" type="common:ShortString"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="IdentityAssociationResponse">
    <xs:complexContent>
```

```
      <xs:extension base="x1:X1ResponseMessage">
        <xs:sequence>
          <xs:element name="ResponseDetails" type="IdentityResponseDetails"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

<xs:element name="LIHIQRResponse" type="IdentityResponseDetails"/>

<xs:complexType name="IdentityResponseDetails">
    <xs:sequence>
      <xs:element name="Associations" type="IdentityAssociationRecords"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="IdentityAssociationRecords">
    <xs:sequence>
      <xs:element name="IdentityAssociationRecord" type="IdentityAssociationRecord"
minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="IdentityAssociationRecord">
    <xs:sequence>
      <xs:element name="SUPI" type="SUPI"/>
      <xs:element name="SUCI" type="SUCI" minOccurs="0"/>
      <xs:element name="FiveGGUTI" type="FiveGGUTI"/>
      <xs:element name="PEI" type="PEI" minOccurs="0"/>
      <xs:element name="AssociationStartTime" type="common:QualifiedMicrosecondDateTime"/>
      <xs:element name="AssociationEndTime" type="common:QualifiedMicrosecondDateTime"
minOccurs="0"/>
      <xs:element name="FiveGSTAIList" type="FiveGSTAIList" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="SUPI">
    <xs:choice>
      <xs:element name="SUPIIMSI" type="common:SUPIIMSI"/>
      <xs:element name="SUPINAI" type="common:SUPINAI"/>
    </xs:choice>
  </xs:complexType>

  <xs:simpleType name="SUCI">
    <xs:restriction base="xs:string"/>
  </xs:simpleType>

  <xs:simpleType name="FiveGGUTI">
    <xs:restriction base="xs:string"/>
  </xs:simpleType>

  <xs:complexType name="PEI">
    <xs:choice>
      <xs:element name="PEIIMEI" type="common:PEIIMEI"/>
      <xs:element name="PEIIMEISV" type="common:PEIIMEISV"/>
      <xs:element name="PEIMAC" type="common:MACAddress"/>
    </xs:choice>
  </xs:complexType>

  <xs:complexType name="FiveGSTAIList">
    <xs:sequence>
      <xs:element name="FiveGSTAI" type="FiveGSTAI" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
```

```
  <xs:complexType name="FiveGSTAI">
    <xs:sequence>
      <xs:element name="MCC" type="MCC"/>
      <xs:element name="MNC" type="MNC"/>
      <xs:element name="TAC" type="TAC"/>
      <xs:element name="NID" type="NID" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>

  <xs:simpleType name="MCC">
    <xs:restriction base="xs:string">
      <xs:pattern value="[0-9]{3}"></xs:pattern>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="MNC">
    <xs:restriction base="xs:string">
      <xs:pattern value="[0-9]{2,3}"></xs:pattern>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="TAC">
    <xs:restriction base="xs:string">
      <xs:pattern value="([A-Fa-f0-9]{2}){2,3}"></xs:pattern>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="NID">
    <xs:restriction base="xs:string">
      <xs:pattern value="[A-Fa-f0-9]{11}"></xs:pattern>
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="ActivateAssociationUpdates">
    <xs:complexContent>
      <xs:extension base="x1:X1RequestMessage">
        <xs:sequence>
          <xs:element name="OngoingAssociationTaskID" type="common:UUID"></xs:element>
          <xs:element name="SUPI" type="SUPI"></xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:complexType name="ActivateAssociationUpdatesAcknowledgement">
    <xs:complexContent>
      <xs:extension base="x1:X1ResponseMessage">
        <xs:sequence>
          <xs:element name="oK" type="x1:OKAckAndComplete"/>
          <xs:element name="CurrentAssociations"
type="IdentityResponseDetails"></xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:complexType name="DeactivateAssociationUpdates">
    <xs:complexContent>
      <xs:extension base="x1:X1RequestMessage">
        <xs:sequence>
          <xs:element name="OngoingAssociationTaskID" type="common:UUID"></xs:element>
        </xs:sequence>
      </xs:extension>
```

```
    </xs:complexContent>
  </xs:complexType>

  <xs:complexType name="DeactivateAssociationUpdatesAcknowledgement">
    <xs:complexContent>
      <xs:extension base="x1:X1ResponseMessage">
        <xs:sequence>
          <xs:element name="oK" type="x1:OKAckAndComplete"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:complexType name="IdentityAssociationUpdate">
    <xs:complexContent>
      <xs:extension base="x1:X1RequestMessage">
        <xs:sequence>
          <xs:element name="OngoingAssociationTaskID" type="common:UUID"/>
          <xs:element name="UpdateDetails" type="IdentityResponseDetails"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:complexType name="IdentityAssociationUpdateAcknowledgement">
    <xs:complexContent>
      <xs:extension base="x1:X1ResponseMessage">
        <xs:sequence>
          <xs:element name="oK" type="x1:OKAckAndComplete"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

</xs:schema>
```

Annex F (normative): ASN.1 schema for LI_XER messages

```
TS33128IdentityAssociation
{itu-t(0) identified-organization(4) etsi(0) securityDomain(2) lawfulIntercept(2) threeGPP(4)
tS33128IdentityAssociation(20) r16(16) version2(2)}


DEFINITIONS IMPLICIT TAGS EXTENSIBILITY IMPLIED ::=

BEGIN

tS33128IdentityAssociationOID RELATIVE-OID ::= {threeGPP(4) tS33128IdentityAssociation(20) r16(16)
version2(2)}

iEFRecordOID RELATIVE-OID ::= {tS33128IdentityAssociationOID iEF(1)}

IEFMessage ::= SEQUENCE
{
    iEFRecordOID        [1] RELATIVE-OID,
    record              [2] IEFRecord
}

IEFRecord ::= CHOICE
{
    associationRecord   [1] IEFAssociationRecord,
    deassociationRecord [2] IEFDeassociationRecord,
    keepalive           [3] IEFKeepaliveMessage,
    keepaliveResponse   [4] IEFKeepaliveMessage
}

IEFAssociationRecord ::= SEQUENCE
{
    sUPI            [1] SUPI,
    fiveGGUTI       [2] FiveGGUTI,
    timestamp       [3] GeneralizedTime,
    tAI             [4] TAI,
    nCGI            [5] NCGI,
    nCGITime        [6] GeneralizedTime,
    sUCI            [7] SUCI OPTIONAL,
    pEI             [8] PEI OPTIONAL,
    fiveGSTAIList   [9] FiveGSTAIList OPTIONAL
}

IEFDeassociationRecord ::= SEQUENCE
{
    sUPI            [1] SUPI,
    fiveGGUTI       [2] FiveGGUTI,
    timestamp       [3] GeneralizedTime,
    nCGI            [4] NCGI,
    nCGITime        [5] GeneralizedTime
}

IEFKeepaliveMessage ::= SEQUENCE
{
    sequenceNumber  [1] INTEGER
}

FiveGGUTI ::= OCTET STRING (SIZE(10))

NCGI ::= SEQUENCE
{
    pLMNID [1] PLMNID,
    nCI [2] NCI
}

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

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

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

SUPI ::= CHOICE
```

```
{
    iMSI        [1] IMSI,
    nAI         [2] NAI
}

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

NAI ::= UTF8String

FiveGSTAIList ::= SEQUENCE OF TAI

PEI ::= CHOICE
{
    iMEI        [1] IMEI,
    iMEISV      [2] IMEISV,
    mACAddress  [3] MACAddress,
    eUI64       [4] EUI64
}

IMEI ::= NumericString (SIZE(14))

IMEISV ::= NumericString (SIZE(16))

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

EUI64 ::= OCTET STRING (SIZE(8))

SUCI ::= OCTET STRING (SIZE(8..3008))


END
```

Annex G (normative): XSD Schema for State Transfers

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
           xmlns:etsiX1="http://uri.etsi.org/03221/X1/2017/10"
           xmlns="urn:3GPP:ns:li:3GPPStateTransfer:r16:v1"
           targetNamespace="urn:3GPP:ns:li:3GPPStateTransfer:r16:v1"
           elementFormDefault="qualified">

  <xs:import namespace="http://uri.etsi.org/03221/X1/2017/10"/>

  <xs:element name="TFLIState" type="TFLIState"></xs:element>
  <xs:complexType name="TFLIState">
    <xs:sequence>
      <xs:element name="PDUSessionID" type="PDUSessionID"></xs:element>
      <xs:element name="XID" type="etsiX1:XId"></xs:element>
      <xs:element name="CorrelationID" type="xs:nonNegativeInteger"></xs:element>
      <xs:element name="TriggeredTasks" type="ListOfTriggeredTasks"></xs:element>
    </xs:sequence>
  </xs:complexType>

 <xs:element name="POILIState" type="POILIState"></xs:element>
  <xs:complexType name="POILIState">
    <xs:sequence>
      <xs:element name="PDUSessionID" type="PDUSessionID"></xs:element>
      <xs:element name="XID" type="etsiX1:XId"></xs:element>
      <xs:element name="SequenceNumber" type="xs:unsignedInt"></xs:element>
      <xs:element name="CorrelationID" type="xs:nonNegativeInteger"></xs:element>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="ListOfTriggeredTasks">
    <xs:sequence>
      <xs:element name="TriggeredTask" type="TriggeredTask" minOccurs="0"
maxOccurs="unbounded"></xs:element>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="TriggeredTask">
    <xs:sequence>
      <xs:element name="XID" type="etsiX1:XId"></xs:element>
      <xs:element name="NEID" type="etsiX1:NeIdentifier"></xs:element>
    </xs:sequence>
  </xs:complexType>

  <xs:simpleType name="PDUSessionID">
    <xs:restriction base="xs:unsignedInt">
      <xs:minInclusive value="0"/>
      <xs:maxInclusive value="255"/>
```

```
    </xs:restriction>
  </xs:simpleType>

</xs:schema>
```

Annex Z (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2019-03	SA#83	SP-190044				Release 15 draft Approved at TSG SA#83	15.0.0
2019-06	SA#84	SP-190343	0004	1	F	Missing trigger for the start of interception with established PDU session	15.1.0
2019-06	SA#84	SP-190343	0006	1	F	Missing Stage 3 text - Start of Interception with registered UE from MDF2	15.1.0
2019-06	SA#84	SP-190343	0007	1	F	Missing stage 3 text - Start of Interception with establishd PDU session from MDF2	15.1.0
2019-06	SA#84	SP-190343	0008	1	F	Typos	15.1.0
2019-06	SA#84	SP-190343	0009	-	F	Additional identifiers to support UPF LI_T2/3	15.1.0
2019-06	SA#84	SP-190343	0010	1	F	In-bound roaming interception at anchor UPFs	15.1.0
2019-06	SA#84	SP-190343	0013	1	F	Roaming toggle correction	15.1.0
2019-06	SA#84	SP-190343	0014	1	F	Anchor UPF interception clarification	15.1.0
2019-06	SA#84	SP-190343	0015	1	F	Branching UPF interception correction	15.1.0
2019-06	SA#84	SP-190343	0019	-	F	ASN.1 Editorial Changes for the drafting rules compliance	15.1.0
2019-06	SA#84	SP-190343	0020	-	F	Clarifications on the Location information derivation and delivery	15.1.0
2019-06	SA#84	SP-190345	0021	-	F	Corrections on LI_T3 triggering	15.1.0
2019-06	SA#84	SP-190345	0022	2	F	Handling of error scenarios in LI_T2 and LI_T3 procedures	15.1.0
2019-06	SA#84	SP-190345	0023	2	B	Secondary Cell Group cells reporting	15.1.0
2019-09	SA#85	SP-190634	0029	1	F	Rapporteur fixes with consistency checking	15.2.0
2019-09	SA#85	SP-190634	0030	1	F	Errors in the clauses of Cell Site Report	15.2.0
2019-09	SA#85	SP-190634	0033	1	F	LI activation at the CC-POI after previous failure	15.2.0
2019-09	SA#85	SP-190634	0046	-	F	Start of interception - Reporting SUCI	15.2.0
2019-09	SA#85	SP-190635	0036	1	F	AMF Registration Update	16.0.0
2019-09	SA#85	SP-190635	0037	1	F	AMF Deregistration Update	16.0.0
2019-09	SA#85	SP-190635	0038	-	F	Location update triggering	16.0.0
2019-09	SA#85	SP-190635	0040	1	F	Reporting SUPI in Unsuccessful Registration	16.0.0
2019-09	SA#85	SP-190635	0041	1	F	SUPI Unauthenticated Clarification	16.0.0
2019-09	SA#85	SP-190635	0042	1	F	Mandatory Inclusion of OtherMessage Parameter	16.0.0
2019-09	SA#85	SP-190635	0044	1	F	Task Details Required for Positioning	16.0.0
2019-09	SA#85	SP-190635	0045	1	F	LALS Report Record Note	16.0.0
2019-09	SA#85	SP-190662	0050	3	C	Addition of map datum for geographicalCoordinates	16.0.0
2019-09	SA#85	SP-190662	0051	2	F	Stage 3 text to service scoping	16.0.0
2019-12	SA#86	SP-190984	0053	1	A	Inclusion of Product XID in triggering scenarios	16.1.0
2019-12	SA#86	SP-190984	0055	1	A	LALS Reference Correction	16.1.0
2019-12	SA#86	SP-190985	0057	-	F	Rapporteur fixes in TS 33.128	16.1.0
2019-12	SA#86	SP-190985	0059	1	D	Editorial name change for ETSI TS 103 221-x references	16.1.0
2020-03	SA#87-e	SP-200030	0061	-	A	Wrong ASN.1 coding of parameters AMFPointer and AMFSetID	16.2.0
2020-03	SA#87-e	SP-200031	0062	-	F	Coding of payload direction in xIRIs	16.2.0
2020-03	SA#87-e	SP-200031	0063	-	F	Clarification on 3GPP identifier coding over LI_X2 and LI_HI2	16.2.0
2020-03	SA#87-e	SP-200030	0065	1	A	A clarification to the xIRI SMFPDUSessionRelease record	16.2.0
2020-03	SA#87-e	SP-200031	0066	-	F	Coding of "other target identifier" conditional attributes in xIRIs	16.2.0
2020-03	SA#87-e	SP-200031	0070	1	F	UDM Serving System based on serving MME	16.2.0
2020-07	SA#88-e	SP-200407	0073	1	B	EPC porting	16.3.0
2020-07	SA#88-e	SP-200407	0074	1	F	Corrections to target identifier formats	16.3.0
2020-07	SA#88-e	SP-200407	0075	1	B	IRI fields for ATSSS	16.3.0
2020-07	SA#88-e	SP-200407	0076	1	B	Drafting rule update	16.3.0
2020-07	SA#88-e	SP-200407	0077	1	F	Fixing ASN.1 to match drafting rules	16.3.0
2020-07	SA#88-e	SP-200407	0078	2	F	Clarification and Correction of LALS Service Scoping	16.3.0
2020-07	SA#88-e	SP-200407	0083	1	C	Enhanced AMF Location Update Reporting with Dual Connectivity	16.3.0
2020-07	SA#88-e	SP-200407	0084	1	F	Correction on provisioning of SMF over LI_X	16.3.0
2020-09	SA#89-e	SP-200807	0088	2	F	MMS	16.4.0
2020-09	SA#89-e	SP-200807	0090	1	F	Missing reporting of SMS over NAS in EPC (MME)	16.4.0
2020-09	SA#89-e	SP-200807	0091	1	F	Corrections to the text that describe the service scoping	16.4.0
2020-09	SA#89-e	SP-200807	0092	1	B	Alignment to TS29.571 & TS29.572 R16 parameters	16.4.0
2020-09	SA#89-e	SP-200807	0093	1	F	Clarification on references in EPC LI	16.4.0
2020-09	SA#89-e	SP-200807	0094	5	B	Support for PTC Stage 3	16.4.0
2020-09	SA#89-e	SP-200807	0095	-	F	Reporting Unsupported MA PDU Session requests	16.4.0
2020-09	SA#89-e	SP-200807	0098	1	F	Access Type Reference Correction	16.4.0
2020-09	SA#89-e	SP-200807	0101	1	F	Clarifying IRI Type for SMF-UPF IRI records	16.4.0
2020-09	SA#89-e	SP-200807	0102	1	F	Clarifying IRI Type for SMSF IRI records	16.4.0
2020-09	SA#89-e	SP-200807	0103	1	F	Clarifying IRI Type for UDM IRI records	16.4.0

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2020-09	SA#89-e	SP-200807	0104	1	F	Clarifying IRI Type for LALS IRI records	16.4.0
2020-09	SA#89-e	SP-200807	0105	1	F	Clarifying IRI Type for Cell Site IRI records	16.4.0
2020-09	SA#89-e	SP-200807	0106	1	F	Correction of field name in LI_X2/T2	16.4.0
2020-09	SA#89-e	SP-200807	0110	1	F	Clarifying IRI Type for AMF IRI messages	16.4.0
2020-09	SA#89-e	SP-200807	0111	1	F	Correcting a typo in the ASN.1 TargetIdentifier choice	16.4.0
2020-09	SA#89-e	SP-200807	0112	1	F	HSS LI (stage 3) porting	16.4.0
2020-09	SA#89-e	SP-200806	0116	-	A	Clarification on contents of UPF CC	16.4.0
2020-09	SA#89-e	SP-200807	0117	-	F	Reference correction for xCC payload format	16.4.0
2020-12	SA#90-e	SP-200940	0120	1	B	PDSR triggers for start and end of flow	16.5.0
2020-12	SA#90-e	SP-200940	0121	-	F	Additional details on Location Update at AMF	16.5.0
2020-12	SA#90-e	SP-200940	0122	-	F	Corrections on UDM Serving System	16.5.0
2020-12	SA#90-e	SP-200940	0130	1	F	Clarification on the contents of the IRI TargetIdentifiers field	16.5.0
2020-12	SA#90-e	SP-200940	0131	-	F	Aligning the CC payload form of 5G with LTE	16.5.0
2020-12	SA#90-e	SP-200940	0133	1	F	PDU session ID in PDHR and PDSR	16.5.0
2020-12	SA#90-e	SP-200940	0136	4	B	MA PDU Session Stage 3	16.5.0
2020-12	SA#90-e	SP-200940	0138	1	B	Identifier Association	16.5.0
2020-12	SA#90-e	SP-200940	0139	1	B	Update to LI at the SMSF	16.5.0
2020-12	SA#90-e	SP-200940	0140	1	F	Update to Provisioning for LI at the SMF/UPF	16.5.0
2020-12	SA#90-e	SP-200940	0141	-	F	Clarification to PDHR/PDSR	16.5.0
2020-12	SA#90-e	SP-200940	0142	1	F	Stage 3 details for SMF/UPF LI_X1	16.5.0
2020-12	SA#90-e	SP-200939	0143	1	A	Missing session establishment time in SMF IRI	16.5.0
2020-12	SA#90-e	SP-200940	0144	-	F	Update to Activate Task Message for IRI-TF and CC-TF in the SMF	16.5.0
2020-12	SA#90-e	SP-200940	0145	-	F	Clarification to trigger for PDSR Delivery	16.5.0
2020-12	SA#90-e	SP-200940	0147	1	B	Update Serving System and support of Subscriber Record Change and Cancel Location (x)IRIs	16.5.0
2020-12	SA#90-e	SP-200940	0150	1	F	Fixing Target Identity Extensions	16.5.0
2021-03	SA#91-e	SP-210031	0153	2	F	GUTI allocation procedure reporting correction	16.6.0
2021-03	SA#91-e	SP-210031	0155	1	F	Removal of note in LI at the UDM sub-clause that no longer applies	16.6.0
2021-03	SA#91-e	SP-210031	0156	1	F	Corrections to MA PDU LI reporting at the SMF	16.6.0
2021-03	SA#91-e	SP-210031	0157	-	F	Identity Association Corrections	16.6.0
2021-03	SA#91-e	SP-210031	0158	1	F	Alignment of positioning methods	16.6.0
2021-03	SA#91-e	SP-210031	0159	1	F	Removal of Reference to Deleted Note	16.6.0
2021-03	SA#91-e	SP-210031	0160	1	F	Identity Association correction and clarification LI_HIQR and LI_XQR	16.6.0
2021-03	SA#91-e	SP-210031	0161	1	F	Correction of FiveGGUTI ASN1 in LI_XER	16.6.0
2021-06	SA#92-e	SP-210302	0167	1	F	LALS: Correcting the error that infers as if LIPF provisions the triggered LI-LCS Client	16.7.0
2021-06	SA#92-e	SP-210302	0169	1	F	LI_T: Clarification on the need to have create destination over LI-T2 and LI_T3	16.7.0
2021-06	SA#92-e	SP-210302	0174	1	F	Avoiding multiple copies of xCC over LI_X3: Additional XID Related Information	16.7.0
2021-06	SA#92-e	SP-210302	0176	1	F	Addition of ModifyTask to LI_X1 realization	16.7.0
2021-06	SA#92-e	SP-210302	0179	1	F	LALS Target Identities	16.7.0
2021-06	SA#92-e	SP-210302	0180	1	F	Alignment of N3GPP Access Location	16.7.0
2021-06	SA#92-e	SP-210302	0200	1	C	LI state transfers in SMF sets	16.7.0
2021-06	SA#92-e	SP-210302	0207	1	F	Ongoing reporting for LI_XQR	16.7.0
2021-06	SA#92-e	SP-210302	0209	1	F	Correction to EPS Event Reference	16.7.0
2021-06	SA#92-e	SP-210301	0213	1	A	Explicit ModifyTask and DeactivateTask for LI_TF	16.7.0
2021-09	SA#93e	SP-210828	0224	1	F	Generation of xCC over LI_X3 for PTC service	16.8.0
2021-09	SA#93e	SP-210828	0226	1	F	Generation of CC over LI_HI3 for PTC service	16.8.0
2021-09	SA#93e	SP-210828	0236	-	F	Correction of reference clause number in TS 33.128 Rel.16 for fiveGSTAIList	16.8.0
2021-09	SA#93e	SP-210828	0237	-	F	Correction of TAC length in Annex E	16.8.0

History

Document history		
V16.3.0	November 2020	Publication
V16.4.0	November 2020	Publication
V16.5.0	January 2021	Publication
V16.6.0	April 2021	Publication
V16.7.0	August 2021	Publication
V16.8.0	September 2021	Publication